Project: **REViSITE** **Roadmap Enabling Vision and Strategy for ICT-enabled Energy Efficiency (www.revisite.eu)**	REViSITE

Title: Combined Technical results of deliverables D2.1 and D2.3

D2.1 **'A common methodology to assess the impact of ICT developments'**	D2.3 **'Impact assessment model'**
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Overview of the deliverable

The modelled output of deliverable D2.3 is based on the qualitative analysis of deliverable D2.2 *'Knowledge and current practices'* and utilises the framework initially developed in deliverable D2.1 *'A common methodology to assess the impact of ICT developments'*. In essence D2.1 outlines the justification for and development of a common Framework for assessing the impact of ICT on energy efficiency, while D2.3 outlines the refined Framework and output as applied to four target sectors. Given the intrinsic association of the two deliverables it was deemed appropriate to consider and present the technical results of D2.1 / D2.3 in combination.

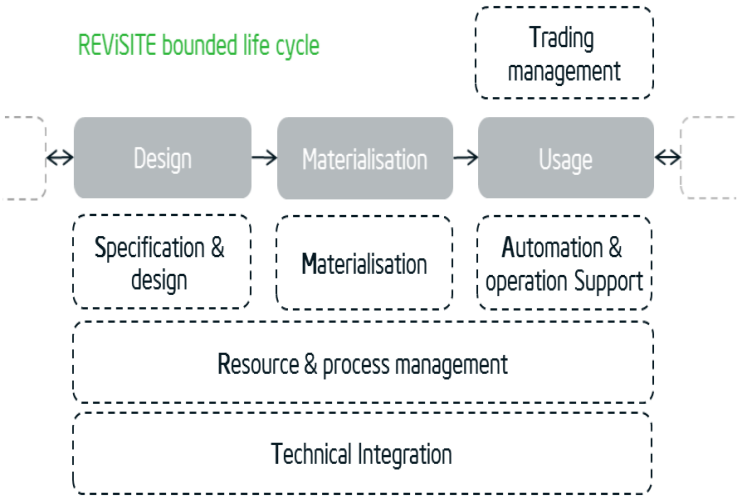
Technical results

The technical output of the two deliverables centres on the REViSITE Framework for assessing ICT impact on energy efficiency and the SMARTT taxonomy of the framework, which was utilised as an integrative cross-sectorial classification system.

Body	Method	Direct effects	Enabling effects
ITU (International Telecoms Union)	Hybrid LCA	Yes	Yes
ETSI (European Telecoms Standard Institute)	Hybrid LCA (National level)	Yes	Yes
iNEMI (International Electronics Manufacturing Institute)	Process-LCA	Yes	No
IEC (International Electrotechnical Commission)	Process-LCA	Yes	No
Ericsson	Process-LCA	Yes	Yes
ATIS (Alliance for Telecom Industry Solutions)	Process-LCA	Yes	Yes
GeSI (Global e-Sustainability Initiative)	Hybrid	Yes	Yes
ISO LCA standards 14040 /44 & British standards Institute PAS-2050			

Research showed current assessment best-practice was based on some form of life cycle assessment (LCA) or life cycle thinking. But also illustrated the lack of a commonly accepted approach in terms of assessing or estimating the enabling effects of ICT. Nevertheless best practice did recognise the need to view both direct and enabling effects.

Given the absence of any agreed approach REViSITE moved to develop one for the projects own use. The first step was to develop a common technical language which could be utilised by the four target sectors, namely – Grids, The Built Environment, Manufacturing and Lighting.



Consistent with best practice the taxonomy was based on a life cycle approach. The use of a bounded Life Cycle was deemed an appropriate and familiar backbone given that at a simplified level all sector life cycles contained a *Design*, *Materialisation* and a *Usage* phase. Materialisation was chosen as a non-sector specific term understood by partners to encompass construction, grid infrastructure and production-system realisation phases.

Aligned to the bounded life cycle are Six high level categories. The categories 'Specification & design', 'Materialisation' and 'Automation & operational decision support ICTs' all vertically align. 'Resource & process management' together with 'Technical integration ICT's' align horizontally, while 'Trading or transactional management ICTs' aligns vertically to the 'usage' life cycle phase

These 6 high level categories form the SMARTT acronym that is smart with two T's. Nested within these are 23 sub-categories. The taxonomy was utilised throughout the project as an integrative classification system and as an aid to common cross sector assessment.

S

Specification & design ICTs
1. Design conceptualisation
2. Human factors Engineering
3. Visual / spatial design
4. Causal Modelling
5. Simulation design function
6. Specification and selection

M

Materialisation ICTs
7. Mobile Decision Support & real-time communication

A

Automation & operational decision support ICTs
8. Secure/resilient wired, wireless & optical infrastructure
9. Embedded intelligent devices (micro architecture)
10. Software & algorithms for monitoring/actuation
11. Inference sensing Software & algorithms
12. Operational decision support
13. User Centred Data Visualisation

R

Resource & process management ICTs
14. Inter-Enterprise coordination
15. Business Process Integration & collaboration
16. Knowledge sharing
17. Data mining & analytics
18. Modelling & simulation across the life cycle

T

Technical integration ICTs
19. ICT standards and protocols
20. Real-time analytical technologies
21. Integration technologies / approaches
22. Cloud based services

T

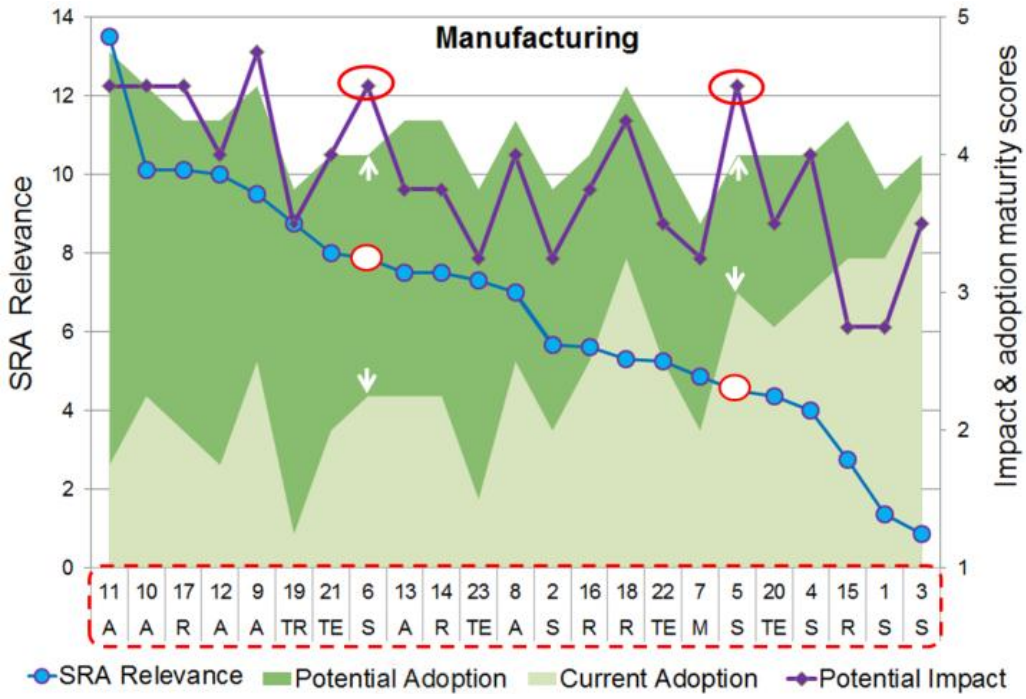
Trading / Transactional management ICTs
23. Trading & Energy Brokerage

In addition to the life cycle based SMARTT taxonomy REViSITE utilised an adapted 'Capability Maturity Framework' or (CMF) in order to quantify what was essential qualitative analysis and together the two form the REViSITE framework.

The CMF element of the approach was employed to frame the thinking, heuristics and estimates of REViSITE partners with regard to commonly defined criterion, based on five levels of maturity, with 1 being inefficient or low and 5 being optimised or high.

The assessment methodology involves 3 Steps. In step 1, the ICT offering is *defined & categorised* in terms of the SMARTT taxonomy, the most relevant phases to consider and the likely first, second and third order effects are initially identified. In step 2, we *refine* that which is to be subsequently assessed by identifying the most relevant phase or phases of both the ICT offering and the host system. In step 3 domain expertise and secondary data is used to *estimate* the *Current adoption, Potential adoption* and *Potential net impact* of the offering.

Within deliverable D2.3 the framework was utilised in a slightly different way. REViSITE community members were invited to score the Current Adoption, Potential Adoption & Potential impact of the 23 SMARTT sub-categories as opposed to specific ICTs



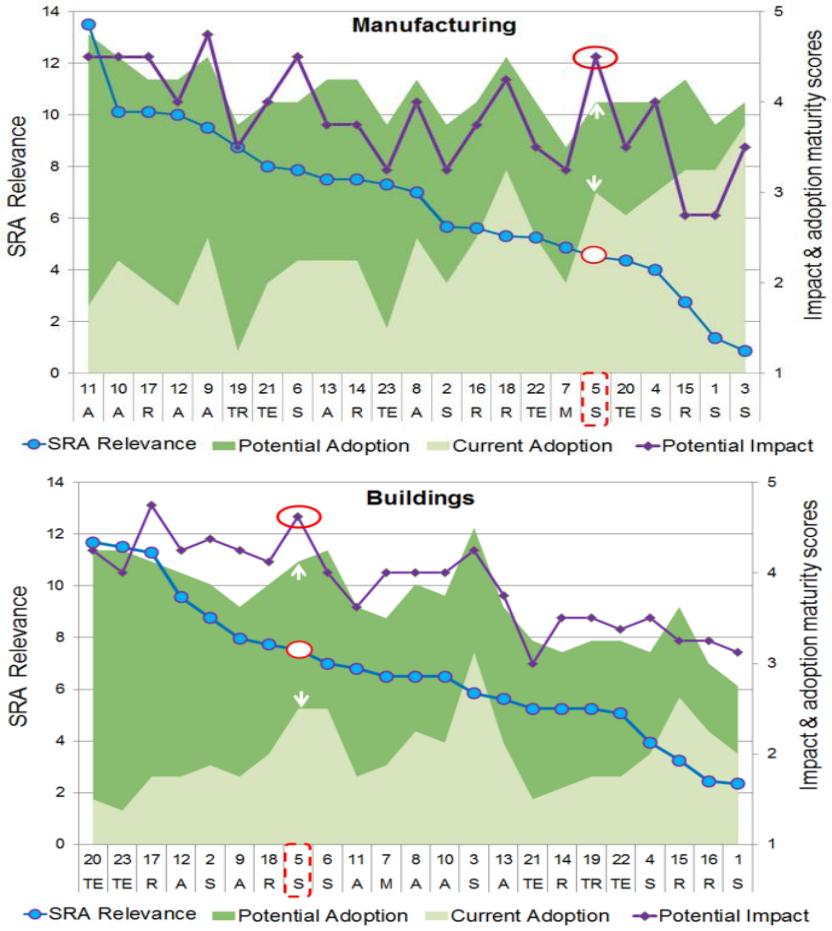
By scoring sub-categories based on *current* and *potential adoption* we were able to use the *adoption-delta* between the two in combination with *potential impact* scores to indicate *relevance* in terms of a 'Strategic Research Agenda'. Sector specific graphs [see example above] and a combined output were then used to inform more qualitative discussion in terms of a refined roadmap.

*SRA relevance = Potential Impact * (Potential adoption – Current adoption),* with *SRA relevance* determining the position of sub-categories along the X-axis. In the above example one can see that a sub-category might score similarly in terms of *Potential impact* but have a very different position in terms of *SRA relevance* given its *adoption delta*.

This proved useful when taking a sector specific view but was more valuable when taking a multi-sectorial view as it indicated possible areas for cross-pollination of best practice.

For example sub-category 5 *'simulation as part of the design function'* scored high in terms of *potential impact* on energy efficiency within Manufacturing but scored low in terms of SRA relevance due to a relatively low *adoption delta* suggesting a certain level of existing sophistication, move then to the Built Environment and one can see that sub-category 5 scored

similarly in terms of *Potential impact* but higher in terms of *SRA relevance* due to a wider *adoption delta*. This is one example were Manufacturing in relation to sub-category 5 might offer a best practice exemplar for the Built Environment.



So while the sector specific indications are of interest the real value of the REViSITE approach in that it offers a 'lens' into the Technology, Technology Practises & Research of other sectors.

Keywords: Energy Efficiency, State of the Art, ICT, ICT4EE, ICT, Knowledge, RTD, Smart Grids, Smart Buildings, Smart Manufacturing, Smart Lighting.	**Date: 01/09/2011**

Dissemination level:

PU – Public

Project co-financed by:

SEVENTH FRAMEWORK PROGRAMME