ICT solutions for sustainable lifestyles

Workshop report

13.02.2013. ETH - Swiss Federal Institute of Technology, Zürich, Switzerland

First International Conference on ICT for Sustainability

This workshop took place as a pre-event for the **ICT for Sustainability (ICT4S) Conference** organized by University Zürich, Swiss Federal Institute of technology (ETH) and Empa Technology and Society Lab in Zürich, Switzerland 14-16 February, 2013.

It was jointly organized by the **World Resources Forum** (WRF), **International Telecommunication Union** (ITU), **Global e-Sustainability Initiative** (GeSI) and **Hewlett-Packard** (HP).

Information: www.worldresourcesforum.org; www.ict4s.org

This report was drafted by Akash Arasu and Veronika Rékasi, based upon inputs of speakers and participants. The summaries of individual presentations have not been reviewed by the speakers.

Special thanks for the support from Sibylle Rock, Alice Valvodova, Vanessa Cooper, José Maria Batanero, Christina Bueti, Bas de Leeuw, Martin Lehmann, Marcela Mogilska, Oksana Kemp, Tobias Welz, Brigitte Bänziger and Bernhard Huber (photos).

St. Gallen, Switzerland, February 2013.

Contents

Being woken up every morning by your digital alarm, checking e-mails from colleagues on your way to work, monitoring your energy consumption through smart meters, communicating and networking with your family and friends, and using your GPS or smartphone to find a proper restaurant for tonight. Information and communication technology (ICT) is all around us. This is why it matters how we use it. ICT can play a significant role in enabling us to live more sustainably and move to a more intelligent use of our time, energy and resources.

Some examples of green ICT solutions include the use of smart technologies in key sectors of the economy such as smart grids, buildings or intelligent transport systems, which can dramatically reduce energy consumption globally, as well as cut down GHG emissions. It is estimated that by 2020 the use of these ICT-enabled applications has the potential of achieving a reduction of 9.1 Gt of GHG emissions, amounting to $1.9 trillion in gross energy and fuel savings. This represents 16.5% of global emissions according to GesI's SMARTer2020 report[1].

The challenge today is to move from theory to practice, and put in place the right measures and policy frameworks to fully scale up green ICT solutions. Findings from both the World Resources Forum 2011, held in Davos, and the World Resources Forum 2012, held in Beijing, indicate that, apart from progress on technical level, sustainable resource management requires more attention to the use phase (consumer side). Raising awareness and providing information need to go hand in hand with providing adequate products, infrastructure and facilities.

The joint WRF, ITU, GeSI and HP workshop aimed to showcase promising ICT solutions helping consumers to be more sustainable and resource-efficient. It also presented the views of different organizations working on green ICT solutions. The long-term objective of the event was to create dialogue on the role of ICT in enabling sustainable lifestyles among stakeholders ranging from social scientists to industry and policy-makers.

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[1] GeSI SMARTer2020: The Role of ICT in Driving a Sustainable Future, http://gesi.org/SMARTer2020

After the welcome remarks and the ice-breaking "introduce your neighbor" game led by **Bas de Leeuw**, *Managing Director World Resources Forum*, the first speaker to kick off the plenary session was **Flavio Cucchietti**, *Vice Chairman of the ITU-T Study Group on Environment and Climate Change*. Mr. Cucchietti mentioned the role played by ICT in today's world and the growing importance and recognition it is achieving in the field of sustainability. Conferences such as Rio+20 and the World Conferences on International Telecommunications devoted significant effort in accelerating the use of ICT to meet sustainable commitments.

The bad news with the hype around ICT was that it contributed to over 2% of global CO_2 emissions. Fortunately, there is another side to this story. ICT does have the potential to reduce emissions in other sectors by 16.5%. However, this potential needs to be realized before this mitigation can take effect.

A key take away from his speech was the need to standardize ICT products - there is too much time, energy and resources wasted on differentiating electronic products when instead they can be standardized for efficiency. A simple relatable example would be the mobile phone. Too often do we run out of batteries only to find that the nearest charger available is incompatible with your mobile phone. This suggestion led to an insightful discussion with an audience member who asked if standardization would halt innovation. What would be the need to innovate if everything was the same? Mr. Cucchietti acknowledged the possibility of that but said that this was an avoidable scenario. It is indeed possible to standardize on a material level while still differentiating on service.

Taking to the stage after Mr. Cucchietti was **Alice Valvodova**, the *Executive Director of the Global e-Sustainability Initiative* (GeSI). Showcasing an overview of the effects of increased GHG emissions on the earth's climate and environment, Ms. Valvodova introduced the key findings of GeSI's SMARTer 2020 report. The report demonstrated how increased use of ICT in video conferencing and smart building management could cut projected 2020 global GHG emissions by 16.5%, amounting to 1.9 trillion USD in gross energy and fuel savings.

This is equivalent to more than seven times the ICT sector's emissions in the same period. Another insight from the SMARTer 2020 study was the effectiveness of policies. Interestingly enough, it is at the national level that policies have the greatest potential to be drivers of change. This stresses the importance of not only involving the public sector but also convincing them to be the drivers of change to realise the benefits of ICT.

The next question would perhaps be how we can get policy makers and the public to adopt solutions which arise from ICT. **Heinz Gutscher**, *Professor Emeritus of Social Psychology at the University of Zurich* gave a presentation on this very issue. The idea of nudging people, drawn from the book by Richard Thaler and Cass Sunstein, is one which advices implicit policies rather than explicit ones.

Professor Gutscher mentioned the libertarian need for everyone to act, behave and decide freely according to their whims and will. However at the same time, it is in policy makers' interest to behave paternalistically in order to limit a group's autonomy for the group's own benefit. He used the example of the urinal fly – a fly imprinted onto male's urinals offering a target board of sorts – to demonstrate the idea of smart nudging. While aiming at the fly, you do not realize the

amount of effort being exerted on you to decrease spillage and keep toilets cleaner. This works brilliantly.

According to Professor Gutscher there are essentially three conditions needed to instigate change. First, there must be sufficient dissonance between the desired condition and the current condition. If there is no perceived difference, there is no perceived need for changed. Secondly, there must be an ability to control behaviour. Lastly, there should be benefits arising from change. Further, one of the most effective tools is having smart default options. Rarely do people want to change a default option when presented with one.

After Professor Gutscher's presentation, it was **Professor "Skip" Laitner**'s turn. Professor Laitner is the *Director of Economic and Social Analysis for the American Council for an Energy Efficient Economy* (ACEEE). The issues he highlighted included the lack of energy efficiency in many economies including the U.S.A. which had only 14% efficiency. Effectively 86% of the energy produced was thus being wasted.

It was necessary he said to implement intelligent efficiency. This includes more people centered initiatives such as real time feedback on personal energy use. Digital energy management would also aid in increasing efficiency. Such energy saving ICT methods could be incorporated into infrastructure allowing us to function efficiently without having to try actively to do so.

Turning invisible resources visible would help alter people's behaviours and perception. Once behavioural changes occur, there will be immediate adoption of ICT solutions to resource problems. He ended his presentation rather prosaically with a quote from John Maynard Keynes:

> "The difficulty lies not with the new ideas, but in escaping the old ones."

At session 2 – the industry panel - participants learned more about innovative ICT solutions for sustainable lifestyles showcased by representatives of the ICT sector and other stakeholders. Bas de Leeuw started the panel with inviting all the representatives to the stage to introduce in one sentence what they are going to talk about: Sibylle Rock (HP) – ICT solutions for Education, Fabian Etter (Swisscom), – using the Smart Grid, Smart metering, Dan Williams (Microsoft) – The hidden opportunities of Cloud Computing and Ulrike Vott (Nokia) - E-Transportation tools.

Sibylle Rock, *Worldwide Stakeholder Engagement Manager for Education & Environment from Hewlett-Packard* highlighted the importance of ICT triggering sustainable lifestyles which starts with educating people at a very young age. HP drives heavily towards solutions that make a global impact. Sibylle talked about one HP educational initiative called EVOKE which HP has launched together with World Bank last year. Evoke educates young people in playing a competitive game using mobile devices and Internet access to address a low level of motivation among students in developing skills in entrepreneurship, innovation and tackling global environmental challenges. The game covers various topics like trash, recycling, water, e-waste, deforestation, and graffiti. The story of the game takes place in two time periods the present day (2012) and the future (2024).

Heroes play a mysterious game each week. The scenery takes place in the own communities of the players. Players have to accomplish different missions every week to earn scores. EVOKE was started in South Africa in 2010. The game was successful in registering 19,324 players. One of the players commented: *"Evoke gave a safe place to put the idea out there and when no-one laughed but actually had good things to say it gave me the confidence to approach others… so I can only imagine that there are many students out there with similar ideas, but without the confidence to pursue them."*

Fabian Etter, *Head of Corporate Responsibility* presented solutions from *Swisscom* for smart metering and intelligent energy usage. According to him a fundamental paradigm shift is imminent in the power market. Today's hierarchical and static structure will be replaced by and interconnected and dynamic structure (see illustration).

A new interconnected and dynamic structure is emerging thanks to the integration of new market players at various levels in the power network
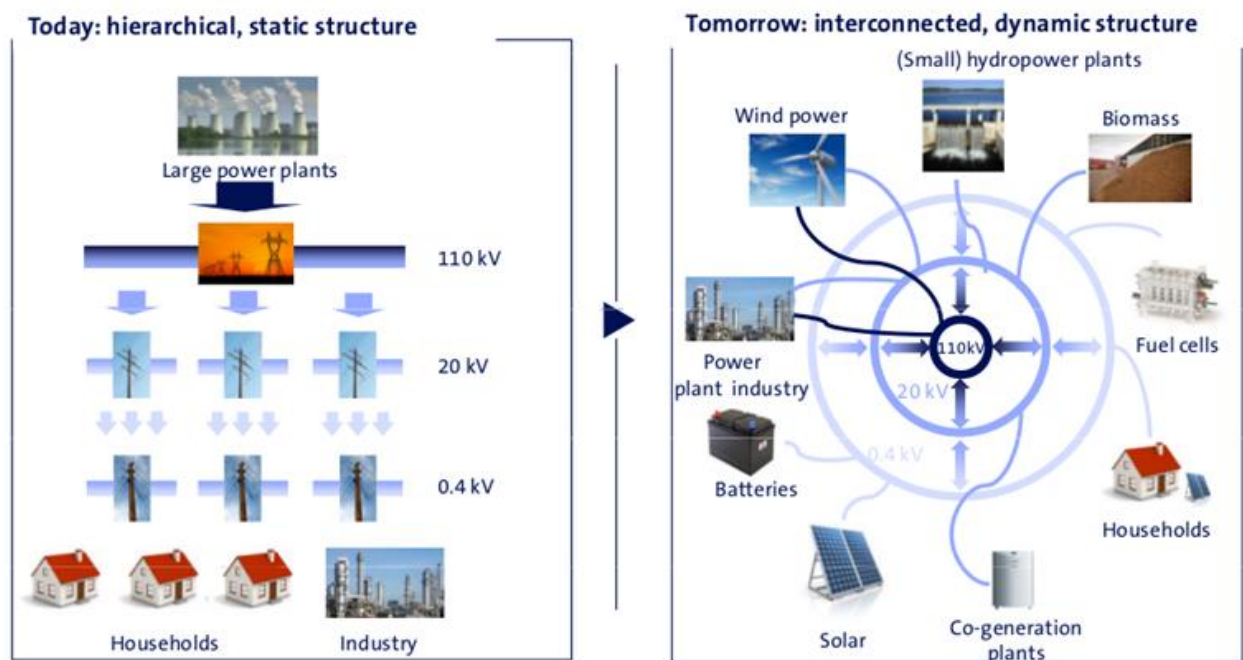
In the new system energy won't go only in one direction, from large power plants to households and industries, but every item will connect and contribute to the energy circulation. The use of renewable energy sources and a reliable communications network will create a much more effective energy circle. A key challenge is to find the balance between production and consumption on the Smart Grid. To achieve this shift ICT is a key enabler. Every day, we get closer to a future where we live in smart and sustainable houses. Swisscom seems ready to take the lead in this field as Mr Etter claimed: "*Swisscom today possesses the capabilities required to meet future requirements*".

The next on stage was **Dan Williams**, *Environmental Sustainability Research Manager from Microsoft*. Mr Williams explained to the audience the hidden potential of Cloud Computing. Adopting cloud-based e-mail, CRM and groupware applications could cut GHG emissions by 4.5Mt, and could result in $2.2+ billion economy-wide savings in energy bills. So, why don't all heads of IT departments switch to Cloud Computing?

"*Because they could create a situation that would cost them their jobs*" explained Mr Williams. While IT is creating uncertainties in markets, policy makers have the power to turn uncertainties into opportunities. The question is: are policy makers understanding
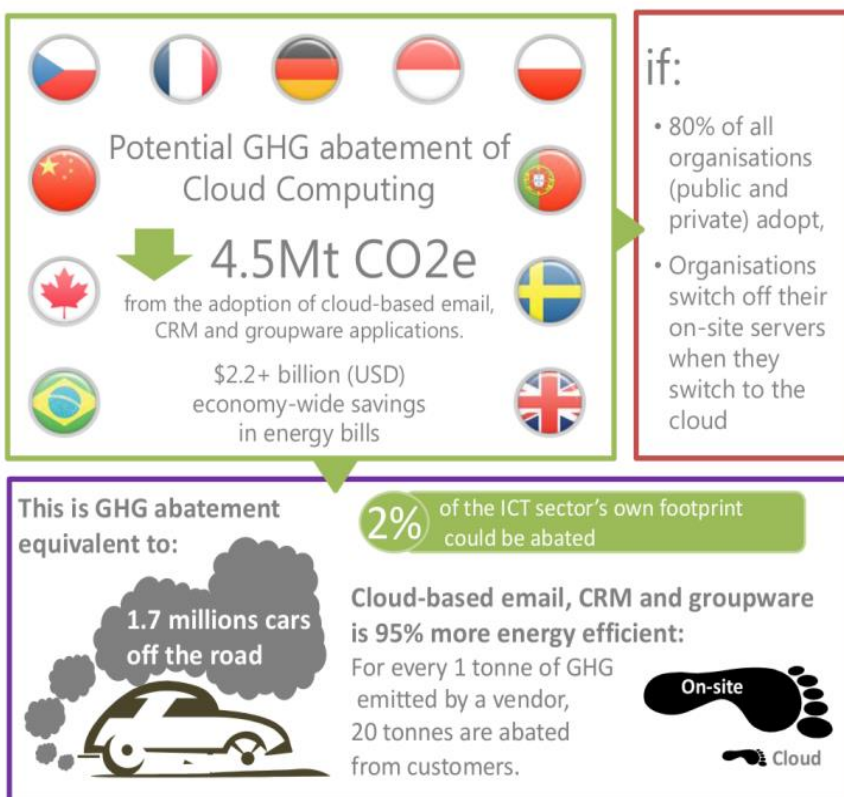
the potentials of cloud computing? Are they leading by example? Policy makers often fail to understand the technology innovation and diffusion cycle, creating policies which bring uncertainties to the market.

He closed his presentation with a food for thought: "*What do you think? Are business leaders and policy makers doing enough to create an enabling environment for enabling technologies?*"

Ulrike Vott, the *Sustainability Manager Middle East and Africa of Nokia* brought two examples to the workshop. First we got to know more about Nokia Data Gathering, a mobile survey system that enables more efficient data collecting in less developed countries. Gathering data through mobile phones makes it easier to analyse the data, create reports and view results. The use of the data from this system resulted in a 50% decrease in time taken to produce drought bulletins in Kenya, and a 93% cut in dengue fever cases in Brazil. Ms. Vott also presented the Nokia Transport application which helps customers to optimise traveling routes. As it helped her in getting to the venue of the workshop, she stated confidently that "*the software is working*". It includes all forms of public transport from buses to trains & light rails. The application is free for download and saves a lot of time making it easier to quickly figure out routes. Customers can also save their favourite destinations and check when the next bus, metro or train arrives.

At this point, the moderator Mr. de Leeuw asked the participants to stand up and go to the imaginary stage while the speakers took place at the tables dedicated to different topics. Besides the topics presented in the "industry panel", two additional discussions were started: Agriculture and e-Behaviour Change. The latter led by Majka Baur, founder of weACT, an enterprise organizing group challenges about sustainable lifestyle choices for organizations as companies, universities or municipalities. After the participants were split into groups, they were asked to envision what the above mentioned sectors would be like in the year 2020 and how ICT can enable sustainable lifestyles, the way forward for mainstreaming ICT solutions. Participants in this session had the chance to share their ideas, opinions and thoughts. They were provided with flip charts and markers, with each of the tables being led by a volunteer. After a discussion time of 30 minutes, one participant from each table topic was asked to present the ideas generated. The result can be read below.

What would daily life look like in 2020 using ICT?

Agriculture

In 2020 mutual and effective communication is granted between producers and consumers. Agricultural producers provide their consumers with adequate information about products' environmental and socio-economic impact along the whole value chain. The same way, consumers have the opportunity to give feedback to the producers. Promoting sustainable agriculture, and research into the field, provides more break-through in the field of sustainable farming.

E-Behaviour

ICT would be in your house letting you know how much or how little energy you were using at any given time, by the year 2020. Sustainability will be the norm, just like globalization is today. Using feedback loops for energy consumption with simple yet concrete data, consumers can self-monitor their usage. Effective communication would be necessary to create a sense of responsibility in consumers. Change must be brought about by a social movement, with a leadership that leads by example.

Cloud computing

Cloud computing enables a wide network of information exchange in the future. Virtualizing services and making data available in the cloud is more efficient and simplifies many aspects of our life, sharing information about logistics, food, medical treatment, car sharing, housing, education, use of utilities, smart metering and remote working. At the same time it creates a new challenge in terms of privacy, as online data is easily available.

Education

Education will be enabled by ICT tools; more systematic software use helps teachers and students in everyday life. The tools meet the following expectations: the hardware has to be built from sustainable resources; the software has to contain adequate content, including the local knowledge, available in the user's languages. Crowd sourcing makes the process of studying easier for students, and for teachers to illustrate with materials.
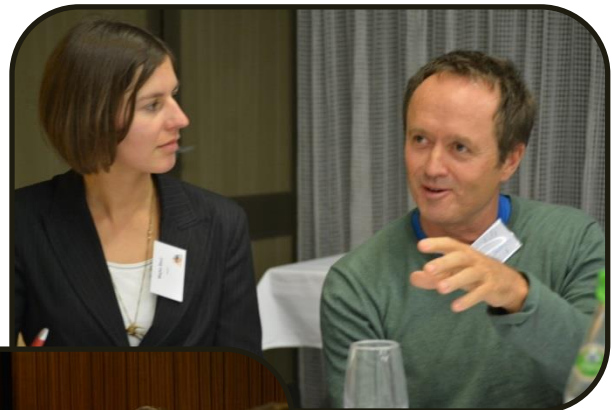
Energy

By increasing the levels of standardization, we could be driven to more sustainable futures. There would be need to build more trust between the suppliers of energy/energy-products and the consumers, this could then result in better quality even at increased prices. The year 2020 would see a more regulated energy market with greater focus on renewable energies – those still using traditional sources of energy would be paying significantly for it.

Transporation and Housing

Transportation is perhaps one of the most rapidly changing industries with the advent of hybrid and electric vehicles. Public transport should run completely on renewable energies by 2020 as the adoption of such modes of transport by the public sector would allow for increased behavioural change. Once people realize that they live in a state that runs its sectors on renewable energies, they themselves would want to adopt electric instead of conventional cars.

Answering the question "What did we learn today?" Akash Arasu, *Project Associate of WRF* stepped on stage to summarize the conclusion of the day.

Standardizing ICT would be the first step to increase adoption rates. There is hassle, be it for mobile phone chargers, or for industry wide software, when they are incompatible with one another. This standardization should however account for innovation and not deter incentives that drive innovation. Next, policies that act as drivers of change tend to be top down from a national level. When a country adopts a policy, it is easier for its citizenry to transition into it. These citizens are ultimately consumers, and they should also be empowered and more importantly feel empowered so that they can understand the consequences of their actions. Resources that they consume must be made more visible. Without physically observing where electricity comes from, we tend to take it for granted. Should you however witness the amount of coal being burnt to produce such electricity on a daily basis, you feel a greater need for change. Lastly, despite the effectiveness of top-down policies, it is bringing about these policies that consist of the challenge. Policy makers are often ignorant of the benefits brought on by ICT and so feel no need to adopt them. The ultimate goal would be for policy-makers to lead by example and create policies conducive to the deployment of innovative ICT solutions for sustainable lifestyles.

14:00-15:30: Session 1- Keynote speeches:

- ➢ **Bas de Leeuw,** Managing Director, WRF

- ➢ **Flavio Cucchietti**, Vice Chairman of ITU-T Study Group 5, ITU

- ➢ **Alice Valvodova,** Executive Director, GeSI

- ➢ **Heinz Gutscher Ph.D**., Professor Emeritus of Social Psychology, University of Zürich

- ➢ **John A. "Skip" Laitner**, Principal, Economic and Human Dimensions Research Associates, and Senior Fellow, American Council for an Energy-Efficient Economy (ACEEE)

15:30-16:00: Coffee break

16:00-16:30: Session 2- ICT solutions industry panel:

- ➢ **e-Education:** *Sibylle Rock*, Worldwide Stakeholder Engagement Manager Education & Environment, HP

- ➢ **Smart metering:** *Fabian Etter*, Head of Corporate Responsibility, Swisscom

- ➢ **Cloud computing:** *Dan Williams*, Environmental Sustainability Research Manager, Microsoft

- ➢ **Intelligent transport:** *Ulrike Vott*, Sustainability Manager Middle East and Africa, Nokia

16:30-17:30: Session 3- Interactive visioning: Interactive group discussions on how ICT can enable sustainable lifestyles in the present and the future, the way forward for mainstreaming ICT solutions.

17:30: Closing remarks and next steps: The key conclusions of the day and the next steps including setting the agenda for WRF Davos, 6-9 October 2013.

18:00: Networking reception (sponsored by Swisscom)

Name	Company
Aebischer, Bernard	Private
Anda, Martin	Murdoch University
Arasu, Akash	World Resources Forum
Arushanyan, Yevgeniya	KTH Royal Institute of Technology
Batanero, Jose Maria	International Telecommunication Union
Baur, Majka	weACT
Bertschi, Peter	Consulting .Energy:IT.Sustainability.Systems.
Blum, Martina	AXA Winterthur
Bondesson, Anna	Ericsson AB
Caras, Jennifer Robin	CARASDESIGN Consortium
Chambers, Jonathan	BEN Energy
Coroama, Vlad	ICT Lisbon
Cucchietti, Flavio	ITU
De Leeuw, Bas	World Resources Forum
Do, Chang-Wook	Korea Electronics Association
Edelmann, Xaver	World Resources Forum
Eisgruber, Alexander	ETH Zürich
Etter, Fabian	Swisscom
Felsner, Heinz	respACT-Austrian Business Council of Sustainable Development
Förster, Anna	University of Applied Sciences of Southern Switzer
Franza, Maike	-
Fredericq, Antoine	Mettler-Toledo
Gasperi, Maurizio	Managecon Maurizio Gasperi
Grau, Rolf	CSI consulting
Grunfeld, Helena	Victoria University
Gutscher, Heinz	University of Zürich
Hauser, Yves	-
Heeb, Inken	Braintrain AG
Heimgartner, Ville	University of Jyvaskyla
Heinze, Claudia	PERSPICA
Hicks, Cheryl	Collaborating Centre on Sustainable Consumption
Höjer, Mattias	KTH
Huber, Bernhard	KTH Royal Institute of Technology
Isler, Lorenz	Microsoft
Kammerer, Daniel	MyClimate
Kara, Kristina	B.A.U.M. e.V.
Kennedy, Rónán	National University of Ireland Galway
Kern, Matthias	UNEP
Koekten, Gizem	ETH Zürich

Laitner, John ("Skip")	American Council for an Energy-Efficient Economy (ACEEE)
Le Lay, Mikako	CSR Europe
Lehmann, Martin	World Resources Forum Association
Linkoln, Lilli	Sitra
Lukács, Gergely	Pázmány Péter Catholic University
Malmodin, Jens	Ericsson
Meyer, Thalia	Spektrum-Energie GmbH
Moser, Stephan	Super Computing Systems AG
Müller, Prisca	weACT
Ochoa, Laura	ETH Zurich
Pargman, Daniel	KTH
Pathaak, Rajesh	Achilles Group
Penzenstadler, Birgit	Technische Universitaet Muenchen
Peters, Heinz- Gerd	Deutsche Telekom
Rékasi, Veronika	World Resources Forum
Rock, Sibylle	HP
Roepke, Inge	Aalborg University, Copenhagen
Rohner, Lori	Self-Employed
Sissa, Giovanna	Università di Milano
Svenfelt, Asa	KTH
Townsond, Jack	University South Hampton
Valvodova, Alice	GeSI
Vott, Ulrike	Nokia
Wangel, Josefin	KTH - Royal Institute of Technology
Welz, Tobias	World Resources Forum
Williams, Dan	Microsoft

About WRF

The World Resources Forum (WRF) is the global science-based platform for sharing knowledge about the economic, political, social and environmental implications of global resource use. WRF promotes innovation for resource productivity by building bridges among researchers, policymakers, business, SMEs, NGOs and the public. Flagship activity is the annual WRF Conference. For further information, visit www.worldresourcesforum.org/world-resources-forum-association.

About ITU

ITU, the International Telecommunication Union, is the UN specialized agency responsible for ICTs. Its membership, comprising 193 governments, some 700 private companies and about 50 universities, has called for ITU to take the lead in engaging the global community in addressing climate change through the use of ICTs. ITU is headquartered in Geneva, Switzerland, with 12 field offices around the world. Further information about ITU´s climate change activities, including the reports referenced in this article, is available at www.itu.int/climate.

About GeSI

The Global e-Sustainability Initiative (GeSI) is a strategic partnership of the Information and Communication Technology (ICT) sector and organisations committed to creating and promoting technologies and practices that foster economic, environmental and social sustainability. GeSI's vision is a sustainable world through responsible, ICT-enabled transformation. GeSI fosters global and open cooperation, informs the public of its members' voluntary actions to improve their sustainability performance, and promotes technologies that foster sustainable development. GeSI has 32 members representing leading companies and associations from the ICT sector. GeSI also partners with two UN organizations - the United Nations Environment Program (UNEP) and the International Telecommunications Union (ITU) - as well as a range of international stakeholders committed to ICT sustainability objectives. These partnerships help shape GeSI's global vision regarding the evolution of the ICT sector, and how it can best meet the challenges of sustainable development. For more information, see www.gesi.org.

About HP

HP creates new possibilities for technology to have a meaningful impact on people, businesses, governments and society. The world's largest technology company, HP brings together a portfolio that spans printing, personal computing, software, services and IT infrastructure to solve customer problems. More information about HP (NYSE: HPQ) is available at http://www.hp.com.

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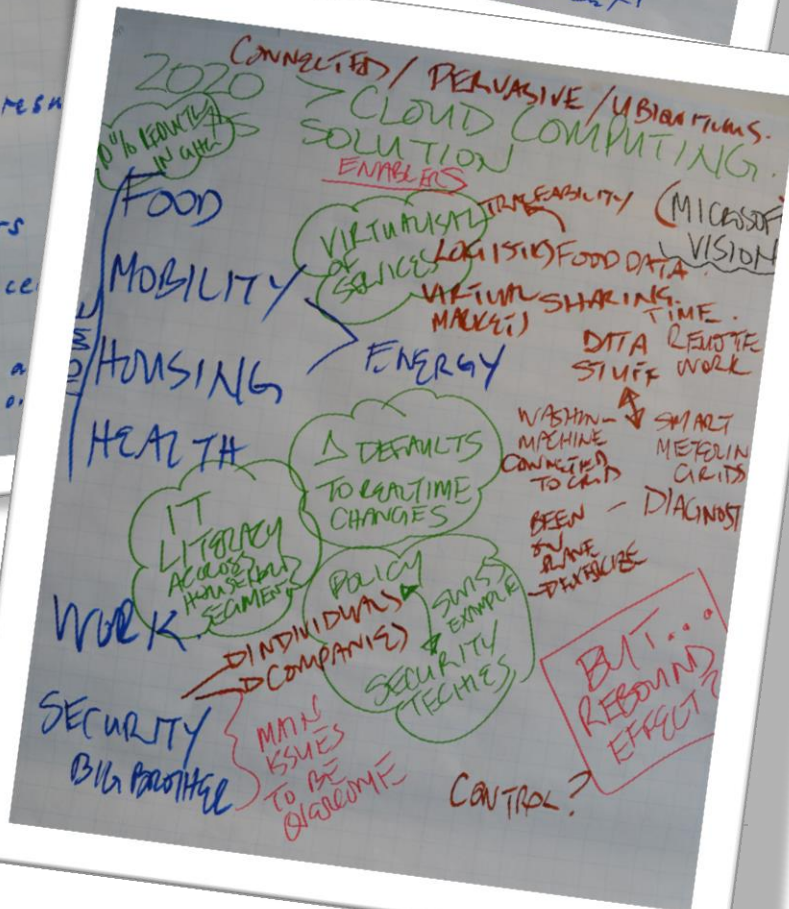sibylle.rock@hp.com

Agriculture

- multidirectional connection between production & consumption
- Producer info → consumer
- Environ. load/impact of product
- Promote sust. agriculture BAT
- Socio-economic transparency in value chain
- Transparency / Facilitating prod. processes / Justice
- Open access to research resu... make them available and applicable for producers
- Consumer feedback Producer
- Midpoint labelling system whole value chain based on network of trust

2020. ICT TOOLS
4. → Sustain Behaviour

CHANGE BEHAVIOUR

1. BRING ICT to home
   → data → feedback
2. Communication
   → Responsibility
   → Awareness "
3. Change by "leadership"
   - Social movement

2020 CONNECTED / PERVASIVE / UBIQUITOUS
→ CLOUD COMPUTING SOLUTION
ENABLERS
FOOD
MOBILITY
HOUSING
HEALTH
WORK
SECURITY
BIG BROTHER
ENERGY
VIRTUALIZATION of SERVICE
LOGISTICS FOOD DATA
VIRTUAL SHARING TIME.
DATA REMOTE STUFF WORK
WASHING MACHINE CONNECTED TO GRID
SMART METERING GRIDS
BEEN IN A PLANE - DIAGNOSTIC
IT LITERACY ACROSS HOUSEHOLD SEGMENTS
Δ DEFAULTS TO REALTIME CHANGES
POLICY (INDIVIDUALS & COMPANIES)
SUST EXAMPLE SECURITY TECHIES
MAIN ISSUES TO BE OVERCOME
(MICROSOFT VISION)
BUT... REBOUND EFFECT?
CONTROL?

Education

Hardware sustainable
Software — content targeted → All levels
crowd source? curriculum
local knowledge
language

Concept, aim, objective → Purpose

All stakeholders "education"

Scale & promoting it

Jobs, Entrepreneuring

Energy

PERSONAL CARBON ACCOUNTING
IMPROVED FORECASTING/OPTIMIZATION ON R
TARIFING → TIME USE CHANGES
SH CHANGING TIME OF USE OF ENERGY
ONE DEVICE FITS ALL
↳ SOFWARE UPGRADES (INSTEAD OF HARDWARE UPGRADES
STUPID PHONES
SMART ENERGY STORAGE
DE-MATERIALIZED HOBBIES
AUTOMATED DEMAND SHAPING
...RATIVE ENERGY CONSUMPTION
...OU NEED TO MAKE IT HAPPEN!
...E OF RESOURCES
...USERS/SECURITY
...CENTIVES SPLIT
...ATION/REGULATION
...TPRINT ON PRODUCTS/LABELING

Visio 2020 Transport & Housing

What's moving?
— People traveling less because ICT?
— Services traveling more in future?
(e.g. doctors)
— Distinction between rural/urban etc.

By which means?
— Intermodal transportation
— Small scale public transportation
— automatic trams/cars
— Electric car + system + automations
— Apps that think for you how to move where
to find cars etc. [Peers] innovators
Common
neighbours

How to convince people?
- adoption of electric cars
· envi benefits
· increased performance
· convinience (you don't have to drive)
· Incentives taxes
· PSS (product, service, systems)

— Community engagement

ICT? Motivation
— makes transportation
efficient/interconnected → Open data → Motivation to change
behavioural make a better
service tog...