Towards a GDC Action Framework: Framework Foundation

V1.0 / 30.11.2011

Deliverable D2.1

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This publication has been produced within the NiCE – Networking intelligent Cities for Energy Efficiency project. The NiCE project is financed by the 7th Framework Programme for Research and Technological Development, under the Information and Communication Technologies theme.
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1 Summary

The GDC Action Framework provides shape and direction to the design and delivery of Action and Reporting Tools relating to the Green Digital Charter. This document provides the foundation layer to the Framework, the building blocks upon which the Framework is constructed.

The Framework builds on the following 'blocks' of research and analysis:

- *Green Digital Charter* commitment analysis as outlined in the GDC contract signed by Mayors and Lead Councillors representing their city (Section 3)
- *Existing initiatives, pertinent policies, strategies and civil society initiatives* at European level as well as global, national and local levels, affecting the implementation of the GDC in cities (Section 4)
- *R&D concepts and results* from various strands of interdisciplinary research addressing broader issues of relevance such as transitions of cities and socio-technical systems (Section 5)
- *RCG stakeholder needs and requirements for implementation*, elicited specifically to inform the GDC Action Framework and subsequent Tool design and development (Section 6)

In future versions of this document, this Summary section will bring together the main conclusions from each section. The first version of this document focuses on identifying which key areas need consideration, the issues to be considered for each area and the process for developing the GDC Action Framework.

2 Introducing the GDC Action Framework

2.1 What is NiCE?

NiCE (Networking intelligent Cities for Energy Efficiency) is a FP7 funded project which will promote and advance implementation of the commitments of the Green Digital Charter (GDC) with a view to use ICT as an enabler to significantly reduce energy consumption and CO2 emissions.

2.2 Objectives for GDC Action Framework

As a starting point and central reference for the activities deployed by NiCE, including tool development (WP2), training and support (WP3), as well as outreach (WP4), a Green Digital Charter (GDC) Action Framework will be developed. This GDC Action Framework (henceforth 'Framework') is essentially meant to help urban stakeholders to:

a) Facilitate high-level political commitment to and broad support of the objectives and actions contained in the GDC;
b) Implement the GDC in all its facets, moving from political commitment to concrete action;

This foundation document therefore has the purpose to provide the empirical and analytical bases needed for designing the Framework. In particular it aims to:

- Depict the broader political and societal context from which the GDC has emerged and within which it will be further promoted and implemented;
- Explore and understand the requirements and conditions for local green & digital policies to materialise, and the main barriers and drivers for their effective implementation in different contexts;
- Derive and specify transferable and replicable concepts, actions and tools needed for enhancing a Europe-wide take-up and implementation of the GDC.
- Document and communicate findings and conclusions that inform the conception and design of NiCE activities and deliverables, according to progress of work;

In line with the milestones of the project workplan, this foundation document will be updated and reviewed in project month 10 and 22 to deliver Version 2 and 3 of the Framework.

2.3 Scope and characteristics of the Framework

The NiCE approach to developing the Framework has followed several overarching principles:

1. The Framework is working towards a "code of practice" or "guideline" and *not yet* towards a "handbook", "manual" or "vade mecum" (which will be one of the tools such as a "step-by-step process").

2. It will benefit from having the following characteristics:
   - Clear, overarching aim
   - Focused on solving problems / addressing challenges
   - Thematically *and* methodologically oriented
   - Allowing for engagement at different levels, depending on 'maturity' of existing activity
   - Categorised broadly enough to incorporate multiple activities
   - Providing quick overviews and more detail as required to enable both the political and managerial perspectives
   - Adaptive
   - Accessible

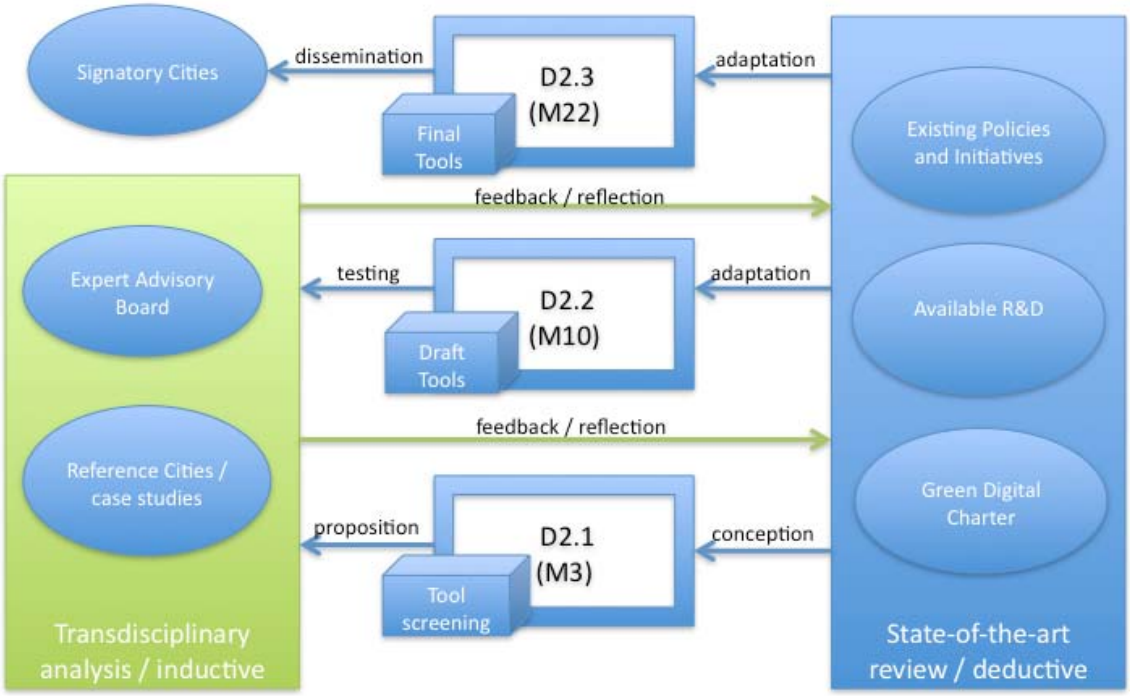
3. The Framework is meant to address local politicians and key decision makers within public administration, aiming to raise awareness *of GDC implications* and providing a shared understanding of concepts, requirements and tasks. The *primary* focus of the NiCE project are civic administrators and through their relationships, the private, third sector and communities themselves as a secondary focus.

4. The Framework uses terms such as 'green' and 'digital' relatively loosely and usefully to mean different things in different contexts. The NiCE interpretation of these terms is as follows:
   - 'Green' refers to activities with an environmental focus
   - 'Digital' refers to activities within the Information and Communication Technologies (ICT) and digital media sphere
   - 'green & digital' groups together activities which are *either* green *or* digital
   - 'green digital' refers to activities which are *both* green and digital at the same time, such as the use of ICT to deal with environmental issues, or addressing the environmental impacts of ICT (NB: 'Green IT' is an industry term and focuses specifically on the environmental impacts of Information Technology (IT)).

2.4 Framework development workflow

The Framework development is iterative, with Version 1 (WPD2.1) due in project month 3 (Nov 2011), Version 2 (WPD2.2) in month 10 (Jun 2012) and the Final version (WPD2.3) in month 22 (Jun 2013). The planned workflow for developing the framework is to reiterate through a screening analysis approach working both from inductive and deductive perspectives. This is outlined in Figure 2.1 below.

Figure 2.1: Iterative approach for developing the GDC Action Framework (PERT)



2.5 Screening and analysis

The above Figure 2.1 shows the Framework and Tool development as an integrated process, drawing on insight provided deductively, from the GDC, R&D and existing policies and initiatives, and inductively from the Reference City Groups and the Expert Advisory Board.

2.5.1 Deductive approach

The deductive approach draws insight from existing documents and activities relating to the green & digital arenas in order to inform the development of the Framework.

The **first** step is to explore the Green Digital Charter commitments, as outlined in the document signed by Mayors and Lead Councillors representing their city. Since this is the binding commitment to action, the Charter wording provides the initial shape and approach to the Framework.

Secondly, as one of several policies and initiatives at European level as well as global, national and local levels, the GDC Framework also needs to align with existing activities in the "green and digital" space. This is particularly important since civic administrators need to see the potential benefits in the GDC to help deliver on other related strands.

Thirdly, the GDC Framework needs to draw on existing R&D concepts and results from various strands of interdisciplinary research addressing broader issues of relevance such as transitions of cities and socio-technical systems towards sustainability and foresight, as well as more specific aspects of ICT usage for energy

efficiency and decarbonisation, focusing in particular on problems of implementation and transferability.

These three areas are outlined in this document (Sections 3,4,5) and will be developed further in the next two versions. At each stage they inform the development of the framework and shape the tools. It is expected that each section will also emerge as a 'tool' in its own right for city use. The 'Resources' section of the GDC/NiCE website will contain summaries and links to a) an analysed Charter, b) relevant R&D, and c) existing related policies and initiatives.

2.5.2 Inductive Approach

The Inductive approach seeks insight and feedback from individuals involved and experienced in green & digital matters. These are split into (1) the civic administrators and other key stakeholders in the Reference City Group and (2) the Expert Advisory Board (EAB). The RCG stakeholders will be engaged in the Framework and Tool development, through a programme of targeted NiCE activities including in-depth discussions, semi-structured one-to-one interviews and focus group sessions and the EAB guide and comment on the process. The Signatory cities are the beneficiaries of the Final Framework and Tools shaped by this iterative process.

This document focuses on the process of engaging and involving the Reference City Group Stakeholders, including how to identify their needs and requirements for implementation (Section 6). It also outlines how the Expert Advisory Board will input into the development process.

2.5.3 Tool development

The tool development process is informed by the Framework development and is therefore at a very early stage. This document version therefore contains a list of possible tools at the end of each section. While the Framework is still in flux, these tool ideas are very rudimentary and subject to change. However, feedback on these ideas and, in particular, how they can be categorised and prioritised is still invited. Further versions of this document will outline the selection criteria for these tools in greater detail and how they are complimentary, and related to, the Framework.

3 Interpreting the Green Digital Charter commitments

Detailed analysis of the GDC leads to the following summary of its commitments:

> *By signing the Green Digital Charter, cities commit themselves to actively lead and engage in a rather open and participatory strategy development process, cutting across sectors and scales. Through this process, a number of specific actions should become prioritized and implemented. Furthermore cities are to learn from these actions, constantly gathering feedback for adaptation. Finally achievements and results should be communicated widely to motivate other actors and inspire take-up of good practices.*

The above summary provides an overall view of the GDC. However within the GDC text itself, there is a wide range of strategic, tactical, aspirational, quantitative and qualitative statements. This first section therefore seeks to interpret these statements in a way that facilitates reporting and that can provide a basis for the Framework and tools. It also identifies "missing links" within these statements, as well as structuring the overall process of implementation.

3.1 GDC commitment typology

Each statement in the GDC is an action. There are 102 action commitments in total. Some are actions of acknowledgement and agreement, others are more direct actions to commit to, and ensure delivery of certain tasks.

While a variety of formulations are used, all the actions in the Charter also express genuine *objectives* ("declare commitment to", "agree to", "aim to achieve this by ensuring", "aim to"). Some of these are actually *targets* for implementation or outcomes, thus providing a qualitative or quantitative yardstick for assessing achievement. In addition, there are statements conveying a broader frame for action that should inform all activities developed in this context ("acknowledge that"). In order to provide a linear connection between the GDC and the implementation process therefore, these actions can be broken down and evaluated according to the following characteristics:

- Objectives - the nature of the action's aspirations,
- Targets - how achievement of the action could be measured,
- Action Type - what type or category actions come under and
- Scales - at what city level the action applies to.

For example, the first statement of the Green Digital Charter (AK1) has two actions with 'Strategy' Objectives. Both actions can be measured using 'Qualitative' Targets, fall into the 'Planning' Action category and work at 'City and City Region' Scales. This is illustrated as follows:

AK1. "Information and communication technologies are critical enablers for sustainable growth (Action 1) and must be integrated into the work of European cities to mitigate climate change (Action 2)"

Objectives = Strategy
Both Action 1 and Action 2 are positioned at the strategic level and therefore have 'Strategy development' objectives.

Targets = Qualitative
As Strategy related objectives, the measures for Action 1 and 2 are more likely to be qualitative.

Action type = Planning
Both Action 1 and Action 2 fall within the scope of the City Admin as part of the Planning for the city's future.

Scales = City Admin
These actions are most likely to be developed by the City Administration, working in collaboration with other urban stakeholders.

3.2 Summary of GDC Breakdown

The analysis of the GDC Charter according to Objectives, Targets, Actions and Scales is summarised in the following Tables 1-4 and then provided in full in Table 5.

Table 1: Type of objectives addressed by GDC actions.

Objectives	How Many	Description
Strategy Development (S)	19	Providing a strategic framework for local action
Implementation (I)	58	Specific implementable local actions and measures
Feedback (F)	11	Action monitoring, evaluation and learning (local to European)
Dissemination (D)	14	Informing and engaging stakeholders (local to European)

Table 2: Type of targets addressed by GDC actions.

Targets	How Many	Description
Quantitative	52	Objectives to be measured in some quantifiable manner (e.g. measurement, statistical and data analyses)
Qualitative	50	Objectives needing qualitative assessment (e.g. case studies and ethnographic methods)

Table 3: Type of scale addressed by GDC actions.

Scale	How Many	Description
City Administration	10	Public sector organisations performing the administration of a city
City / City Region	42	City as delimited by administrative boundary (municipality) City Region as City and urban agglomeration (mono-/polycentric) as delimited by existing institutions (e. g. for planning, mobility, material flow)
City / STS (Socio-Technical system)	42	Systems/Services in a functional relation to the City (e.g. electricity, heating)
City to City	8	Multiple cities in bilateral or network relation

Table 4: Type of action

Actions	How Many	Description
Governance	8	Enable leadership and dialogue concerning green & digital activities, create structures for collective steering and decision making
Cooperation	7	Work together within local government, among municipalities, and with all relevant stakeholders
Planning	19	Draw up medium-term plans for green & digital activities; identify and assess problems and solutions; select and facilitate measures
Financing	1	Plan for budget availability and acquire third party funding; Develop new business cases
Open Innovation	10	Create user-driven and target-led innovation environments and experiments (e.g. Living Labs)
Data sharing	4	Make data interoperable and enable open access as far as possible
Digital Infrastructure	9	Provide ICT infrastructures and services to enable low carbon practices
Low Carbon Projects	4	Implement ICT projects that improve CO_2 balance
Green ICT	10	Take measures to reduce ICT carbon footprint
R&D/Pilots	2	Implement research and pilot projects to

		develop and test new green & digital solutions
Measurement	3	Measure CO_2 balance (standardised)
Reporting	2	Report regularly on green & digital activities (standardised)
Evaluation	1	Assess efficient and effective objective achievement
Learning	10	Foster knowledge transfer and creation within and across all green & digital activities
Promotion	12	Raise awareness of and carry out marketing for green & digital activities

Table 5: Synthesis – Actions contained in the GDC and interpretation by objective, target, action type and scale.

Item	Objectives	Targets	Action type	Scales
ACKNOWLEDGE				
AK1. That				
1) Information and communication technologies are critical enablers for sustainable growth and	Strategy	Qualitative	Planning	City Admin
2) They must be integrated into the work of European cities to mitigate climate change	Strategy	Qualitative	Planning	City Admin
AK2. That				
1) European good practices for low-emissions ICT must be based on the practical experience of public authorities	Feedback	Qualitative	Learning	City Admin
2) who can set an example for others	Dissemination	Qualitative	Promotion	City to City
AK3. That cities can lead Europe in maximising the potential for ICT to reduce emissions, by				
1) delivering innovative technical solutions and	Strategy	Qualitative	Planning	City/City Region
2) encouraging behavioural change	Strategy	Qualitative	Learning	City/City Region
COMMIT				
C1. To developing cities as platforms for innovation through:				
1) digital planning and	Strategy	Qualitative	Planning	City Admin
2) new digital infrastructures and	Implementation	Quantitative	Infrastructure	City / STS
3) services	Implementation	Quantitative	Infrastructure	City / STS
in order to enable low carbon activities and achieve systemic carbon efficiencies				
C2. To demonstrating that cities can lead by practical example by ensuring that				
1) a city's own ICT infrastructure and	Implementation	Quantitative	Green ICT	City Admin
2) a city's own digital services	Implementation	Quantitative	Green ICT	City Admin
have the smallest possible carbon footprint, and by				
3) promoting these practices towards the private sector and	Dissemination	Qualitative	Promotion	City/City Region
4) promoting these practices towards the wider community	Dissemination	Qualitative	Promotion	City/City Region

C3. To 1) creating new partnerships by connecting leaders and stakeholders together in each city 2) to secure practical commitments for implementing a new green digital agenda	Strategy Strategy	Qualitative Qualitative	Promotion Governance	City/City Region City Admin
C4. To promoting: 1) integrated approaches and 2) large-scale solutions To do this through the implementation of a series of digital applications for improving 1) the measurement, 2) transparency and 3) visibility of energy use, and by involving 1) citizens, 2) service providers, 3) public sector organisations and 4) businesses in test-bed implementation projects	Dissemination Dissemination Implementation Implementation Implementation Feedback Feedback Feedback Feedback	Qualitative Qualitative Quantitative Quantitative Quantitative Quantitative Quantitative Quantitative Quantitative	Promotion Promotion Measurement Reporting Data sharing Cooperation Cooperation Cooperation Cooperation	City / STS City / STS City / STS City / STS City / STS City / STS City / STS City / STS City / STS
C5. To supporting open innovation by 1) encouraging and 2) promoting low carbon activities in all sectors, through 1) R&D activities and 2) deployment projects in user-driven, open innovation environments	Dissemination Dissemination Implementation Implementation	Qualitative Qualitative Quantitative Quantitative	Learning Promotion R&D/Pilots Low Carbon Proj.	City Region City Region City / STS City/City Region
AGREE				
AG1. To 1) implement a strategy to promote green connected cities and, 2) make the most effective use of ICT as a platform for the	Strategy Dissemination	Qualitative Qualitative	Promotion Planning	City Admin City to City

a) economic b) social and c) environmental wellbeing of all citizens	Strategy Strategy Strategy	Qualitative Qualitative Qualitative	Planning Planning Planning	City/City Region City/City Region City/City Region
AG2. To deploy ICT to 1) change the way our communities link to each other, and 2) more critically, in the way they link to the environment	 Implementation (of strategy in AG1) Implementation	 Quantitative Quantitative	 Open Innovation Open Innovation	 City/City Region City/City Region
AG3. Promote inclusive sustainability by recognising that action on climate change is required by all members of the community, including households and SMEs	Dissemination	Qualitative	Promotion	City/City Region
AG4. Ensure that ICT-enabled climate change initiatives will go hand in hand with work to promote social cohesion, given the large concentrations of socially excluded people in many cities	Implementation (of strategy in AG1)	Quantitative	Planning	City/City Region
AG5. Promote ICT innovation for climate change mitigation which maximises the benefits for 1) local communities and 2) businesses	Dissemination Dissemination Dissemination	Qualitative Qualitative Qualitative	Promotion Cooperation Open Innovation	City/City Region City/City Region City/City Region
ENSURE				
E1. That ICTs are more energy efficient by: **Encouraging** the **use** of low emission ICT equipment, including 1) intelligent "thin client" facilities, 2) smarter uses of laptops and 3) more energy efficient servers; **Using renewable energy resources** both to 1) power ICT 2) to utilise energy emissions from ICT, to heat buildings for example **Ensuring** that city use of hosting and data centres is **as green as possible**,by 1) maximising renewable energy use 2) sharing services with other users, and using 3) planning rules 4) compliance arrangements and	 Dissemination Implementation Implementation Implementation Implementation Implementation Implementation Implementation Implementation Implementation	 Qualitative Quantitative Qualitative Quantitative Quantitative Quantitative Quantitative Quantitative Qualitative Qualitative	 Planning Green ICT Promotion Green ICT Infrastructure Infrastructure Infrastructure Green ICT Governance Governance	 City Admin City/STS City/STS City/STS City/STS City/STS City/STS City/STS City/STS City/STS

5) service level agreements to control ICT emissions and encourage green ICT	Implementation	Qualitative	Governance	City/STS
_ **Implementing** a strategic **commitment** to improve the sustainability of the				
1) production	Implementation	Qualitative	Planning	City/STS
2) use and	Implementation	Qualitative	Planning	City/STS
3) disposal of ICT equipment;	Implementation	Qualitative	Planning	City/STS
E2. The measurability, transparency and visibility of emissions & energy data by:				
_ **Developing** common **standards** to collect, collate and analyse emission and energy data across:	Strategy	Qualitative	Measurement	City/City Region
1) city administrations and	Implementation	Quantitative	Data sharing	City/STS
2) cities as a whole;	Implementation	Quantitative	Planning	City/City Region
_ **Ensuring** the **compatibility of data** on ICT impacts with the measurement of data on emissions, (including working in partnership with initiatives such as the Covenant of Mayors);	Feedback	Quantitative	Data sharing	City to City
_ **Being innovative** with the **use of new tools**	Strategy	Qualitative	Open Innovation	City Admin
to make data and their analysis as transparent	Implementation	Quantitative	Cooperation	City/STS
and visible as possible, for example through “ecomaps”, the use of Geographical Info Systems (GIS) and the Urban Atlas initiative	Implementation	Quantitative	Data sharing	City/STS
E3. That ICT solutions facilitate energy-efficient, “smart” processes by:				
_ **Improving** the **energy efficiency of buildings** by				
1) applying common standards for new buildings and	Implementation	Quantitative	Governance	City / STS
2) for retro-fitting existing buildings;	Implementation	Quantitative	Low Carbon Proj	City / STS
_ **Applying innovation** in				
1) ICT systems and	Implementation	Quantitative	Open Innovation	City / STS
2) services **for transport and urban mobility**, including smart public transport networks, greater use of tele-conferencing and more sustainable ways of working;	Implementation	Quantitative	Green ICT	City / STS
_ **Developing “smart” energy grids** to support greater use of				
1. renewable energy,	Implementation	Quantitative	Infrastructure	City/City Region

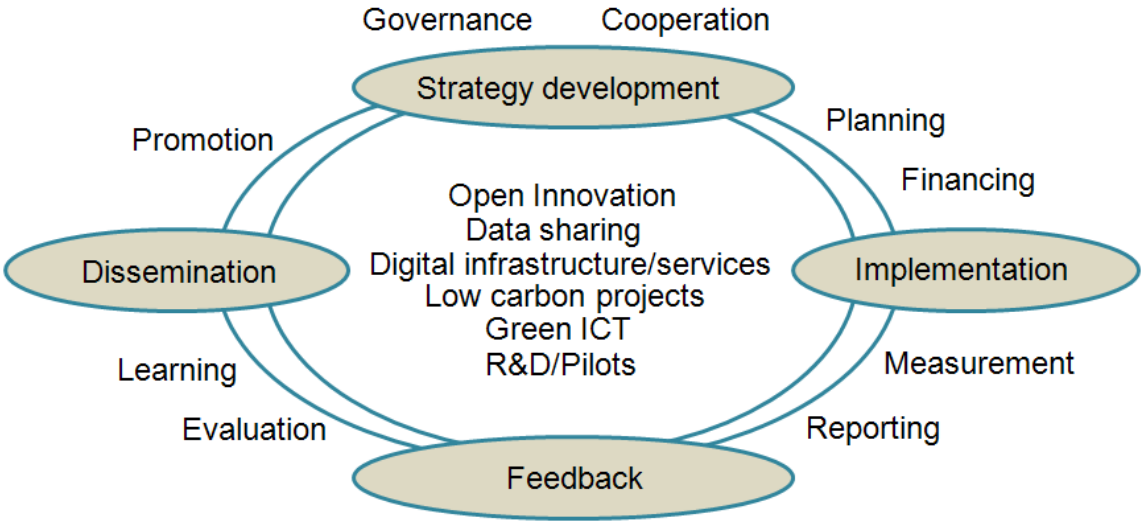
2. micro-generation and	Implementation	Quantitative	Low Carbon Proj	City/STS
3. more energy efficient lighting systems;	Implementation	Quantitative	Infrastructure	City/City Region
_				
Collaborating with industry to support				
1) greener production	Feedback	Qualitative	Learning	City/STS
2) logistics and	Feedback	Qualitative	Learning	City/STS
3) using green procurement.	Feedback	Qualitative	Learning	City/STS
E4. Transformational approaches to ICT, which				
1) drive new values and behaviours,	Strategy	Qualitative	Open Innovation	City/City Region
by:				
_ **Supporting the creation of** low carbon next generation				
1) digital **infrastructure** and	Implementation	Quantitative	Infrastructure	City / STS
2) broadband networks based on high-capacity optical fibre and	Implementation	Quantitative	Green ICT	City/ STS
3) advanced wireless and mobile applications;	Implementation	Quantitative	Open Innovation	City/STS
_ **Developing or supporting** innovative **new services** based on the highest speeds and capacities of these networks to				
1) transform the way that we run our cities and in the way that we	Implementation	Qualitative	Open Innovation	City/City Region
2) work,	Implementation	Qualitative	Planning	City/City Region
3) live and	Implementation	Qualitative	Planning	City/City Region
4) play	Implementation	Qualitative	Planning	City/City Region
_**Enabling the "restructuring"** of the way we organise **economic processes** so that the use of materials and energy can be reduced while enhancing				
1) the quality and	Implementation	Qualitative	Governance	City/City Region
2) quantity of jobs;	Implementation	Quantitative	Governance	City/City Region
_**Developing** opportunities for innovation in **eGovernment** to transform public services, for example through				
1) mobile channels,	Implementation	Quantitative	Infrastructure	City/City Region
2) enhanced strategic planning,	Implementation	Quantitative	Planning	City/City Region
3) virtual policy modelling,	Implementation	Quantitative	Measurement	City/City Region
4) scenario planning,	Implementation	Quantitative	Open Innovation	City/City Region

5) simulations and	Implementation	Quantitative	Low Carbon Proj	City/City Region
6) visualisations;	Implementation	Quantitative	Green ICT	City/City Region
_ **Transforming** citizen engagement through				
1) **eParticipation,**				
2) greater co-production by citizens of content and	Implementation	Quantitative	Green ICT	City/City Region
3) services	Implementation	Quantitative	Cooperation	City/City Region
in order to develop better opportunities for improved skills, employment, inclusion, well-being and quality of life.	Implementation	Qualitative	Governance	City/City Region
_ **Providing** a commitment to open innovation platforms and methodologies through the **further development** of the				
1) Living Labs **network** across Europe, including **creating** new city-based **Living Labs** and	Implementation	Quantitative	Learning	City to City
2) **developing** new **open innovation initiatives**				
3) for low carbon solutions.	Implementation	Qualitative	Open Innovation	City/City Region
	Implementation	Quantititive	Green ICT	City/ STS
AIM				
AIM1 Work with Green Digital Charter signatories on ICT & Energy Efficiency	Dissemination	Qualitative	Promotion	City to City
AIM2 Deploy five large-scale ICT pilots per city addressing the above areas within 5 years	Implementation	Quantitative	R&D/Pilots	City/City Region
AIM3 Decrease ICT direct carbon footprint per city by 30% within 10 years	Feedback	Quantitative	Reporting	City/STS
WORK				
W1 Make use of				
1) the vast expertise within the EUROCITIES network and	Strategy	Qualitative	Learning	City to City
2) in particular the EU funded project NiCE (Networking intelligent Cities for Energy Efficiency) to coordinate our efforts	Strategy	Qualitative	Learning	City to City
W2 Develop an implementation roadmap on the commitments above	Strategy	Qualitative	Planning	City/STS
W3				
1) Exchange experiences and	Feedback	Qualitative	Evaluation	City to City
2) build benchmarks of good practice	Strategy	Quantitative	Learning	City/City Region
W4 Seek external sources of funding to support our ambitions	Strategy	Quantitative	Financing	City/City Region

3.3 Sequence and interrelations of GDC commitments

Based on the above interpretations, the action types can be logically structured into a sequence. This structure illustrates that the GDC shows the typical characteristics of a conventional policy cycle model of Strategy Development, Implementation, Feedback and Dissemination (see Figure 3.1 below). However, some key issues for system innovation and practical implementation are insufficiently addressed (cf. Section 5 below).

Figure 3.1: Interpretation of the GDC – interrelation of action types in an overall implementation sequence



3.4 Questions raised by the GDC

The interpretation of the GDC commitments therefore identifies a significant group of actions which can be categorised and structured in different ways. These actions can be combined with a contextualised understanding of current policy initiatives, R&D into different types of implementation processes and a nuanced understanding of city needs and requirements, to deliver the commitments. However the GDC also raises a number of questions and certain gaps emerge. These are explored as follows.

3.4.1 Who and How?

There is considerable mention within the GDC of 'We' and 'our'. The commitments of the document are framed in terms of action and cooperation, with an expectation that these will be done 'together'. The document remains unclear however on the actors leading this process and the stakeholders to be involved. After the Mayor makes the commitment by signing the document, the next stage of who develops the strategy, delivers the implementation, gathers the feedback and disseminates the best practice is not specified. The Framework therefore must incorporate a clear perspective on who these people might be and how they can go about making the Charter happen in their cities.

3.4.2 Clarifications on trajectory of GDC

3.4.2.1 Before signing

The process undertaken by cities *before signing* the Green Digital Charter would benefit from clarification. Potential signatory cities need clear guidelines on

- The value of signing the GDC for their city
- Any preconditions for signing
- What is expected from them once they have signed the GDC

3.4.2.2 Post signatory

All signatories also need a clearer understanding of the evolution of the GDC. The dates for delivering major projects are already inappropriate and the GDC has been altered to reflect this. However, there is also a need for clarification on the ongoing future of the GDC over 5-10 years. Cities need reassurance that the charter is appropriately resourced before committing time to signing and delivering the commitments.

3.4.3 Contextual diversity of GDC signatories

Cities are at multiple levels of maturity in the green digital sphere and in their capacity to deliver on the commitments. There needs to be clarification on whether cities can join different 'completion tracks' based on their resources and the existing status of their green digital activity.

3.5 Interim conclusions

Outlined below are a series of conclusions based on the analysis in this section. They are in outline only to elicit feedback and further consideration, and will be explored in more depth in subsequent versions of this document.

3.5.1 Framework design

- Civic administrators should be the primary target groups for the Framework
- The structure of the Framework should incorporate/map onto these categorisations: Strategy, Implementation, Dissemination and Feedback; Quantitative, Qualitative; together with the Actions and Scales to align with and support delivery of the GDC

3.5.2 Possible tools

- Green digital planning
- Business cases
- Step-by-step process
- Measuring status
- Stakeholder analysis
- Process management including prioritisation
- Comparing with other cities
- Working at different municipal levels
- Tracking progress

- Tools categorised and searchable by Strategy, Implementation, Feedback and Dissemination
- Breakdown and analysis of GDC

3.5.3 Open issues

The above discussion also raises some questions below that are not immediately answered by the GDC and do need to be included in the GDC framework. Some 'possible tools' are likely to emerge from these issues.

- Comprehension of GDC itself – how do we articulate the nature of GDC
- Connecting GDC to CoM
- Connecting Reporting process to GDC commitments
- How do we approach green digital Planning – what steps & stages does it imply?
- How do we "measure" a city's current green digital status ?
- Where does green digital fit with a city's wider strategies etc ?
- Where does resourcing fit in ?
- Do we need to consider green digital business cases?
- What are the green digital processes within a city - who are the key stakeholders?
- How can activities be prioritized ?
- How do we handle scope ? ie City Admin/City/City Region etc
- How can we ensure that real innovation and learning takes place?
- Where are the starting benchmarks? How do we track progress?
- What are the missing elements?
- Ensuring that tools are both quantitative and qualitative

4 Policies and civil society initiatives

This section seeks to highlight specifically 'green digital' policies and initiatives that have relevance to the GDC and its implementation in cities. For this version of the document, this section identifies the areas in which further research is required.

4.1 EU policies and initiatives

There are a myriad of EU policies and initiatives relevant in some way to the GDC, the most important being the Covenant of Mayors (CoM), for which NiCE will provide some integration of reporting tools and the various communications and recommendations around ICT4EE. In this first version of this document, we have sought to identify relevance, whilst in later versions we will seek to identify GDC impact as well as recommendations for policy change or new initiatives.

The following sections list relevant items and provide links to web documents where available.

4.1.1 EU Strategic frame and objectives

- Sustainable Development Strategy and Europe2020
- Adapting to Climate Change: Towards a Common European Framework for Action
- Resource Efficiency Roadmap

4.1.2 EU environmental and ICT policies

- 2004 Environmental Technologies Action Plan (ETAP)
- 2007 Strategic Energy Technology (SET) Plan
- 2009 EC recommendation on mobilising ICT
- 2010 Digital Agenda for Europe
- European information space: SISE, SEIS, INSPIRE, GEOSS, GMES
- ICT4EE Forum

4.1.3 EU policies focusing on cities/municipalities

- Covenant of Mayors
- 6.EAP and Thematic Strategies => SUMP, IEMP
- Reference Framework for European Sustainable Cities
- European Green Capital

4.2 EU funding instruments

- 7th Research Framework Programme (FP7) => smart cities, ICT for sustainable growth, FIRE and others
- CIP ICT PSP => smart cities
- Intelligent Energy Europe (SAVE, ALTENER, STEER)
- Structural funds (INTERREG)

4.3 Global Initiatives

- ITU-T Joint Coordination Activity on ICT and Climate Change
- ITU Initiative on impact of ICT in Cities
- UNEP's "Draft International Standard for Determining Greenhouse Gas Emissions for Cities
- GHG Protocols
- WBCSD (World Business Council on Sustainable Development) GHG accounting methodology for cities

4.4 Multi-level public and private initiatives

- GeSI: Smart2020
- Connected Urban Development (Cisco)
- Smarter Cities Challenge (IBM)
- European Green City Index (Siemens)
- Intelligent Community Forum (ICF)

4.5 Member state frameworks and initiatives: Selected examples

While it is inappropriate for this project to outline all related member state frameworks and initiatives, it is important to acknowledge the role of state initiatives in the implementation GDC by different cities. There will therefore be some analysis of selected states such as the UK and Germany in the next version of this document.

- UK: Green IT
- DE: 2010 High Tech Strategy, 2010 ICT Strategy, EE cities

4.6 City network initiatives

While the Covenant of Mayors (CoM) is a significant city network initiative with which the GDC will align closely, there are other city network initiatives which are relevant here.

- Local policies (ex-ante typology, selected examples)
- Eurocities KSF
- EnoLL

4.7 City initiatives

While it is inappropriate for this project to outline all related city initiatives, consultation with Reference City groups and the development of good practice studies will lead to a compilation and understanding of the dynamics of city initiatives and this will be shared in the next version of this document.

4.8 Interim conclusions

Outlined below are a series of conclusions based on the analysis in this section. They are in outline only to elicit feedback and further consideration, and will be explored in more depth in subsequent versions of this document.

4.8.1 Framework design

- Develop thorough understanding of CoM progress monitoring framework
- How can civil society initiatives be brought into the developing framework?
- Is it appropriate for the Framework to incorporate civil society initiatives at an EU level or better to encourage cities to engage with environmental movements at levels appropriate to their legislative area?
- How do we incorporate greening the ICT sector itself into the Framework?

4.8.2 Possible tools

- Tracking compliance with green digital, green and digital EU targets and initiatives
- Interface with Shared Environmental Interfacing System (SEIS)
- Multiple GDC-CoM interface
- Systems architecture analysis and planning for integrating across multiple platforms
- Guidelines on modular toolkit approach based on apps and mash-ups.
- Guidelines on service oriented architectures based on the cloud-computing paradigm.
- Guidelines on full interoperability based on models such as INSPIRE spatial data infrastructures.
- Guidelines on shift to open standards and open source platforms.
- Guidelines on democratisation of specialised functions such as modelling through improved user interfaces
- Interface with Clearing House Mechanism
- Transport integration processes
- Interfaces with civil society initiatives
- Combining relevant datasets from across EU and civil society for analysis and comparison
- Guidelines on engaging SMEs focused on green/digital activity to support implementation of GDC
- Guidelines of modern uses of digital and social media such as Twitter, Facebook, mobile phone apps, open data.
- Summary of related existing initiatives and policies

4.8.3 Open issues

- Co-ordinate with key CoM Stakeholders to ensure GDC-CoM reporting tool aligns with existing activities
- Co-ordinate with Joint Research Centre to ensure GDC-CoM reporting tool aligns with existing activities
- Establish relationships between CoM signatories and GDC signatories
- (How) can the NiCE project support the CoM more widely?

- GDC-CoM Reporting tool is an existing deliverable but what other interfaces with CoM could there be?
- How to negotiate relationships between digital actors and environmental actors, many of whom may never have met or cooperated on shared ventures?
- When developing tools, how to we get a balance between digital capacities of Implementation representatives and those of their citizens

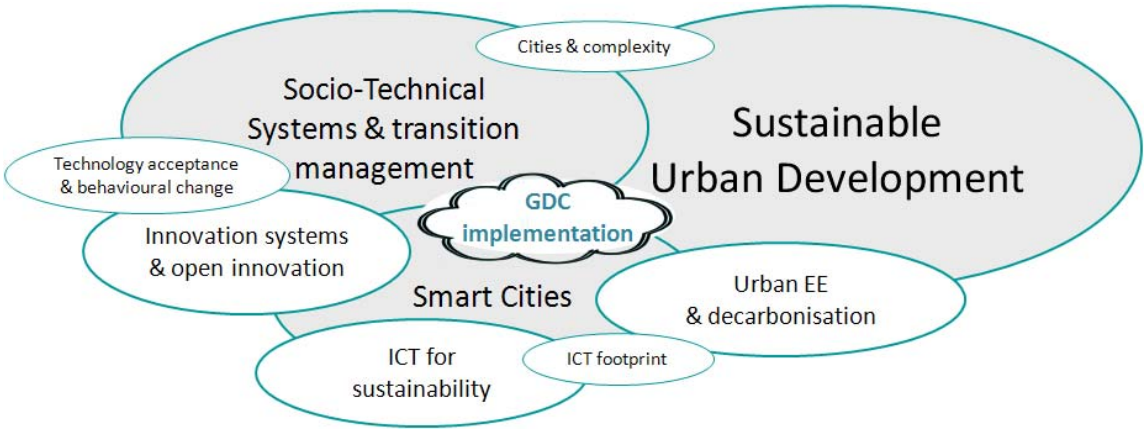
5 R&D concepts and findings

The challenges of resource and energy efficiency, as well as mitigating climate change and adapting to its effects are a fundamental part of cities' policy agendas. There is also a growing recognition that ICT, and digital media more widely, will have to play an integral role in optimising cities' performance, but also for enabling a more radical transformation towards more sustainable practices. Yet, cities are complex adaptive systems, shaped through the time- and place-specific interaction of multi-level socio-economic, ecological and technological networks. They are equally innovation hubs where multiple information flows converge, thus creating new discourses, knowledge and practices.

This raises the overarching question of how the usage of ICT in cities can be shaped purposefully to maximise its contribution to achieving key policy goals. There are a large number of research strands that have investigated the co-evolution of cities and technologies, as well as urban resource use and carbon emissions from various disciplinary angles. Furthermore, there are also multiple ongoing research projects examining further related questions.

This section aims to synthesise the most pertinent findings for the deployment of the GDC. As a first step, it provides a mind-map that identifies relevant areas of research and individual projects (Figure 5.1). Depending on the feedback obtained from the Reference City Group (RCG) and Expert Advisory Board (EAB), future versions of this document will discuss in more detail those references that are considered to be key for the design of the Action Framework and supporting tools.

Figure 5.1: Mindmap of research strands relevant for GDC implementation



5.1 Sustainable urban development (SUD)

Over 20 years since the UN World Commission on Environment and Development published its report "Our common future" (1987), multiple follow-up events and research projects have underlined the crucial importance of urban areas for global sustainability. In particular with a view to rapid urbanisation, dependence on the influx of outside resources and social justice, cities rank high on the overall sustainability agenda, as underlined lately by the establishment of the Sustainable Urban Development Network (SUD-Net, UN-HABITAT 2009).

The main question still is, how urban stakeholders can shape a development process that leads to more sustainable practices and performance (Curwell 2007; Höjer et al. 2011; Wheeler & Beatley 2009; UN-Habitat 2009). In this respect, important research strands address:

- Measurement of sustainability via management methods such as indicators, ecological footprints, or urban sustainability reporting (Vreeker et al. 2009);
- Consideration of intra- and intergenerational justice at all scales (Wheeler et al. 2008);
- Policy integration across the sectoral divide in order to make sustainability an overall task in urban policy (Runhaar et al. 2009);
- Practical planning methods, tools and technologies that enable resource efficiency gains (Höjer et al. 2011; Macaulay et al. 2009);
- Role of governance systems and their socio-cultural specificities (institutions, legal systems, preferences, practices, etc.)

Related references to be reviewed:

- JPI Urban Europe
- Urban Audit

5.2 Urban energy efficiency and decarbonisation

This very broad research strand engages with identifying conditions and options for enhancing (urban) energy efficiency and decarbonisation processes in a wide range of domains. It thus provides deeper insights into the respective institutional fields and related actor constellations (e.g. energy supply and consumption, land use, construction, mobility), as well as regarding the potential role of ICT in each of these domains.

Related references to be reviewed:

- Carbon Disclosure Project
- (Droege 2008)
- (Servatius et al. 2011)

5.3 Cities and complexity

In the scientific debate about planning in urban contexts, the notion of "complexity" has gained prominence in recent years (Batty 2005; de Roo & Silva 2010; Healey 2007; Portugali 2011; Dockter 2010). Based on post-structuralist approaches, debates have sought to uncover the changing form and governance of cities and regions following the

dissolution of the Fordist 'sociospatial fix' (Portugali 2011). Key concepts in this debate are the "central-local" relations of government, the influence of 'regimes' and 'growth coalitions', and the rise of the 'learning' or 'institutionally thick' regions. In particular, the evidence of new forms of networking in decision-making processes between actors ("from government to governance", Macleod et al. 1999) has fostered the conception of cities as complex adaptive systems (Roo et al. 2007).

These debates have also driven practitioner demand for strategic planning approaches and methods. Planning itself has increasingly become a decentralized, bottom-up process, with a focus on societal goals and the involvement of various stakeholder groups. Discussions in current research thus revolve around how to account for non-linear dynamics, emergence and self-organization in planning (Healey 2007). In particular, criticality, thresholds, surprise and phase transitions of urban systems have to be addressed. This has also generated responses that draw on ICT methods and tools for simulating urban system behaviour (e.g. agent-based modelling) to reduce elements of fuzziness in decision-making and participation processes (Batty 2007).

Related references to be reviewed:

- Synergy city (Wood 2007; Ravetz 2011, forthcoming)

5.4 Socio-technical system transformation and transition management

The concept of socio-technical systems (STS) has been developed in the fields of history and sociology of technology (cf. Cooper & Foster 1971; Bijker et al. 1987; Basalla 1988), which is of increasing relevance for various strands of sustainability studies (cf. Smith et al. 2005; Grin et al. 2010; van den Bergh et al. 2011). Here the starting point of considerations is the recognition that technological innovation can only be understood and explained by accounting for its historical embeddedness in social practice. Any urban ICT application thus appears to tie together not only networked hardware and software components, but also a range of actors (individuals and organisations) and their respective cognitive and normative references through specific practices and routines. This includes technology regulation, provision, financing, design and usage. Such complex STS can achieve temporarily stable configurations on the basis of continuous internal adjustment and negotiation, providing optimised benefit for all parties involved at a given time. Yet, such regimes tend to become institutionalised and therefore offer strong resistance to external change. With a view to the GDC, this represents a major challenge since it heavily reduces or undermines efforts for enhancing resource efficiency through ICT.

Nevertheless, research on the transformation of large-scale STS illustrates how short-term innovations and long-term trends can contribute to increasingly destabilise an established regime, forcing actors to respond and adapt. Furthermore, positive feedback loops and cumulative effects can create an accelerating dynamic that ultimately leads to a new system configuration, further adjustment of institutional embedding and re-stabilisation (cf. René Kemp & Rotmans 2005; Smith et al. 2005). Therefore, to transform, STS requires particular synergies created through pressures from above and from below. This does not advocate a hierarchical view, but points to adopting a multi-level perspective in which the regime is located at the meso-level

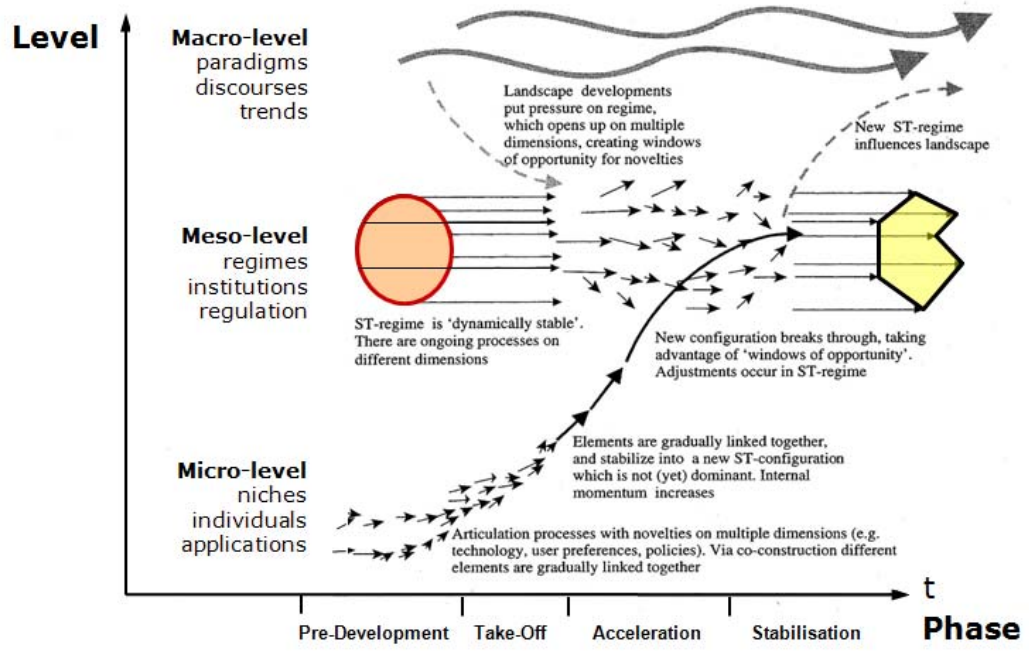
(Geels 2010). “From above” then refers to the long-term cognitive and normative framing through broader societal discourses at a macro-level. “From below” refers to alternative practices and deviant individual behaviour emerging spontaneously in niches at a micro-level (Figure 5.2).

In order to initiate and steer such processes through typical phases of system transformation towards sustainability, the transition management approach has been developed (Réné Kemp & Loorbach 2006; Loorbach 2010). It conceives of a descriptive and prescriptive framework for stakeholder interaction, combining a long-term vision with short-term experimental learning to find pathways for realising this vision. Starting from a critical systems analysis, four types of interventions are thus devised to flexibly influence the development path. They are specific in terms of actors involved, methods applied and outcomes targeted:

1. Activities that structure complex problems and conceive of the long-term horizon and alternative futures;
2. Activities that relate to build-up and break-down of system structures (e.g. institutions, regulation, infrastructures, financing);
3. Activities that relate to short-term decisions and action, creating new system components or changing the use of existing ones;
4. Activities that foster reflexivity e.g. through evaluation, assessment and research, as well as exchange and debate;

Transition management has already been applied in a number of contexts at a national, regional and local scale (esp. in the Netherlands and Belgium). At the local level, the city of Rotterdam is particularly active in adopting the approach in various policy fields (climate change, social inclusion, urban development) (Loorbach 2009).

Figure 5.2: Multi-level perspective and phase model of socio-technical system transformation (Geels 2000 *modified*)



5.5 Innovation systems and open innovation

Debates in economic and spatial sciences about "innovation systems" stem from a critique of the neoclassical, firm-based microeconomic models on resources of innovation and economic development. In the 1990s, discussions especially in economic geography have characterised innovation as a socially embedded and spatially structured process (Morgan et al. 2002). Central to the notion of "innovation", as the main trigger of economic development, are capacities of learning, knowledge creation and organisation, as well as technology and culture ("learning economy", Lundvall et al. 1994). Thereby processes of change are interrelated to technological and organisational forms of innovation, often in form of (informal) networks (Cooke et al. 1993). Research has rapidly spread from analysis of firm and inter-firm level relations ("learning organisations", Senge et al. 1994), to regional forms of innovation management supported by the state ("learning regions", Morgan 1997).

Research in this field has resulted in practical policy initiatives (e.g. "cluster policies"), which aim at a kind of "constant transition management" by various (regional) actors to secure economic development through innovation. This includes the search for flexible and new forms of organisation between research, industry and state (triple helix model - cf. Leydesdorff & Etzkowitz 1996). The measures aim at the "openness" of knowledge systems and joint learning between stakeholders, e.g. by establishing business parks in the vicinity of universities (where research and knowledge can be assumed to be easily accessible).

In terms of ICT, this approach towards innovation has been mirrored by the "Living Lab concept" (Eriksson et al. 2005), which aims at the enhancement of innovation, inclusion, usefulness and usability of ICT and its applications by the involvement of the user (firms, organisations and consumers). Thereby the approach strives to make innovation systems user-centric by applying co-design processes where users and developers actively work together creating the new solutions (Følstad 2008).

5.6 Technology acceptance and behavioural change

This includes various research strands in motivational psychology and ethnographic methods, addressing technology acceptance and behavioural change of individual and corporate actors i.e. consumer groups and households, as well as decision makers and staff in public and private organisations.

Related references to be reviewed:

- Models explaining behavioural intentions and change with a view to technology; Key factors: Performance expectancy, effort expectancy, social influence, facilitating conditions, moderating variables (gender, age, experience, voluntariness of use) (Ajzen 1991; Venkatesh et al. 2003)
- Role of feedback systems (new topic e.g. regarding smart metering)
- Anthropological analyses of group learning and interaction with technologies, creativity and innovation.

5.7 Smart Cities

This comprises research approaches that are pursuing an integral conception of cities, adopting ICT for improving performance regarding economy, society, environment, mobility, quality of life and governance. In this, the ultimate goal of smart city development, as well as the role attributed to stakeholder participation and open innovation, largely differ between authors.

Related references to be reviewed:

- (Caragliu et al. 2009; Giffinger et al. 2007; Komninos 2002)
- City2020
- SmartCities (INTERREG IVC)
- Energy Efficiency Research Alliance (EERA) => smart cites WG

5.8 ICT for sustainability

This strand covers a wide range of projects targeting rather individual ICT applications and their impacts on certain sustainability aspects (e.g. carbon emission reduction, urban environmental quality, social inclusion). A basic distinction exists between approaches with a view to the role attributed to open innovation methods.

Related references to be reviewed:

- List of EU funded RTD actions (FP7 and ICT PSP)
  - Smart Buildings
  - Smart Data Centers
  - Energy Efficient Manufacturing
  - Smart Grids
  - Climate Change Management with ICT
- Smart2020
- 2010 EC report: Impacts of ICT on EE
- 2011 ICT4EE toolkit for local and regional initiatives
- ICT4EE Wiki
- ICTensure (FP7)

5.9 ICT footprint

This strand represents a subset of the above, but should be adressed specifically with a view to the ICT footprint reporting tool development.

Related references to be reviewed:

- ITU
- WBCSD / World Resource Institute
- (Helal 2011)
- Emerging literature on Green IT from the Information Systems (IS) community focuses on how to ensure that IS incorporates a sustainability agenda into its remit. See Watson et al (2010), Berkhout and Hertin, (2004) and Melville and Ross (2010)

5.10 Emerging R&D gaps

In future versions of this document, this section will provide the starting point for deriving an R&D roadmap and research recommendations.

5.11 Interim conclusions

The initial review of pertinent research approaches and findings provides useful indications for the design of the Action Framework and tools, but also raises questions for further exploration. Some preliminary conclusions are presented here.

5.11.1 Framework design

- Take sustainable urban development as a normative yardstick, using widely adopted measurement methods (SUD indicators);
- Help to clarify the contributions of the GDC to this overall goal and its local adoption;
- Emphasise the need to assess intra- and intergenerational justice, as well as social and economic implications of GDC actions (largely focused on environmental impacts);
- Foster targeted policy integration across sectors and innovations in urban governance;
- Acknowledge for the implications of a complex adaptive systems view of cities in terms of non-linear dynamics across temporal and spatial scales, including uncertainty, thresholds, surprise and emergence;
- Underline the crucial role of learning, knowledge transfer and knowledge creation for open innovation (expanded triple helix model) – far beyond habitual policy evaluation practices;
- Complement the type of actions contained in the GDC with a view to initiating and steering *transformative* change of cities, drawing on the transition management approach and its methods;
- Address ICT-based complexity modelling as an important umbrella activity to the range of ICT applications directly targeting resource efficiency;
- Account for factors that condition actor motivations and behaviour relating to ICT at individual and corporate levels.

5.11.2 Possible tools

- GDC indicators as a subset of SUD indicator systems;
- Guidance for key transition management methods (e.g. COST C20 urban knowledge arenas, scenarios and backcasting, niches management, etc)
- Urban simulation and complexity modelling tools.

5.11.3 Open issues

For case studies and discussion with the RCG:

- What are key drivers and barriers for local governments and their stakeholders when moving from established strategy making practices to managing open innovation and socio-technical transitions?
- What are the most useful practices and experiences that stakeholders need to built upon for GDC adoption and implementation – and how can they be identified?

6 Stakeholder needs and requirements

"GDC Framework will be **created in close cooperation with the reference group providing input on the basis of their own experiences of the GDC"**

(NiCE Task 2.1)

The implementation of the Green Digital Charter must be informed by the existing challenges cities are facing. The Framework should be pragmatic and perceptive to the political and social dynamics in a city. This section outlines how the Reference City Group (RCG) will be engaged in the Framework development and the case study approach for the consultation period. It also considers how the Expert Advisory Board (EAB) can be involved in this process.

6.1 RCG Stakeholders Engagement

6.1.1 Reference City Group (RCG)

The overall target of the NiCE project are 'cities', however for the purposes and practicalities of the project, NiCE focuses primarily on senior city administrators and particularly on those involved in city strategy, green, digital and infrastructure projects.

Likely job roles of the individuals who participate are Heads and Directors of Sustainability/ Carbon Economy/ Energy/ Digital/ICT Infrastructure, Programme and Project Managers on city strategy, green or digital/ICT projects and a combination thereof.

The NiCE project therefore focuses on people within the Reference Cities who have the capacity to identify challenges, provide data and insights, use and then feedback on tools as they are developed. It is also expected that our initial contacts within the cities will introduce and appeal to other related departments/individuals on the effectiveness and potential of NiCE. The project itself forms a useful entry point for discussion between departments, which may not already be taking place.

While our focus is primarily on civic administrators, it is likely that insight may be gained through discussions with others in the city, such as ICT providers, green initiative organisations and other relevant NGOs. It may also be appropriate to talk to political leaders. However we will be guided by our primary RCG contacts in this.

Our commitment to the city stakeholders is to make effective use of their time and resources to gain a clear understanding of the issues involved and develop tools that match their needs as appropriately as possible. The tools that we develop for these cities will form the basis of a wider collection of tools to be used by all GDC Signatory Cities.

The Reference City Group includes Eindhoven, Genova, Linkoping, Manchester and Warsaw. Some preliminary conversations with each city have already taken place.

6.2 RCG Stakeholder analysis process

The table below outlines expected activity and output in relation to RCG Stakeholders over 3 phases of Engagement to develop the Framework and tools. The technical networking and visibility events defined in WP3/4 are *not* part of this discussion.

Phases	Activity with Stakeholders	Expected output/gains
Phase 1	• Initiating conversations, establishing relationships, identifying appropriate ways of communicating • Developing case study approach • Preliminary conversations • Presentations to appropriate people • Desk research on city • Identify and produce 'Quick Win' tools where possible	Draft Framework; Introduction to Reference City representatives and the nature of their roles in the city and what they expect from the NiCE project; appropriate hypotheses and questions for case study analysis; Outline view of city challenges, primary relevant datasets informing policy and decision making, key individuals likely to use tools, initial assessment of appropriate areas of focus for tools, initial 'quick win' tools for immediate use
Phase 2	• Exploring issues through case study analysis • Eliciting feedback on developing framework • Conduct semi-structured intervies • Identification and sharing of initial tools • Feedback on usefulness of tools • Scoping and development of further useful tools	First pass case studies for comment and analysis to inform Framework; reshaped and improved Framework; Closer understanding of city needs, clarification of key contacts/tool users, feedback on process and tool use, extensive tool development
Phase 3	• Exploring issues through case study tools • Eliciting feedback on developing framework • Shape of tools into packages • Development of tools for signatory city use • Sharing tools across cities • Feedback on usefulness • Analysis of exploitation potential	Refined case studies for comment and analysis to inform Framework; reshaped and improved Framework; Extensive tool development; Tool packages for each city which are being used regularly and providing benefit; advocacy and communication between cities

6.3 Phase 1: Engaging RCG Stakeholders

6.3.1 Scoping the tools

Activity to date in relation to engaging RCG stakeholders in the Framework and tool development has been to establish the dynamics of the potential relationships with stakeholders and their expectations from the project. Since city administrators are extremely busy, it is important that the NiCE project is deemed valuable from initial contact. We are therefore focusing on how the NiCE Framework and toolkit can be immediately useful to them.

The conversations with the cities so far, have focused largely on the tools themselves rather than the Framework. In order to achieve the most 'buy-in' from cities, the emphasis has been placed how the tools can be shaped to respond to their city needs, and also on tools they are using which can be shared across the Group. This focus has the advantage of ensuring the NiCE project and the proposed tools are a) immediately relevant, b) drawn from the 'real world', c) provide case studies and advocates. As the Framework takes shape, its value for the RCG stakeholders will become more apparent.

Any 'quick win' tools which are straightforward to produce are developed and provided to the requesting city, with a view to replicating this tool across the other Reference Cities. For example, Manchester requested a 'Glossary of terms', a draft of which has been produced. Another possible tool, a 'Virtual Green Drinks' online gathering has been discussed and is available for use should the cities take an interest in it. A further tool, 'good practice examples of green digital projects', has been requested by all the Reference Cities and is in the process of being developed.

Tool ideas as they emerge are collected and will shortly be made available on the NiCE website for comment. This facility will constitute a 'tool'. Some initial categorisation of these tools has taken place but the final categorisations are to be guided by the Framework.

6.3.2 Scoping the city

It is essential that the NiCE project connects into existing activities in the cities to ensure both enthusiastic participation in the project and also maximising the usefulness of the project for the city. Initial conversations have therefore focused on the cities' objectives and motivations for taking part in the project.

Conversations so far have been as follows:

- NiCE Project Launch, 13th September
- NiCE Reference City Group Launch,
- Preliminary conversations, Eindhoven
- Preliminary conversation, Manchester

The following conversations are in the process of being scheduled

- NiCE Presentation to Manchester Environment European Strategy Group
- Preliminary conversation, Linkoping
- Preliminary conversation, Genova
- Preliminary conversation, Warsaw

- Preliminary conversation, City of Yantai

These will be followed up with more structured discussions both online and during site visits.

6.4 Phase 2: Case exploration and analysis

Phase 2 of RCG Stakeholder Engagement will be informed by a structured approach using case exploration and analysis. NiCE envisages studying the situation in the selected reference cities with the aim to:

- Understand local processes of green & digital policy formation in different contexts (political, cultural, socio-economic, etc)
- Identify barriers and drivers of GDC adoption and/or implementation – as well as good practice examples
- Specify RCG stakeholder requirements
- Derive design criteria for the GDC action framework, reporting and action tools

6.4.1 Questions & hypotheses

Starting from the insight obtained through a literature and policy review, as well as initial discussions with RCG stakeholders, the following list of questions (Q) and hypothesis (H) has been formulated to guide the empirical steps. They will be constantly reviewed and modified according to the progress made in the different analysis phases.

6.4.1.1 Discourses

(cognitive and normative frames i.e. the way actors think and talk about green & digital issues, and the values thereby attributed to these; story lines, discourse formation and discursive closure)
Q1.1 What does “green digital” mean to you? What are the local terms used to address green & digital issues?
Q1.2 Why has the "green digital issue emerged on the local policy agenda?
Q1.3 What are the key arguments crossed when it comes to green & digital activities?
Q1.4 What are main references invoked to support these arguments (policies, experiences, RTD, etc.)?

H1.1 Green digital does not yet form an established conceptual reference for actors. Pertinent activities are rather framed and argued for from different perspectives, drawing on the respective discourses and policies for justification/legitimation. This includes in particular:

- Environmental policies: Energy efficiency and climate change mitigation
- Information society policies: E-Government, Spatial Data Infrastructures, digital inclusion
- Economic development and innovation policies: New business/service development, competitiveness, location attractiveness
- Urban development policies: Urban redevelopment, sustainable neighbourhoods and buildings;

- Existing systems used in city infrastructure and overseen by city administration which could be made more 'green' through optimisation of related ICT

H1.2 The added value of linking activities under a green digital policy label is not recognised by most local stakeholders. Hence there is a lack of integration between the various policy strands concerned in order to support the emergence, design and implementation of green digital policies.
H1.3 Negative effects range from unexploited synergies to real conflict and counterproductive measures.
H1.4 There is substantial scope for better alignment as all key actors actually agree about core tenets of a green digital approach.
H1.5 The NiCE project itself will introduce and facilitation discussions between previously unconnected local stakeholders

6.4.1.2 Structure

(institutions, regulation, routines, technologies)
Q2.1 What kind of organisations (public, private) are dealing with ICT, energy efficiency and climate change issues at city scale (or beyond), and how are they constituted?
Q2.2 What are relevant regulatory frameworks (all levels) in these domains that guide actors' behaviour?
Q2.3 What are predominant local routines of policy design and modes of interaction in these domains?
Q2.4 What technologies and legacy systems are established in practice, and what changes are envisaged?
Q2.5 Are there any recent institutional changes that have occurred in these domains? How do they affect the local green digital agenda?
Q2.6 Baseline and monitoring: How do you assess status and progress?
Q2.7 What is the delivery structure for ICT in your city? E.g. managed by in-house systems teams within local administration, outsourced and overseen, some other combination?
Q2.8 What non-governmental organisations are involved in ICT strategy and delivery in your city?
H2.1 Established organisational structures within local governments usually hinder the emergence and/or reinforce fragmentation of green digital policies (corresponding to policy discourses). This general tendency can be reinforced or reduced by cultural factors (role of hierarchy vs. negotiation)
H2.2 Green digital policy integration is favoured by less differentiated administrative structures (proximity) - as is the case in small- to medium-sized cities (<< 300.000 inh.).
H2.3 Alternative models for enhancing green digital policy coordination and innovation include:

- Local ICT champions: Individual at management staff level with a broad responsibility for coordinating ICT-related activities (e.g. Linköping)
- Coordinating boards: Formation of a mediating body constituted of members from various local government departments and private businesses (e.g. Eindhoven)
- Institutional adoption: initiative and responsibilities are (gradually) integrated into the portfolio of an existing institution (e.g. Manchester)

H2.4 While some form of cooperation of local government with business and science actors usually exists, these are not well designed or exploited for the GDC. While for

some cities this "triple-helix" model still represents a challenge, requirements for green digital policies are actually even higher ("multiple helix"). The models above (H2.3) offer different possibilities for addressing this.
H2.5 Basic provisions for assessing the current status and progress in terms of GDC activities are currently not in place (or still very controversial – e.g . Ghent). Key problems are data access (not availability) and widely accepted indicator definitions.
H2.6 Most ICT solutions in cities are managed with different levels of ownership and power to change these solutions. The GDC needs a process for identifying which ICT systems the participants actually have control over

6.4.1.3 Agency

(actor interests and calculi)
Q3.1 Initiative and leadership: Who are the drivers and local champions?
Q3.2 Who are the green & digital key stakeholders - relevance due to resources (power, knowledge, money)?
Q3.3 Who are the potential losers of green digital activities?
Q3.4 What are relevant changes of actor positions linked to green digital activities (dialogue, partnerships, coalitions)?
H3.1 Local initiatives for linking green & digital policies are especially promoted by a) political leaders (seeking to "seize" new agendas) b) large private companies esp. from the IT and energy sectors (seeking new business opportunities).
H3.2 Although highly motivated by personal interest and drawing on pertinent knowledge, key actors at an intermediate level such as heads of IT or environment departments alone are not able to effectively launch green digital initiatives. They rely on setting up a broader coalition.
H3.3 Research institutes and universities are not playing an active role in shaping local green & digital agendas at present. Although key actors required for enhancing knowledge transfers and innovation, they tend to respond only if an initiative is launched.
H3.4 Civil society appears to play a marginal role in sectoral activities addressing green digital so far. Only where active involvement is already practised in related contexts (e.g. LLs), this results to affect the conception of new projects.

6.4.1.4 Niches

(projects, experimental action, deviant practice)
Q4.1 Type of "green & digital" initiatives and policies: Which territory and application domains? What kind of projects? Which partners?
Q4.2 How have these concrete "green & digital" activities been designed (prioritisation, resources, partnerships, …)?
Q.4.3 (How) have niche 'green & digital' projects been rolled out into mainstream?
H4.1 The adoption of open innovation approaches and practical local experiences in this field (e.g. Living Labs) have a strong overall impact on the readiness and willingness of actors to cooperate on green & digital issues (feedback: cognitive and normative frame).
H4.2 Pertinent projects emerge rather independent from each other, following the respective sectoral logic. The priority is mostly given to:

- Energy supply (smart grids)
- Housing (smart metering, heating, lighting)

- Mobility (ITS, commuting)
- Public space lighting
- ICT footprint

H4.3 GDC needs to focus on the mainstream

6.4.1.5 Form

(geography, urban form, infrastructures)
Q5.1 How does the history, location, its physical form and connectivity affect the policies and measures devised?
H5.1 One of the biggest variances in cities is their physical constitution and their history. This is one of the most challenging aspects in the design of the Framework.

6.4.1.6 Comparison

(if applicable)
Q6.1 What are similarities and differences in framing, dealing with, and deploying "green & digital" activities?
Q6.2 What are key factors that shape such similarities and differences (e. g. culture, regulation, agency, …)?
H5.1 The cities are keen to be compared against each other, to benchmark and rate their own progress, and also because cities are quite competitive.

6.5 Phase 3: 'Generic City' Framework and Tool development

Through an iterative dialogue with the Reference City Group, the Framework and Tool development will be shaped by 'real world' circumstances and gain both enthusiastic users and case studies for sharing good practice. Phase 3 therefore will be the formation of 'packages' of tools that can be put together and used in multiple combinations. This will allow any Signatory city to select and combine tools based on their particular needs, drawing on the 'generic city' framework and toolset.

6.6 Expert Advisory Board (EAB)

The Expert Advisory Board (EAB) is made up of seven renowned experts, providing independent expertise in the development of the project. Key responsibilities are as follows:

- Provide strategic advice on the overall project approach and methodology
- Comment on the quality of the project deliverables
- Offer specific expertise on key issues addressed by the project, in particular WP2
- Contribute as invited experts to technical networking events in WP3 and visibility events in WP4
- Support the project's dissemination activities

Details of the people involved are as follows:

Name	Organisation	City (based)	Expertise
Jessen Page	AIT	Vienna	Jessen joined the Energy Department of the Austrian Institute of Technology (AIT) in August 2010 where leads a small team of researchers devoted to the study and simulation of energy within the urban context. The core of their efforts is dedicated to the development of tools that can assist decision-makers in designing the low carbon cities of tomorrow. Prior to working at AIT Jessen worked as a sustainability and later senior energy consultant at the head office of Arup, an engineering consultancy, in London. This experience provided him with a great deal of insight into sustainable urban design and the necessity to adopt an approach that integrates the various strategies involved (water, transport, energy, socio-economics, logistics, waste, etc.). Jessen holds a doctorate of science from the Ecole Polytechnique Fédérale de Lausanne, where he developed stochastic models to simulate the impact of occupant behavior on buildings' energy demands, as well as a masters in physics from the University of Fribourg.
Nicola Villa	Cisco		Nicola Villa is a senior director working in Cisco's Internet Business Solutions Group (IBSG). He is the global director of the Urban Innovation team, focusing on Cisco's innovation strategy for the global Smart+Connected Communities program. Prior to that, he managed Cisco's Connected Urban Development program. The program was part of the commitment Cisco provided to the Clinton Global Initiative, and it aimed at developing innovative ICT & Broadband solutions in large metropolitan areas to stimulate CO2 emissions reductions.

Molly Webb	The Climate Group	London	Molly is responsible for developing and coordinating The Climate Group's SMART 2020 Program, which supports climate change action across the Information and Communications Technologies (ICT) sector. The programme aims to support market development of ICT-enabled climate change solutions through developing demonstration projects, and supporting finance and policy networks to scale up solutions. The initiative follows the report she co-authored SMART 2020: Enabling the low carbon economy in the information age (June 20, 2008) which highlighted the 7.8 Gt opportunity for the sector to reduce emissions through enabling energy efficiency across the economy.
Dennis Pamlin	Independent Expert		15 years of experience of sustainable business (IKEA, HP, Ericsson, China Mobile, Dow, Huawai, Haier, Lenovo, Sinopec, etc,) Responsible for WWFs work with trade and investment in the BRICs countries (special focus on China and India) (www.panda.org/trade) 15 years of international project management for NGOs (Amnesty, Greenpeace, Friends of the Earth and WWF) 14 Years experience of international negotiations (The Climate Convention, WTO, CSD, UNCTAD, UNEP, UNDP, etc) Worked with companies and government agencies in emerging countries to support sustainable trade (MOFCOM, NDRC, Baoding, etc) Studied the role of Asia (esp. China) in the global economy (CASS, RSA, OECD Governments, Friends of the Earth, WWF, etc)
Claus Barthel	Wuppertal Institute	Wuppertal	Research Focus Potentials of energy efficiency in households, the service sector and in industry; measures to develop these potentialsFuture technologies on the supply side as part of a future energy system

The EAB are encouraged to comment and participate in the development of the Framework and tools as much as their time allows. There are also four specific EAB meetings planned, providing opportunity for detailed discussion.

6.7 Interim conclusions

6.7.1 Framework design

- Despite clear commitments on ICT and EE, there is a need for stronger alignment between different established policy strands for GDC implementation (energy, environment, e-government, SDI, urban development, economic development, innovation, ...)
- Organisational structures within local government and institutional settings in the region for dealing with ICT and environment policy portfolios are therefore key factors to address.
- The core rationale for engaging in GDC activites may not always be clear enough for all local actors in the light of current local policies and measures. It can also differ from city to city.

6.7.2 Possible tools

- Process of implementing the GDC
- Iterative version of GDC
- Good practice stories
- Sample contract clauses which require green digital action
- Methods for encouraging leadership
- Methods for negotiating relationships across departments
- Rollout plans for city administration, employees, suppliers and networks
- Method for comparing and identifying potential in combining different datasets
- Interfaces on datasets for different contexts (e.g. civic employee use, citizens, policy makers, planners)
- Analysis and recommendations on different communication strategies and platforms
- Arguments for the value of green digital
- Process for conceptualising the value of green digital
- Virtual Green Drinks – an online space for people to meet regularly and discuss potential green/digital projects informally and across sectors, cities and countries - the Virtual Green Drinks could work well particularly if people could bring their concerns and questions to it.
- ICT Reporting Working Group – to collaborate and discuss how to reduce environmental impact on digital sector.
- Environmental sensor reading data compiled across the city and then compared with other cities in Europe – a common baseline for measuring
- Glossary of terms
- Summary of cities challenges and activities in green digital space
- NiCE/GDC Website

6.7.3 Open issues

The above discussion raises questions and actions to develop the Framework further. It includes possible tools. These include

- How to we ensure that the Framework works with different levels of existing activities in cities?
- How do we developing funding and business case tools that work across different municipalities (see UK National Lottery funding docs)?
- How do we develop a flexible strategy?
- How can we advocate strong cross sector leadership?
- What is the process for identifying the different owners and responsibilities across different administrations?
- How might the city be able to act as an 'enabler' rather than 'doer'? This is particularly pertinent for cities with no budgets (Manchester has some good practice on this)
- The Framework should incorporate a 'rolling out' process, where cities start with their own administrations (or at least can demonstrate some activities within) before they move out, possibly through employees, partners, service providers?

- How do we deal with digital naivety among decision makers who do not fully understand the potential of green digital activities?
- How do we manage for unintended consequences?
- The process of implementation is in itself a tool and potentially the **primary** action tool
- Much more discussion is needed to elicit RCG stakeholder requirements, what is the process?
- How can the discourses/structure/agency/niches combine with the other insights in this document to shape the Framework
- How do the different threads of GDC/Existing initiatives/RCG stakeholder reqs/R&D usefully combine and inform the Framework
- What is the process for deciding on the right tools from the 1000s available/potentially useful
- How to make the most of EAB involvement

7 Conclusions: The Foundations of a GDC Framework

This document has identified and analysed the key building blocks required for a robust, contextualised and useful framework design. These are worked out as follows:

1. It is absolutely critical that the Framework follows logically and coherently from the Green Digital Charter itself, and the identification and categorisation of the Charter commitments into 102 actions facilitates this. Tool development must align logically with these actions and commitments.
2. The GDC must be put into the context of other existing policies and initiatives working at global, EU, national and city levels. Cities will want to connect the GDC into their existing commitments and activities, and also seek to leverage other opportunities in the green digital space. The Framework must be designed to align with these and tools developed to guide them through what is already out there.
3. There are many ways of conceptualising the potential for green digital activity within a city, and the Framework will benefit from capturing and structuring recent R&D to facilitate this process. Research into city development in relation to green digital projects is also useful for cities in its own right and can therefore be captured into a tool.
4. The Framework and tool design must align with existing city activities and needs and the process through which this alignment happens is best developed through an ongoing conversation with the Reference City Group. Open, structured but flexible discussions are facilitated through case study analysis.

In the process of identifying the base upon which the Framework can be built, a number of questions and issues have been raised, together with a long list of potential tools. These are listed as follows and inform the next phase of Framework development:

7.1 Framework design

GDC Analysis

- Civic administrators should be the primary target groups for the Framework
- The structure of the Framework should incorporate/map onto these categorisations: Strategy, Implementation, Dissemination and Feedback; Quantitative, Qualitative; together with the Actions and Scales to align with and support delivery of the GDC

Existing Policies and Initiatives

- Develop thorough understanding of CoM progress monitoring framework
- How can civil society initiatives be brought into the developing framework?
- Is it appropriate for the Framework to incorporate civil society initiatives at an EU level or better to encourage cities to engage with environmental movements at levels appropriate to their legislative area?
- How do we incorporate greening the ICT sector itself into the Framework?

R&D Analysis

- Take sustainable urban development as a normative yardstick, using widely adopted measurement methods (SUD indicators);

- Help to clarify the contributions of the GDC to this overall goal and its local adoption;
- Emphasise the need to assess intra- and intergenerational justice, as well as social and economic implications of GDC actions (largely focused on environmental impacts);
- Foster targeted policy integration across sectors and innovations in urban governance;
- Acknowledge for the implications of a complex adaptive systems view of cities in terms of non-linear dynamics across temporal and spatial scales, including uncertainty, thresholds, surprise and emergence;
- Underline the crucial role of learning, knowledge transfer and knowledge creation for open innovation (expanded triple helix model) – far beyond habitual policy evaluation practices;
- Complement the type of actions contained in the GDC with a view to initiating and steering *transformative* change of cities, drawing on the transition management approach and its methods;
- Address ICT-based complexity modelling as an important umbrella activity to the range of ICT applications directly targeting resource efficiency;
- Account for factors that condition actor motivations and behaviour relating to ICT at individual and corporate levels;

Stakeholder Engagement

- Despite clear commitments on ICT and EE, there is a need for stronger alignment between different established policy strands for GDC implementation (energy, environment, e-government, SDI, urban development, economic development, innovation)
- Organisational structures within local government and institutional settings in the region for dealing with ICT and environment policy portfolios are therefore key factors to address.
- The core rationale for engaging in GDC activities may not always be clear enough for all local actors in the light of current local policies and measures. It can also differ from city to city.

7.2 Possible tools

GDC Analysis

- Green digital planning
- Business cases
- Step-by-step process
- Measuring status
- Stakeholder analysis
- Process management including prioritisation
- Comparing with other cities
- Working at different municipal levels
- Tracking progress
- Tools categorised and searchable by Strategy, Implementation, Feedback and Dissemination
- Breakdown and analysis of GDC

Existing Policies and Initiatives

- Tracking compliance with green digital, green and digital EU targets and initiatives
- Interface with Shared Environmental Interfacing System (SEIS)
- Multiple GDC-CoM interface
- Systems architecture analysis and planning for integrating across multiple platforms
- Guidelines on modular toolkit approach based on apps and mash-ups.
- Guidelines on service oriented architectures based on the cloud-computing paradigm.
- Guidelines on full interoperability based on models such as INSPIRE spatial data infrastructures.
- Guidelines on shift to open standards and open source platforms.
- Guidelines on democratisation of specialised functions such as modelling through improved user interfaces
- Interface with Clearing House Mechanism
- Transport integration processes
- Interfaces with civil society initiatives
- Combining relevant datasets from across EU and civil society for analysis and comparison
- Guidelines on engaging SMEs focused on green/digital activity to support implementation of GDC
- Guidelines of modern uses of digital and social media such as Twitter, Facebook, mobile phone apps, open data.
- Summary of related existing initiatives and policies

R&D Analysis

- GDC indicators as a subset of SUD indicator systems;
- Guidance for key transition management methods (e.g. COST C20 urban knowledge arenas, scenarios and backcasting, niches management, etc)
- Urban simulation and complexity modelling tools;

Stakeholder Engagement

- Process of implementing the GDC
- Iterative version of GDC
- Good practice stories
- Sample contract clauses which require green digital action
- Methods for encouraging leadership
- Methods for negotiating relationships across departments
- Rollout plans for city administration, employees, suppliers and networks
- Method for comparing and identifying potential in combining different datasets
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- Environmental sensor reading data compiled across the city and then compared with other cities in Europe – a common baseline for measuring
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7.3 Open issues

GDC Analysis

- Comprehension of GDC itself – how do we articulate the nature of GDC
- Connecting GDC to CoM
- Connecting Reporting process to GDC commitments
- How do we approach green digital Planning – what steps & stages does it imply?
- How do we "measure" a city's current green digital status ?
- Where does green digital fit with a city's wider strategies etc ?
- Where does resourcing fit in ?
- Do we need to consider green digital business cases?
- What are the green digital processes within a city - who are the key stakeholders?
- How can activities be prioritized ?
- How do we handle scope ? i.e. City Admin/City/City Region etc
- How can we ensure that real innovation and learning takes place?
- Where are the starting benchmarks? How do we track progress?
- What are the missing elements?
- Ensuring that tools are both quantitative and qualitative

Existing Policies and Initiatives

- Co-ordinate with key CoM Stakeholders to ensure GDC-CoM reporting tool aligns with existing activities
- Co-ordinate with Joint Research Centre to ensure GDC-CoM reporting tool aligns with existing activities
- Establish relationships between CoM signatories and GDC signatories
- (How) can the NiCE project support the CoM more widely?
- GDC-CoM Reporting tool is an existing deliverable but what other interfaces with CoM could there be?
- How to negotiate relationships between digital actors and environmental actors, many of whom may never have met or cooperated on shared ventures?
- When developing tools, how to we get a balance between digital capacities of Implementation representatives and those of their citizens

R&D Analysis

- What are key drivers and barriers for local governments and their stakeholders when moving from established strategy making practices to managing open innovation and socio-technical transitions?
- What are the most useful practices and experiences that stakeholders need to built upon for GDC adoption and implementation – and how can they be identified?

Stakeholder Engagement

- How to we ensure that the Framework works with different levels of existing activities in cities?
- How do we developing funding and business case tools that work across different municipalities (see UK National Lottery funding docs)?
- How do we develop a flexible strategy?
- How can we advocate strong cross sector leadership?
- What is the process for identifying the different owners and responsibilities across different administrations?
- How might the city be able to act as an 'enabler' rather than 'doer'? This is particularly pertinent for cities with no budgets (Manchester has some good practice on this)
- The Framework should incorporate a 'rolling out' process, where cities start with their own administrations (or at least can demonstrate some activities within) before they move out, possibly through employees, partners, service providers?
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8.2 Web documents

City2020 Report

Study undertaken by CL for the DG/INFSO looking at the role of ICT in reducing carbon in Cities.

http://www.greenshifteurope.eu/opencms/opencms/city2020/

UNEP Standard

International Standard for Determining Greenhouse Gas Emissions for Cities (Draft) . Start point for continuing work by ITU on the role ICT in reducing carbon in Cities.

http://www.unep.org/urban_environment/PDFs/InternationalStd-GHG.pdf

EC (DG/INFSO) Study

Study by SQW into Local and Regional Initiatives in relation to ICT for Energy Efficiency

http://ec.europa.eu/information_society/activities/sustainable_growth/docs/ict4ee_wiki/final_toolkit_master-p_v.pdf (Report)

http://ec.europa.eu/information_society/activities/sustainable_growth/ict4ee_wiki/index_en.htm (Wiki)

Green Digital Charter

http://eurocities.files.wordpress.com/2010/01/greendigitalcharter2009pdf-smul.pdf
http://ec.europa.eu/information_society/activities/sustainable_growth/docs/charter/green_d_charter.pdf

Bristol work on ICT Footprint of City
http://www.greenaddict.eu/

Covenant of Mayors - Various documents including SEAP reporting requirements.
http://www.eumayors.eu/support/library_en.html

CISCO – Connected energy
http://www.cisco.com/web/about/ac79/docs/wp/ctd/connected_energy.pdf

Siemens - Green City Index
http://public.dhe.ibm.com/common/ssi/ecm/en/gbe03248usen/GBE03248USEN.PDF

IBM - How smart is your city?
http://public.dhe.ibm.com/common/ssi/ecm/en/gbe03248usen/GBE03248USEN.PDF

European smart cities study
http://www.smart-cities.eu/download/smart_cities_final_report.pdf
http://www.smart-cities.eu/download/results_indicators.pdf

EC Smart Cities Initiative: Smart cities report
http://www.eui.eu/Projects/THINK/Documents/THINKsmartcitiesReport.pdf

Synergy city (Sydney 2005)
www.isf.uts.edu.au/publications/mitchelletalsynergy.pdf

Designing sustainable cities of the future (Cambridge 2008)
http://www.research-horizons.cam.ac.uk/features/designing-sustainable-cities-of-the-future.aspx

9 Annex A: Green Digital Charter (full text)

The full text of the Green Digital Charter is as follows. Each statement has been analysed and interpreted in Section 3 above. The codification provided facilitates reference to the individual statements. Emphasis has been added (bold letters) in order to underline key concepts and activities.

AK: Acknowledge (3x)
CO: Commit (5x)
AG: Agree (5x)
E: Ensure (4x)
AIM: Aim (3x)
W: Work (4x)

We, Mayors and Leaders **acknowledge** that:
AK1: Information and communication technologies **(ICT) are critical enablers** for sustainable growth and must be **integrated into the work** of European cities to mitigate climate change;
AK2: European **good practices** for low-emissions ICT must be based on the practical experience of public authorities who can set an example for others;
AK3: Cities can lead Europe in maximising the potential for ICT to reduce emissions, by delivering **innovative technical solutions** and encouraging **behavioural change**.

We, therefore, declare our **commitment** to:
C1: Develop cities as **platforms for innovation** through **digital planning** and new **digital infrastructures and services**, which will enable low carbon activities and achieve systemic carbon efficiencies;
C2: **Demonstrate** that cities can lead by practical example by ensuring that a city's own **ICT infrastructure** and digital services have the smallest possible **carbon footprint**, and by **promoting** these practices towards the private sector and wider community;
C3: Create **new partnerships** by connecting **leaders and stakeholders** together in each city to secure practical commitments for implementing a new green digital agenda;
C4: Promote **integrated approaches** and **large-scale solutions** through a series of digital applications for improving the measurement, transparency and visibility of energy use, and by **involving** citizens, service providers, public sector organisations and businesses in test-bed implementation projects;
C5: Support **open innovation** by encouraging and promoting low carbon activities in all sectors, through **R&D activities** and **deployment projects** in **user-driven**, open innovation environments.

We **agree** to:
AG1: Implement a **strategy** to promote green connected cities, making the most effective use of ICT as a platform for the economic, social and environmental **wellbeing of all citizens**;
AG2: Deploy ICT to change the way our communities **link to each other**, and more critically, in the way they **link to the environment**;

AG3: Promote **inclusive sustainability** by recognising that action on climate change is required by all members of the community, including households and SMEs;
AG4:Ensure that ICT-enabled climate change initiatives will go hand in hand with work to promote **social cohesion**, given the large concentrations of socially excluded people in many cities;
AG5: Promote ICT innovation for **climate change mitigation** which maximises the benefits for local communities and businesses.

We aim to achieve this by **ensuring**:
E1: That ICTs are more **energy efficient ICT** by:

- E1.1: Encouraging the use of low emission ICT equipment, including intelligent "thin client" facilities, smarter uses of laptops and more energy efficient servers;
- E1.2: Using renewable energy resources both to power ICT and to utilise energy emissions from ICT, to heat buildings for example;
- E1.3: Ensuring that city use of hosting and data centres is as green as possible, by maximising renewable energy use, sharing services with other users and using planning rules, compliance arrangements and service level agreements to control ICT emissions and encourage green ICT;
- E1.4: Implementing a strategic commitment to improve the sustainability of the production, use and disposal of ICT equipment;

E2: The **measurability**, **transparency** and **visibility** of emissions & energy data by:

- E2.1: Developing common **standards** to collect, collate and analyse emission and energy data across city administrations and cities as a whole;
- E2.2: Ensuring the **compatibility** of data on ICT impacts with the measurement of data on emissions, including working in partnership with initiatives such as the Covenant of Mayors;
- E2.3: Being innovative with the use of new tools to make data and their analysis as **transparent and visible** as possible, for example through "ecomaps", the use of Geographical Info Systems (GIS) and the Urban Atlas initiative.

E3: That ICT solutions **facilitate** energy-efficient, **"smart" processes** by:

- E3.1: Improving the energy efficiency of **buildings** by applying common standards for new buildings and for retro-fitting existing buildings;
- E3.2: Applying innovation in ICT systems and services for transport and urban **mobility**, including smart public transport networks, greater use of tele-conferencing and more sustainable ways of working;
- E3.3: Developing "smart" **energy grids** to support greater use of renewable energy, micro-generation and more energy efficient lighting systems;
- E3.4: Collaborating with industry to support greener **production and logistics** and using green **procurement**.

E4: **Transformational approaches** to ICT, which drive **new values** and **behaviours**, by: (E4)

- E4.1: Supporting the creation of low carbon **next generation digital infrastructure** and broadband networks based on high-capacity optical fibre and advanced wireless and mobile applications;

- E4.2: Developing or supporting **innovative new services** based on the highest speeds and capacities of these networks to transform the way that we run our cities and in the **way that we work, live and play**;
- E4.3: Enabling the "restructuring" of the **way we organise economic processes** so that the use of materials and energy can be reduced while enhancing both the quality and quantity of jobs;
- E4.4: Developing opportunities for innovation in **eGovernment** to transform public services, for example through mobile channels, enhanced strategic planning, virtual policy modelling, scenario planning, simulations and visualisations;
- E4.5: Transforming **citizen engagement** through eParticipation greater co-production by citizens of content and services and, consequently better opportunities for improved skills, employment, inclusion, well-being and quality of life.
- E4.6: Providing a commitment to **open innovation platforms** and methodologies through the further development of the **Living Labs** network across Europe, including creating new city-based Living Labs and developing new open innovation initiatives for low carbon solutions.

We, Mayors and Leaders, **aim** to:

- AIM1: **Work with** Green Digital Charter **signatories** on ICT & Energy Efficiency;
- AIM2: Deploy **five large-scale ICT pilots per city** addressing the above areas **within 5 years**;
- AIM3: Decrease **ICT direct carbon footprint** per city by **30% within 10 years**.

We will **work** on the above by:

- W1: Making use of the vast expertise within the EUROCITIES network and in particular the EU funded **project NiCE** (Networking intelligent Cities for Energy Efficiency) to **coordinate our efforts**,
- W2: Develop an **implementation roadmap** on the commitments above,
- W3: **Exchange experiences** and build **benchmarks** of **good practice**, as well as
- W4: Seeking **external sources of funding** to support our ambitions.