Renewing the knowledge societies vision: towards knowledge societies for peace and sustainable development

Report

World Summit Geneva 2003 Tunis 2005
on the Information Society
Turning targets into action

United Nations
Educational, Scientific and
Cultural Organization

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TABLE OF CONTENTS

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The views expressed in this report are not those of any institution and we take full responsibility for any errors or omissions.

FOREWORD

by Irina Bokova, Director-General of UNESCO

In 2005, UNESCO published its World Report – Towards Knowledge Societies – in order to shift the global debate from focusing on 'information societies' to the wider, more complex and more empowering concept of 'knowledge societies.' This was a major contribution by UNESCO to the World Summit on Information Society (WSIS), in cooperation with the International Telecommunication Union (ITU) and other partners. For UNESCO, knowledge societies build on four pillars – freedom of expression and freedom of information; universal access to information and knowledge; quality learning for all; and respect for linguistic and cultural diversity.

Moving from information to knowledge was far more than a change of label – it called for rethinking the role of information and knowledge in societies as a whole, and their contribution to the empowerment of individual women and men.

These ideas remain sharply relevant today – all the more so in a context that has changed dramatically, with the rapid development and spread of new information and communication technologies (ICTs). These changes call on us to understand clearly what has been achieved and where we stand today in terms of harnessing the potential of ICTs for sustainable development.

This was a key objective of the WSIS+10 Review Event that UNESCO organised in February 2013. To prepare for the Review Event, UNESCO commissioned this Report by two eminent international experts, Robin Mansell and Gaetan Tremblay, to assess the evolution of the context and to develop ideas for action by UNESCO to promote inclusive and equitable knowledge societies in a changing environment.

Renewing our vision of knowledge societies is essential at a time when creating and sharing knowledge has become essential for all societies. In moving forward, UNESCO's starting point remains firm and clear – people transform societies not technologies. New ICTs offer vast opportunities to accelerate progress towards sustainable and inclusive development, but they are not enough in themselves. Empowering individual women and men requires not just access to information but the skills to transform it into knowledge. This involves quality learning, in both formal and informal settings, in ways that promote the full participation by the learner. This calls for targeted policies to overcome new digital divides emerging across the world, between societies and within them.

As the authors of this Report underline:

If the goal of knowledge societies is to foster peace and sustainability, it is imperative that strategies for action ensure that decisions at all levels promote the integration of knowledge within people's lives in ways to maximize the benefits and minimize harms. This needs to take the goals of economic prosperity, environmental protection, inclusive social equity and justice into account.

This is the spirit guiding this Report, which draws on multiple case studies, highlights lessons since the first WSIS meeting in 2003, and sets out ideas for renewing UNESCO's vision of knowledge societies. I believe this analysis is especially useful now, as we support countries in reaching the Millennium Development Goals by 2015 and as we set a new global development agenda to follow. Building inclusive, equitable and just knowledge societies must stand at the heart of all efforts to build lasting peace and sustainable development in the century ahead.

Irina Bokova

ExECUTIVE SUMMARy

Any vision of knowledge societies must affirm the core aspirations for peaceful and sustainable knowledge societies in a way that acknowledges the interests of all stakeholders. It is essential to recall that knowledge societies are concerned with human development, not only with technological innovation and its impacts. In this report, we focus on the importance of freedom of expression and freedom of information, universal access to information and knowledge, quality education for all, and respect for linguistic and cultural diversity. We underline the key role of learning and training processes, grassroots initiatives and stakeholders' participation, and policies to achieve a fair balance between public and private interests.

In the wake of rapid, and sometimes surprising, developments in information and communication technologies (ICTs) and in the media, information and communication environment, we call for the renewal of UNESCO's knowledge societies vision as a means of highlighting priorities for UNESCO and other stakeholders in a WSIS+10 world. UNESCO played a leading role with the ITU in the planning for the WSIS 2003/2005, setting out its vision for *Knowledge Societies* in its 2005 World Report. It is time for a renewal of that vision in the light of experience.

UNESCO's initial vision of knowledge societies moved beyond a focus on the information and communication infrastructure to human beings and to processes of learning. In 2013, the vision of knowledge societies for peace and sustainable development requires a further move to emphasize the need to rally partners from the private and public sectors and civil society to clarify persistent problems and to create processes and actions that will address them. UNESCO is well-positioned to lead in future work aimed at promoting *knowledge societies that are inclusive and equitable*.

Our starting point is to recall that if knowledge is valuable economically, it is also the core of culture and human life within peaceful societies. We emphasise that universal access to information is a basic requirement to create knowledge societies for peace and sustainable development, but it is not a sufficient requirement. This is because knowledge implies meaning, appropriation and participation. Access to knowledge implies much more than access to ICTs or digital information. It involves learning in formal and informal educational settings and it is partly acquired through experience. Knowledge is a means to achieve social and economic goals. It is essential to cultural socialization, political participation and integration within markets. It is also the path to individual and collective emancipation and should be valued for itself. The full potential of digital networks and media and information applications can only be achieved if there is a fair balance between private and public interests in knowledge.

If the goal of knowledge societies is to foster peace and sustainability, it is imperative that strategies for action ensure that decisions at all levels promote the integration of knowledge within people's lives in ways that maximize the benefits and minimize harms. This needs to take the goals of economic prosperity, environmental protection, inclusive social equity and justice into account. It is essential to understand, not only what needs to be done to promote knowledge societies, but also how the interests of stakeholders are changing. The renewal of UNESCO's vision of knowledge societies should acknowledge that policy measures are needed to support an open information commons and a market-led approach in a balanced way. The policy environment currently favours market-led strategies and actions often focus principally on technology and digital information, neglecting other issues.

Policy makers need to look beyond the 'uses' of networks and ICT applications to the conditions – institutional, regulatory, financial, political, and cultural –that frame these uses, whether the focus is on mobiles, social media or databases.

Learning is at the core of knowledge societies. The expansion of digital networks opens fantastic opportunities to facilitate education and learning at all levels. But this potential can materialize only if basic requirements are satisfied: above all, high quality content and well-trained tutors. High quality education for all, at every level, must be one of the main aims of knowledge societies for peace and sustainable development. This can be achieved only through sufficient investment in training educators, whether they facilitate formal or informal learning. An equally important concern for policy is cultural and linguistic diversity which are essential for encouraging participation in knowledge societies. If these are not given sufficient attention, people may gain access to networks and digital information, but to education and learning opportunities that are not meaningful to them in their everyday lives.

Distance education is frequently identified as the miracle solution to the lack of educational materials and human resources, including the capabilities for learning such as reflection and making sense of information. Indeed, it can serve as an effective means of giving better access to scarce learning resources. Properly used, it can help to train teachers more rapidly in countries where large numbers of teachers are needed in a short time to meet the needs of primary and secondary schools. But to be effective, distance education must be designed well in advance, rely on high quality content, and qualified technicians, teachers and tutors, and build the capabilities associated with a range of literacies among its learners.

A crucial question is how a society should organize access to information while encouraging the creation and production of knowledge. This question goes to the very heart of how we value knowledge socially, as well as economically. The challenge is to find a balanced solution that is socially acceptable and economically viable between two contrasting options – copyright which protects intellectual property but restricts access to information in the market and the commons approach which favors a public domain and open access to information. Dogmatic opposition between proprietary market-led approaches and the information commons should be rejected. Adjustments to the policy environment should be encouraged to enable market and commons-based creative activity to proceed in parallel and to foster hybrid approaches. Stimulating the production of information in knowledge societies which is relevant for those who apply it remains a major challenge for policy in the coming decades.

Access to information and knowledge, together with economic rewards, is crucial for the development of a creative economy. Workers in the cultural and creative sectors must be well-trained to master specific knowledge and skills. The development of the creative industries therefore requires high quality training programmes, in addition to the freedom and encouragement to contribute in innovative and creative ways. In view of the growing contribution of the creative industries to national economic output, most countries are seeking to adopt policies to develop their creative industries to strengthen their competitiveness in the global economy. However, countries also need to develop policies which foster inclusive participation by citizens through their creative contributions to society.

There needs to be improved coordination of measures aimed at building the infrastructure for open information and learning and for promoting social networking and the use of open data and information. Efforts also are needed to encourage genuinely participatory practice in knowledge societies. Specialized organizations need to work with all the actors involved to understand power relationships, the new means of organizing volunteerism, and how such projects can yield the most useful outcomes for those who hope to benefit from them.

In this report we highlight lessons across several issue areas - formal and informal education and learning, media and mediated content, freedom of expression, freedom of information and political transparency, gender sensitivity, environmental sustainability, and ethics. Knowledge societies are not emerging in isolation from other large-scale changes in society including shifts in economic power, and major political, social and cultural transitions. The policy environment needs to be flexible enough to ensure that stakeholders do not become locked into unsustainable pathways. Many policy initiatives are insufficiently concerned with the potential for the empowerment of local communities and disadvantaged or excluded groups. Greater attention needs to be given to approaches that embrace bottom up participation and promote education and learning.

We conclude with a set of guidelines for UNESCO's strategy towards knowledge societies.

1 ***Giving priority to learning processes and the organization of networked learning in the light of UNESCO's mission is essential.*** All people need the abilities to evaluate digital information critically in the light of other sources of knowledge. Education through formal and informal learning processes, mixing online with offline where necessary, should be given a high priority, as should multilingualism to foster diverse and inclusive learning environments. This means that information and media literacies must be strengthened throughout all segments of society and that context specific factors must be taken into account.

2 ***Strong emphasis should be given to the training of trainers, combining effectively all the resources available from face-to-face interaction to digital networking.*** Achieving autonomy, a key aim of education, requires the help of competent trainers. The development of digital networks offers new opportunities that should be taken up and given the appropriate financial and technical resources to enlarge and improve the training of teachers.

3 ***Facilitating the rapid circulation of scientific knowledge in all parts of the world, especially in less developed areas, should be given priority.*** Scientific knowledge is a key factor in the innovation process and in finding pathways to industrial development which are respectful of the environment. Science should be acknowledged as a common or public good and it should be shared universally. Well-established universities and laboratories should be encouraged to share their discoveries and their know-how at an early stage, especially with institutions located in less developed areas.

4 ***Encouraging research and debate on a balanced legal system to protect intellectual property and to favour access for all is essential.*** Market exchange and creative commons models should be articulated together to stimulate the creation and sharing of information. New business models are needed to promote the sharing of information. At the same time, it is essential to consider the implications of information sharing for the protection of individual privacy.

5 ***Fostering balanced partnerships among the private sector, the public sector and civil society organizations, as well as among individuals and other groups, should be a priority.*** Digital networks and access to information are being developed through private and open applications of ICTs across the whole of the economy, polity and social environment. Companies, governments and civil society organisations are often working in isolation or their relationships are contested. In all of these contexts, efforts are need to privilege participatory bottom up action.

6 ***Stimulating participatory initiatives, valuing diversity and giving individuals and local communities visibility and voice should be a very high priority.*** Even when efforts are made to promote local participation, insufficient attention is given to what is necessary to ensure that applications of digital technologies are participatory and empowering for all those involved. Innovation and learning processes are most successful when they are open to the unexpected and to changes in the environment.

7 ***Responsiveness to the interests of women, people with disabilities, native peoples, and marginalized people and groups should be a consideration of the highest priority in all measures to promote knowledge societies.*** All policy measures must seek ways of addressing inequality and social injustice, especially through measures that respect human rights. Networking offers new opportunities for empowerment of women and other marginalised and excluded groups, but the opportunities cannot be realised without attention to discriminatory practices, privacy considerations and ethical issues.

8 ***UNESCO should take a leading role in all the areas covered by its mandate, encouraging collaborations among those in and outside the UN System with the resources to host information portals, to foster measures which support open data initiatives and make information more accessible, and provide guidance about how to link data and interpret it in ways that are meaningful to those whose interests are often neglected.*** UNESCO should increase its presence on the internet, provide access to information, and foster interconnections among groups working on similar problems. This includes attention to open standards for information sharing, the implications of the increasing scale of data resources, including 'big data', and the growing importance of cloud computing for data and information access.

9 ***Fostering environments in knowledge societies that employ fair employment practices and respect the human rights of voluntary contributors and paid workers is essential for diversifying and improving livelihoods and should be an***

important priority for UNESCO in collaboration with other organizations. Open data and information are making it easier

to generate new knowledge in support of development goals and many of these activities fall within UNESCO's mandate. UNESCO should strengthen its coordination with other agencies with mandates with respect to labour practices.

In renewing its vision of knowledge societies, UNESCO, with other intergovernmental, State and private sector actors will play a role, alongside citizens and civil society organizations, in establishing the way information resources, including media content, are produced and applied within societies.

It is essential to ensure that all stakeholders are held accountable for their strategies and actions. If information asymmetries are not addressed, enhanced participation will have relatively little impact.

If UNESCO's vision of knowledge societies acknowledges that these societies are neither uniform, nor always beneficial for citizens and consumers, then its work programme is likely to provide exemplary insight into the feasibility of participation in the information commons, alongside the commercial development of innovative information and media products. In renewing its vision, UNESCO should call for continuous evaluation of the opportunities and risks of knowledge societies, and for principles, enabling policies, and programmes that will help to accelerate inclusive knowledge societies that contribute to peace and sustainable development.

1.

Renewing the Knowledge Societies Vision for Peace and Sustainable Development

THE STARTING POINT

From the pioneering book on The Production and Distribution of Knowledge by the American economist Fritz Machlup published in 1962,[1] and through the work of various researchers,[2] it is increasingly recognized that knowledge is a key factor for economic development in modern societies. In a parallel way, thinkers since the earliest days of civilization have proclaimed that knowledge, albeit of a different kind, is crucial in pursuing the high road to peace.[3] Knowledge is certainly valuable for economic reasons but not only for these reasons. It is also at the core of culture and human life. In the first decades of the 21st century, we think that all forms of knowledge should contribute to the creation of peaceful societies on the way to sustainable development.

In 2005, UNESCO participated in the World Summit on the Information Society (WSIS), suggesting a move from the information society to knowledge societies. In its World Report, *Towards Knowledge Societies*,[4] these were defined as societies benefiting from their diversity and their capacities for stimulating knowledge sharing. These offer many new opportunities for development, supported by technological innovation and by wide-scale participation in the production and consumption of information. The report especially pinpointed four key dimensions of knowledge societies: freedom of expression and freedom of information, universal access to information and knowledge, quality education for all, and respect for linguistic and cultural diversity.[5]

The authors of the UNESCO report explained in detail the different aspects of knowledge societies. Ten chapters were dedicated to learning processes, lifelong education, digital networks, higher education, research, science and other relevant themes. The contribution of local and indigenous knowledge was not forgotten. It was also acknowledged that access, although necessary, is not sufficient for achieving the goals for knowledge societies or for ensuring active citizen participation in these societies.

UNESCO's contribution stipulated clearly that knowledge societies consistent with equity and human and sustainable development could not be achieved only by developing the technological infrastructure. The report rejected technological determinism and called for recognition of the diversity of knowledge societies. It also warned against an excessive commoditization of knowledge. When knowledge societies are not limited to information societies, knowledge cannot be reduced to the mere diffusion of information and cultural content. It also requires the acquisition of a range of abilities for the development of analytical and critical thinking.

The report ended with ten recommendations, focussing on the necessity to improve:

- high quality education for all,
- community access to information and communication technologies (ICTs),
- enlargement of the public domain of knowledge,
- scientific cooperation networks,
- sharing of environmental knowledge for sustainable development,
- linguistic diversity,
- knowledge certification on the internet,
- creation of partnerships for digital solidarity,
- increased women's participation in knowledge societies, and
- development of statistical tools to measure knowledge societies.

UNESCO's vision of knowledge societies represented an original and stimulating contribution to the debate on the information society, in line with its mission which is "to contribute to the building of peace, the eradication of poverty, sustainable development and intercultural dialogue through education, the sciences, culture, communication and information".[6] Indeed, knowledge is the lifeblood that circulates in educational systems, science laboratories, cultural activities and within communication and information networks.

UNESCO's report gave a detailed outline of ideal knowledge societies and it asked a crucial question: "Will knowledge societies be societies based on knowledge-sharing for all or on the partition of knowledge?"[7] It said that knowledge societies are "about capabilities to identify, produce, process, transform, disseminate and use information to build and apply knowledge for human development".[8] It stressed two significant dangers. One was the risk of policies and practices that promote a single model of the 'knowledge economy', based on privileging aspirations for economic growth over cultural and social goals. The second was the tendency to give in to technological determinism. If this were to persist, the greatest attention would be given to encouraging the spread of digital technologies, networks and their applications, and too little would be given to how this would make a difference in people's lives.

Since 2005 much has changed. This is acknowledged in recent reports on the importance of information and knowledge in society.[9] ICTs, especially mobile phones and digital information, as well as the content of the media, are becoming much more accessible to the world's population.[10] But the rapid and uneven diffusion of digital technologies and greater access to digital information has not eradicated the danger that knowledge societies which respect human rights and are consistent with peace and sustainable development are being jeopardized by persist inequality and social injustice.[11]

This risk is visible in policy debates about the follow up to the 2003/2005 World Summit on the Information Society (WSIS).[12] In various accounts of progress towards the goals and actions set out during the WSIS, including those concerning greater equity, diversity and social justice within knowledge societies, there is evidence of continuing challenges.[13] Documents issued by the WSIS Forum,[14] for example, refer to the 'urgency' of renewed efforts to progress towards the ideals for democratic
knowledge societies.

These challenges are relevant to all stakeholders in knowledge societies. They are especially relevant for those who are disadvantaged or excluded. The United Nations Millennium Declaration 2000 states - "we will spare no effort to free our fellow men, women and children from the abject and dehumanizing conditions of extreme poverty, to which more than a billion of them are currently subjected".[15] Progress on each of the Millennium Development Goals (MDS) is varied, [16] and the emerging characteristics of knowledge societies are a crucial consideration in debates about the post-2015 renewal of these goals, including whether Sustainable Development Goals (SDGs) should be incorporated.[17]

If we understand human development as "a process of enlarging people's choices", [18] and creating "an enabling environment for people to enjoy long, healthy and creative lives", it is essential that progress is made in promoting freedom of expression, freedom of information, universal access to information and knowledge, quality education for all, and respect for linguistic and cultural diversity. These aspects of knowledge societies are just as important as the accumulation of commodities and financial wealth. The need to balance these dimensions is strikingly clear in the wake of the global financial crisis and the imperative to address climate change. UNESCO's emphasis on progress towards inclusive, diverse, and participatory knowledge societies calls for the renewal of its 2005 vision in the light of developments since that time. Renewal of UNESCO's knowledge societies vision should inform policies and actions at all levels of discussion about the post-2015 MDGs.

In this report we build on the UNESCO 2005 vision of knowledge societies, commenting on and renewing the vision and emphasizing the implications for UNESCO's strategy for action. Freedom of expression, universal access to information and knowledge, high quality education and learning for all, and respect for linguistic and cultural diversity, are highly desirable goals. But UNESCO should move a step further. Criticising and rejecting simplistic models based on technological determinism and top- down authoritarian approaches, as well as the unbalanced privileging of market values (neoliberalism), provides a basis for designing pragmatic programmes. These should take into account the diversity of the concrete situations lived by people in different parts of the world. They should aim at ensuring that knowledge societies involve them in their

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own enlightenment, empowerment and achievement. They should urge private, public and civil society partners to join their resources and actions to build knowledge societies for peace and sustainable development. Knowledge is necessary to achieve this. More than a powerful means to do so, when policies and strategies are designed to support this, knowledge can contribute to human emancipation through its creative application; it is itself a worthy goal for human kind.

With its vision of knowledge societies, UNESCO moved beyond a focus on the information and communication infrastructure to human beings and to processes of learning. The vision of knowledge societies for peace and sustainable development requires a further move to emphasize the need to rally partners from the private and public sectors and civil society to clarify persistent problems and to create processes and actions that will address them.

2. Renewing the Knowledge Societies Vision for Peace and Sustainable Development

KNOWLEDGE, PEACE AND SUSTAINABLE DEVELOPMENT

It is difficult to define the complex cultural, social, political, and economic aims implied by the words peace and sustainable development. We know that peace is not merely the absence of war, but a condition of living where everyone can enjoy tolerance and respect. The achievement of sustainable development has become a rallying policy goal, but the specific measures to achieve it and the interpretations of the objectives differ among interest groups.[19] Consensus in these areas in real situations can only be reached through democratic debate and this requires both freedom of expression and freedom of information. Our contribution is modestly focused on recalling and revisiting the aims of knowledge societies. We rely on an intuitive interpretation of peace and sustainable development as globally positive values - respect for human life and for the environment. Development policies within knowledge societies should take into account the protection of the environment, social equality and economic welfare.

Knowing about one another is not a guarantee for peace. But learning about other peoples' culture and history, understanding how and why they behave is the first step to respect and even admiration and love. Conversely, peace is necessary to artistic creation and scientific innovation since it establishes favourable conditions for the blooming of knowledge societies. However, it has to be recognized that knowledge can be and has been used to make violence and war more effective and more destructive. Desirable knowledge societies should promote a culture of peace. This was asserted firmly during the UNESCO General Assembly at its 25th session in November 1989, endorsing the declaration of Sevilla (1986).[20] It is also a goal pursued by the University for Peace in Costa Rica, supported by UNESCO.[21]

In a similar way, knowledge can be used either to protect or to damage the environment. There are plenty of sad examples showing irresponsible applications of science and technology. In contrast, the scientific community in large majority is warning the public and political authorities about the risks of global warming. It is also continuously demonstrating the serious consequences of human behaviours which are endangering animal species and natural resources. Hopefully, there will be a growing number of good practices supported by scientists and local communities in a joint effort to share their respective knowledge and to adopt strategies leading to sustainable development. Participation of all stakeholders is a key factor for success. Misunderstood and binding solutions cannot provide lasting results. On the way to more sustainable knowledge societies, ICTs can increasingly be used to echo such good practices and to mobilize public opinion so that there is a response to urgent and threatening issues.

In many documents on what is variously called the information society, knowledge economy, or knowledge society, knowledge is often mistakenly used as an equivalent to information. There are diverse definitions of these terms in the literature, but basically, information refers to signals measured in bits. On a second level, information may mean data that may or not be related. On a third level, information is interpreted or mediated through events reported by the media. On a fourth level, information may be combined and interpreted to constitute knowledge. Capacities for the production, circulation and use of information have increased so much over the last few decades as a result of technological innovation and the development of networks that we have become familiar with characterizing our societies as information societies.[22]

Universal access to information is a basic requirement to create knowledge societies for peace and sustainable development, but it is not a sufficient requirement.

Knowledge is a more complex concept than information.

It cannot be reduced to the mere addition of unrelated information elements. Knowledge is a concept that implies meaning, organization and structure. It refers to articulated sets of meaningful observations, analyses, and interpretations that are developed over time and available for each generation to be discussed and criticized. Access to knowledge implies not only access to technical devices and to stocks of information, but also involvement in learning processes. There is no knowledge without learning.

UNESCO's move from information to knowledge societies was not a mere change of label. It means that the challenges are more complex than developing the technological infrastructure. It also means that a fundamental challenge

is the requirement to ensure universal access to formal and informal learning processes and facilities.

In industrial and post-industrial societies, much knowledge

is mainly created through organized scientific activity; and

it is acquired mainly through the formal educational system. Thus, an interest in knowledge production and circulation leads necessarily to paying attention to research and training, to science and to education. However, much would be missed

if we limit ourselves to scientific knowledge and to formal educational systems. Non-industrial societies have also created and developed knowledge, including useful knowledge for medical purposes, for economic production and for various situations in daily life. The value of this knowledge is progressively being rediscovered, even in countries where it has been neglected for decades.

Furthermore, it is well known that much knowledge production and acquisition occurs outside school and the formal education system. The opportunities for informal learning and gaining knowledge as a result of experience have been greatly expanded by the development of the electronic media and digital networks. An increasingly large part of knowledge production and sharing occurs informally. For example, our human heritage is now available from home to those who are connected to the internet and have developed the abilities to gain access to it, understand it, and use it to their benefit. Additionally, knowledge is developed through everyday life interactions and problem-solving

which may or may not involve digital networks or access to digital information. In this respect it is important to recognize that there many different sources and types of knowledge and to find ways to incorporate non-electronically mediated information and indigenous sources of knowledge or wisdom into the institutions and processes that facilitate both formal and informal learning. This means paying particular attention to context specific factors that influence the ways in which the use of digital technologies and services is integrated into people's lives.[23]

Knowledge is a means to achieve social and economic goals. It is essential to cultural socialization, political participation and integration within markets. But it is also the path to individual and collective emancipation and should be valued for itself.[24] As a recent report puts it, "Education is critical to the development of knowledge societies as it is the source of basic skills, a foundation for knowledge acquisition and innovation and an engine for socio-economic development".[25] Education is central to civic empowerment and especially for young people. UNESCO has been actively involved in this field and should continue to build upon this expertise.[26] This is important for the renewal of the knowledge societies vision because there are many lessons showing that a focus on learning technologies and access to technical skills (like keyboarding) is not sufficient to ensure that learning will empower people to make changes in their lives.[27] In fact, it is increasingly evident that information and media literacies in knowledge societies need to encompass conceptual competencies such as critical thinking, innovative approaches to problem solving; practical competencies for navigating in media and information environments; and competencies such as social networking, digital citizenship and cross-cultural interaction skills.[28] Such competencies also need to include those which enable people with disabilities to participate in knowledge societies.[29]

From a utilitarian perspective, knowledge generation is a means of economically valued production. Such knowledge, often designated as 'useful' knowledge,[30] gives workers access to jobs, and helps to improve business productivity and the competitiveness of national economies. Gaining access to knowledge means providing access to strategic information and to professional skills. In this perspective, because knowledge can contribute to competitive advantage, individuals and groups that create it tend to limit access by controlling access to information through the enforcement of intellectual property rights.

It is widely acknowledged, however, that freedom of expression is fundamental to democratic life.[31] Therefore, access to knowledge through formal and informal education and learning should not only satisfy economic needs. It should facilitate freedom of expression, not mainly of the privileged, but of every citizen. Reciprocally, the development of knowledge can only benefit from freedom of expression and from artistic creation that can bloom in an environment that favours liberty. It needs to be recognised there is a paradox at the heart of emerging knowledge societies: the spread of the participatory possibilities offered by digital technologies all too frequently coincides with the deterioration of democratic processes at least in some countries.[32] This makes it essential to give a very high priority to education so as to ensure that people are able to participate in knowledge societies and to make informed choices about their lives and how they are influenced culturally, politically and economically by the availability of digital technologies, networks and services.

In modern states, education, together with health care, is among the most important components of public spending. As the process that enables knowledge acquisition, it starts with basic education at primary and secondary school which
is generally recognized as a public service. Higher education is provided by private and public institutions at college and university levels and lifelong education includes informal and professional training. The expansion of digital networks opens fantastic opportunities to facilitate education and learning at all levels. But this potential can materialize only if basic requirements are satisfied: above all, high quality content and well-trained tutors. High quality education for all, at every level, must be one of the main aims of knowledge societies for peace and sustainable development. This can be achieved only through sufficient investment in training educators. An equally important concern for policy is cultural and linguistic diversity which is essential for encouraging participation in knowledge societies. If these are not given sufficient attention, people may gain access to networks and digital information, but to education and learning opportunities that are not meaningful to them in their everyday lives.[33]

Distance education is frequently identified as the miracle solution to the lack of educational materials and human resources, including the capabilities for learning such as reflection and making sense of information. Indeed, it can serve as an effective means of giving more access to scarce information resources. Properly used, it can help to train teachers more rapidly in countries where large numbers of

teachers are needed in a short period to meet the needs of primary and secondary schools. But research and experiments have shown that distance education requires more than a communication infrastructure.34 To be effective, distance education must be designed well in advance, rely on high quality content, and qualified technicians, teachers and tutors and build the capabilities associated with media and information literacies among its learners.[35]

Education is not only a top-down activity through formal teaching and learning. It also occurs through exchanges among people with different types of expertise. Many universities are acknowledging that they have a social responsibility regarding local and regional development. For decades, in cooperation with different partners they have created, usually with few resources, valuable services for local communities.[36] These initiatives combining the 'know how' of academics with the 'know how' of practitioner stakeholders are a good way to ensure that knowledge is produced and circulated for application in contexts that respond to real social and economic needs.

Scientific research is conducted in private and public organizations which need huge financial investments. The outcomes can result in competitive advantage for businesses in national and global markets. They can also yield medical interventions and medicines that are effective in treating large numbers of people. Because the production of knowledge is the result of a process involving individual effort and the use of previous knowledge, it is very important to define legal systems that provide a fair balance between the protection of intellectual rights and the public access to knowledge.[37] A fair balance between private and public interests in knowledge is one of the major preconditions for achieving knowledge societies for peace and sustainable development. UNESCO's role should be to encourage this by commissioning research to understand existing imbalances and by setting up international forums, in cooperation with other international organizations, to discuss and publicize initiatives that provide illustrations of how greater fairness in the existing arrangements can be achieved. This applies across all domains of knowledge societies, including the traditional and converged media.[38]

In adopting the *Convention on the Protection and Promotion of the Diversity of Cultural Expressions* in 2005,[39] the UNESCO General Assembly acknowledged that cultural diversity is a human heritage worthy of protection and promotion. Since knowledge is part of culture, cultural expressions represent

a valuable kind of knowledge which is as important as instrumental knowledge. Through expressive activities, people give meaning to their lives, share values, emotions and ideas. They learn to understand each other, to share their fears and their hopes, to experiment with solidarity and to face challenges. An important issue is the role of language and the development of a multilingual online environment,[40] and this is linked closely to the development of public domain content. Thus, all forms of knowledge, including artistic knowledge, should be promoted together with instrumental knowledge, because they are all essential for individual and social life.

Digital technologies and networks open new opportunities for a large number of people to gain access to artistic expression. Many experiments in different parts of the world have shown that smaller scale equipment which is designed for use in specific local contexts at low cost can help marginalized individuals and communities to find ways to give meaning to their lives and to achieve better social, cultural and economic integration. But these opportunities do not flow automatically from access to technologies or to information. This is why it is so essential to renew UNESCO's vision of knowledge societies as part of an ongoing learning process that takes account of changes in technologies and in the societies in which they are embedded.

3. Renewing the Knowledge Societies Vision for Peace and Sustainable Development

RENEWING THE KNOWLEDGE SOCIETIES VISION

If the goal of knowledge societies is to foster peace and sustainability, it is imperative that strategies for action ensure that decisions at all levels promote the integration of knowledge within people's lives in ways that maximize the benefits and minimize harms, taking into account the goals of both economic prosperity and inclusive social equity and justice. There are numerous reports on the actions needed to foster information or knowledge societies. Some focus on digital infrastructure, some on involving small and medium sized enterprises in using digital technologies for poverty alleviation, others on encouraging a greater role for private sector investment, the importance of open software development and applications, or the need for partnerships among public, private and civil society stakeholders.[41]

UNESCO's mandate is to give priority to freedom of expression, access to information and the empowerment of people. This means encouraging measures that uphold fundamental human rights, media freedoms, and freedom of speech, and enable people to acquire the "necessary skills to produce and circulate information and engage with the media, and also to critically analyze and synthesize the information they receive".[42]

Digital technologies and networks do have the potential to enable people to participate in societies as active citizens, but citizen empowerment does not follow naturally from access to information. Empowerment requires pre-conditions to be in place.[43] One of these pre-conditions is the legal infrastructure protecting rights to freedom of expression, freedom of information, and privacy and the regulatory environment which supports these.[44]

Many reports address the question of *what* should be done to foster knowledge societies that promote these values. However, they are not always explicit about the competing interests that create barriers to achieving them. A principal reason for this is reluctance on the part of many stakeholders to acknowledge that their interests change as local and global knowledge (mediated content, information) becomes increasingly central to our "very capacity to be in the world".[45]

It is widely assumed that if people gain access to the internet through a mobile phone, they will be able to produce and consume information which they value. For some, market- imposed information scarcity creates the best incentive to achieve this because information is costly to produce. Maximizing creativity and information diversity is expected to benefit from the strongest enforcement of laws protecting intellectual property. However, others recognize that since digital information is virtually costless to reproduce, the best incentive for its production, circulation and consumption is created when information is openly shared.[46]

For some stakeholders, the proper policy is to rely on market demand for ICTs and information to maximize individual choice and spur technological innovation that is responsive to human needs. But over-relying on the market to guide change in knowledge societies is only one choice among many. The alternative is also to rely on collective action in an open information commons to shape knowledge societies.

The renewal of UNESCO's vision of knowledge societies should acknowledge that policy measures are needed to support

an open information commons and a market-led approach in a balanced way. It is possible to develop novel ways to legitimize the open circulation of digital information and to balance this with novel means of making economic returns from digital information. In debates about this stakeholders usually make opposing claims. The asymmetric relations among stakeholders that produce conflicting policies and strategies in knowledge societies will persist. But there are many spaces of opportunity for change as the environment in which these societies are emerging changes. UNESCO's vision of knowledge societies needs to enlarge and foster these opportunities. Progress towards knowledge societies for peace and sustainable development means learning new habits of thought about the ownership of information and access to it. It requires creative solutions that do not involve the excesses of the market or complete reliance on the information commons.

The knowledge societies policy environment is currently tilted in favour of market-led strategies and actions as shown below.

Information exchange for a price in the marketplace, maintained through enforcement of private rights of information ownership (copyright, patents), and attempts to limit access to information are favoured by prevailing laws and conventions. But policy making institutions are also fostering an open commons for information sharing, taking advantage of the abundance of digital information, and relying on the innovative abilities of networked communities. UNESCO's renewed vision of knowledge societies must emphasize a balanced approach to information exchange in the market and sharing in the information commons (as shown below).

There is an urgent need for novel policies and actions to achieve this balance. As Manuel Castells put it in his book, *Networks of Outrage and Hope*, "if there is an overarching theme, a pressing cry, a revolutionary dream, it is the call for new forms of political deliberation, representation and decision-making".[47] Now that people are gaining access to networks and digital information, they are more effectively expressing their for progress toward a fairer and more democratic polity in knowledge societies; societies concerned with cultural, social, and political human values, not only with economic value.

A plea for imaginative ways of dealing with conflicting interests in knowledge societies is not a new. It can be found in research on the role of digital technologies, information and knowledge in the development process.[48] What is valued in tomorrow's knowledge societies will be shaped by the strategies and actions towards information, communication and education that are taken in the near term and much can be learned from experience since the WSIS deliberations in 2003 and 2005.

We have learned that it is inappropriate to look only to ICTs – the internet, mobile phones, broadband or software apps – to understand societal transformation.[49] There continue to be a fascination with technology which is seen as the solution to development problems. But whether it is the 'always with your camera' or multiple YouTube channels, it is clear

that these become meaningful in people's lives in ways that differ enormously across the world and that the social and economic consequences of the use of these technologies vary enormously.[50] The best strategy is to enable people to empower themselves through knowledge so that they can shape how their requirements for well-being are met. This means looking beyond 'uses' of networks and applications,[51] to the conditions – institutional, regulatory, financial, political, and cultural – that frame these uses, whether these are uses of mobiles, social media, or other forms of mediated interaction.[52]

A central lesson from decades of research on the economics of technological innovation, and especially innovations in ICTs, is that it is possible to "leapfrog" generations of technology, for example, to wireless networks without extensive fixed line networks. But it is not possible or desirable to "leapfrog" towards a universal knowledge society. This is a misleading view because it does not take account of the many non-technical arrangements that must be in place for earlier generations of technology to be bypassed or for new technologies to be assimilated into people's working and everyday lives. Those who study this process are increasingly acknowledging that socio-economic and cultural change occurs in very complex ways.[53] Information and knowledge are not the same because knowledge requires interpretation by human beings. What matters is participation in change, enabling people's choices, values, preferences and voices to be expressed, heard and taken into account. A renewed vision of knowledge societies must not take the impacts of digital technology for granted. It must not ignore the complex and unpredictable ways in which technological innovation is coupled with other changes in all areas of society.[54]

The vision of knowledge societies must be one that affirms the core aspirations for peaceful and sustainable knowledge societies in a way that acknowledges the interests of all stakeholders.

In the remainder of this report, we focus on the challenges of managing the production and accessibility of information for peace and sustainable development (section 4) and the ways in which access to digital information can be facilitated (section 5). In section 6 we provided selected illustrations from which lessons can be learned about how best to achieve the vision of equitable, just and sustainable knowledge societies. In section 7, we outline some recommendations for UNESCO's forward strategy.

4. Renewing the Knowledge Societies Vision for Peace and Sustainable Development

MANAGING THE PRODUCTION OF INFORMATION AND KNOWLEDGE

One of the most important challenges for knowledge societies is the adoption and the enforcement of appropriate public policies for managing the processes and institutions involved in the production and circulation of information within these societies. Such policies ought to involve many sectors of society and they require the concertation of different ministries (education, science, industry, justice, etc.) and citizen and consumer groups to ensure that the knowledge societies developments are enabling.

The production of knowledge results from a process involving individuals, but it also benefits from collective activities. Before the industrial revolution, knowledge was produced mainly by academics, artists, writers and inventors who worked in relatively isolated ways and did not need huge investments. Today, private and public laboratories often employ internal and external teams in which many thousands of researchers are responsible for knowledge production efforts and outcomes. They rely on large budgets from private and public funds. They can count on public support and private laboratories benefit from public subsidies and tax deductions from States that compete to attract them.

Knowledge is also produced and circulated in schools and universities. Most modern societies acknowledge that access to these institutions should be available to all. Unfortunately, the resources allocated are, in many cases, not sufficient and the level of access remains too low. There can be no real knowledge society where access to basic education is not ensured for all.

We know little about the cognitive aspects of the creative process but one thing is obvious from mere observation: a new idea or a new product is never entirely new. It results in greater or lesser part from an original combination of already known elements. Creations always borrow something from the collective heritage, the collections in previous books, works of art, popular music, traditional tales and so on. This means that the act of creation is a blend of individual and collective contributions.[55] This is even more the case in an era in which digital mash-ups and remixes are relatively simple to create.[56] As a result, the management of the benefits of creative production should take its double origins into account.

Since the Antiquity, most philosophers and scientists have thought that knowledge should be accessible to all and that it is their duty to promote it. Artists also want people to be given the opportunity to enjoy their productions. Of course, writers, scientists and artists also wish to earn a living from their activity. The question is how a society should organize access to information while encouraging the production of knowledge.[57] This is perhaps the most crucial issue for the future of knowledge societies because it goes to the very heart of how we value knowledge socially, not just economically. Historically, the intellectual property rights regime was developed to balance the interests of creators and those wishing to access their works.[58] This balance was reflected in Article 27 of the Universal Declaration of Human Rights: "Everyone has the right freely to participate in the cultural life of the community, to enjoy the arts and to share in scientific advancement and its benefits. Everyone has the right to the protection of the moral and material interests

resulting from any scientific, literary or artistic production of which he is the author". This balance sought to provide a reasonably large public domain in which everyone could benefit from access to information. Over time, however, this public domain has been squeezed with greater attention to information ownership rights and less to authorial or moral rights. In addition, today there are many innovative ways in which people can share information in a digital commons.

Charlotte Hess and 2009 Nobel Laureate in Economic Science, Elinor Ostrom, argue that knowledge is a collective resource and a non-rival common good.[59] This means that sharing information does not inevitably lead to what Garrett Hardin called the "tragedy of the commons" referring to the excessive use of natural commons (water, forest, fishery),[60] when access is not regulated. Community pastures could quickly be destroyed by uncontrolled use by individuals who look only to maximize their own benefits if they are not managed through formal or informal norms and conventions. However, information not only survives individual appropriation; it is non-rival in use, but its value and usefulness increase with diffusion. Conversely, excessively limited access impedes its stimulating effect on other creators and can lead to what the lawyer Michael Heller calls the "tragedy of the anticommons".[61]

Does this mean that access to information and knowledge facilities should always be free? Promoters of the Creative Commons do not intend this.[62] They offer six types of license, defining progressive conditions of access which correspond to different levels of intellectual property control. The Creative Commons movement acknowledges that individual contributions to a creative work can be recompensed if an information good is commercialized. But Creative Commons and other similar initiatives try to maximize creativity and access in contrast to business models, based on existing copyright law, which try to limit access strictly to consumers who are able to pay the market price determined by the copyright holders, with relatively narrow provisions for 'fair dealing' or 'fair use'.

Even though information which is produced and shared in a knowledge commons helps to contribute to widespread creativity and learning in knowledge societies, some information also has strategic value for businesses that reasonably expect a return on their investment to produce it. Huge amounts of money are sometimes needed over years to create a new information product or service. Knowledge societies should adequately protect intellectual property to

favour such investments. But such protection and restricted access have been extended to far too long after the creator's death.[63] Completely open information access would result in a disincentive to creation. But, an all-encompassing direct payment system is too exclusive, restricting access and it restrains incentives for creation. The challenge is to find a balanced solution between these two extremes that is socially acceptable and economically viable.

Economic rewards for the creation of digital information are especially important in the economic sector identified since the 1990s as the creative industries in which creation plays a key role. Definitions vary, but the creative industries sector usually refers to the cultural and media industries, adding to the list architecture, design, craftsmanship, the digital equipment and software industry, and advertising publicity.[64] Workers in this sector must be well-trained to master specific knowledge and skills. The development of the creative industries therefore requires high quality training programmes in addition to the freedom and encouragement to contribute in innovative and creative ways. In view of the growing contribution of the creative industries to national economic output, most countries are seeking to adopt policies to develop their creative industries so as to strengthen their competitiveness in the global economy. [65]

However, societies are also increasingly characterized by both decentralized individual action and *collective action* – "new and important cooperative and coordinated action carried out through radically distributed, nonmarket mechanisms that do not depend on proprietary strategies plays a much greater role than it did, or could have, in the industrial information economy".[66] Our strategic vision for enabling the production and accessibility of digital information in knowledge societies rejects a dogmatic opposition between proprietary market-led approaches and the digital information commons. Adjustments to the policy environment should be encouraged to enable market and commons-based creative activity to proceed in parallel.

In addition, experience has shown that the best outcomes for all stakeholders can be expected when the private stakeholders in the marketplace and State actors play complementary roles instead of fighting each other. Market players should stimulate competition and provide sufficient investment and incentives for innovation. The State, for its part, should support high quality education, good market governance and a well-balanced system to protect intellectual

property and facilitate universal access to digital information. Civil society actors should be involved in the definition and the management of information-related activities in which they are stakeholders. Participatory initiatives usually produce better results than top-down initiatives. Giving a high priority to participation is a good way to ensure that policies are owned and favoured by grassroots groups.

Finally, public broadcasting systems, in line with their public service missions, have a double responsibility to promote cultural and knowledge production and to facilitate access to their creations by the whole of society. They should renew their missions in the light of the development of the internet and the creative industries. UNESCO could play a coordination role in organizing meetings and circulating information to share experience and innovative experiments. Public service media in the wealthy countries should be encouraged to work in cooperation with countries without a strong tradition of public service to give people access to diverse and locally relevant content via the internet or via older broadcast media forms, without importing broadcasting industry and regulatory models that are insensitive to local conditions. These initiatives should acknowledge that there are substantial differences among public broadcasting models ranging from State controlled to public independent and to community initiated.

There are many illustrations of efforts to restore the balance between the information market and the commons. For example, the Access to Knowledge Movement seeks improved access to digital information services and to knowledge embedded in goods, as well as to the digital technologies which enable individual and distributed collective knowledge production.[67] In addition, copyleft licenses use copyright law to maintain the openness of the intellectual property. The GNU General Public Licenses (GNU GPL) emerged from the free software movement, later inspiring the Creative Commons (CC) open content licensing system mentioned above which has been especially helpful in promoting access to educational resources.[68] In 2010 it was estimated that there were more than 400 million CC licenses.[69] The need for training in the area of intellectual property protection is likely to increase as individuals and organisations continue to use these kinds of licenses. For example, there is a need for specific courses with a focus on development issues and the challenges of accessing knowledge in key areas such as climate change, food security, population health, public education, gender equity and poverty reduction. Issues

to be addressed include the role of health sector patents; biodiversity, climate change and intellectual copyright law; and the role of copyright in protecting local or indigenous knowledge.[70]

Another issue of particular importance is the question of the curation of digital artefacts that are of significance for cultural heritage and science.[71] Open information activities involve participants from formal science and loosely networked groups. Investment in digital curation occurs with a view to the long-term accumulation of useful knowledge, but if digital information is not openly accessible it will only be available to a minority of people.[72] UNESCO's work on cultural heritage memory and on safeguarding the documentary heritage of humanity provides a basis for further consideration of how curation relates to the management of digital information in the commons.[73] For example, attention needs to be given to the management of ephemeral or short-lived information in the digital age, to information that is lost because of changing digital formats and standards, and to how digital information located in the cloud should be accessed, protected and preserved. We know too little about how the design principles for the management of the commons should apply in a complex area like the information commons.[74]

From the perspective of institutions in the private and government sectors, open initiatives sometimes seem to present threats to their authority or to compete for financial resources. Open initiatives may be charged with degrading the information commons if they do not operate in line with conventions for information verification or if the release of information is seen as being damaging to the public interest. Policy measures are needed to underpin collaborations and partnerships between traditional institutions and distributed networked groups to foster hybrid approaches to managing the information commons.

Effective policy requires a better understanding of emerging forms of collective action in the information commons if it is to encourage the application of information to time critical problems and to accumulate useful knowledge for learning how to address future problems. Within formal science institutions there is intense debate about the enlargement of the public domain and provisions for the 'fair use' of copyright protected information.[75] These issues go beyond access to information. The increasing granularity and modularity of information activities supported by new technologies for interaction in the information commons,[76] means that there

are enormous opportunities for social benefit from synergies between the activities of distributed networked groups and traditional scientific and educational institutions. Every effort should be made to increase collaborations between them.

It is insufficient simply to liberate information from the prevailing copyright regime. We emphasize throughout this report that access to information is not a sufficient condition for meeting the goals of knowledge societies for peace and sustainable development.[77] Efforts must be made to understand the conventions, norms and practices relating to the management of information by these different groups and the dynamics of partnerships among public, private and civil society groups.[78]

5. Renewing the Knowledge Societies Vision for Peace and Sustainable Development

FACILITATING ACCESS TO INFORMATION AND THE PRODUCTION OF KNOWLEDGE

Stimulating the production of information in knowledge societies which is perceived as relevant by those who apply it will remain a challenge for policy in the coming decades. This is because access to information is a basic, but not a sufficient, condition for achieving the goals of knowledge societies. In this section we highlight some key domains that require concertation if the vision of knowledge societies for peace and sustainable development is to be achieved. These issues are: building a network infrastructure for open information and learning; social networking and open data and information; and the importance of genuinely participatory practices in knowledge societies. We link these issues together in this section because the changing mediated environment means that when audiences/users have affordable access to networks they are much more likely to be active contributors of information today that they have been in the past. This changing landscape redefines what it means to talk about 'access' to the internet and mobile phones.

5.1 BUILDING THE INFRASTRUCTURE FOR OPEN INFORMATION AND LEARNING

In the division of responsibilities among United Nations agencies, UNESCO's mandate is only indirectly concerned with the network infrastructure that is essential for facilitating access to information. However, even though UNESCO is not directly concerned with the technical and financial aspects of building the network infrastructure, the social and cultural aspects of its design, operation and use need to inform UNESCO's policies. It is too often assumed that if policy goals in the infrastructure domain can be met, e.g. if the technological digital divide is closing as a result of the diffusion of mobile phones, then other aspects of the vision of knowledge societies will fall into place. However, the infrastructure for information access can be developed in a way that is more or less favourable to facilitating open access and information and knowledge sharing. Policies in this area need to be coordinated with issues that are within the mandates of a large number of agencies at intergovernmental, including the International Telecommunication Union (ITU), and at national levels.

A persistent issue for lower income countries is the threat of being left out of technological advances that are central to innovation, well-being and prosperity in knowledge societies. The response is to seek measures to bridge the technological digital divide to improve access to telecommunication networks, the internet and ICT applications.[79] However, this approach does not recognise the fact that innovation in knowledge societies is continuous and that it is insufficient to concentrate primarily on closing technological divides. It is often argued that access to the global network infrastructure is inexpensive relative to the opportunities it provides. Investments in modern telecommunication infrastructures are offering the opportunity for access to international data flows and fibre infrastructure is providing unprecedented opportunities for the global reach of these networks. However, the priority is usually given to connection to the most economically important locations which are also often locations with better access to electrical power which is

normally essential to support user devices. While the conditions of access are opening opportunities for country-level access, they also focus initially on major cities and ports which already have a substantial lead in providing access to information as compared to other regions of countries. This heightens 'enclave' patterns of development and contributes to rapid urbanization which is a feature of modern development, with very mixed consequences especially for environmental sustainability.[80]

Wireless access and the expansion of fibre cables means that significant progress has been made over the past decade in extending both fixed network and mobile network access, but this has not always succeeding in providing affordable access.[81] Reproducing 'universal service' and striving for higher levels of broadband internet service for individual homes is often prohibitively expensive for lower income countries.

A principal issue for knowledge societies is the increasing complexity of network infrastructure provision. There is an enormous expansion in physical capacity and its utilization, but complaints about the affordability and availability of access continue. In addition, when it is acknowledged that the design and development of infrastructure is also a gendered activity, there are issues of design, for example, for gender aware telecentre access, whether these are private or public, for secure email systems, or for the complexity and functionality of handsets, that need to be considered.[82] These are not usually the primary issues on the minds of infrastructure builders, but they are key issues for UNESCO in view of its aim of ensuring that knowledge societies are inclusive.

A major challenge for infrastructure provision is that while policies aimed at improving competition are being implemented with the aim of addressing pricing and availability issues, many bottlenecks remain. Some of the problems of extending information access are being addressed by the mobile revolution and mobile telephone data communications is burgeoning. Global mobile traffic as a percentage of total internet traffic rose to 10% in early 2012, up from less than 1% in 2008,[83] but the impact of growth in traffic on peoples lives depends on a variety of complex factors.

Use of Mobile Phones in soUth AfricA

A 2012 study exploring how the poorest citizens in south Africa use mobile phones found several key factors which influence the likelihood of those individuals using the internet. examining the habits of individuals who live on less than Us$1.80 per day – defined as those at the 'base of the pyramid' (BoP), the major obstacles to internet use by those at the boP included cost, access and a lack of knowledge. Some 65% of the boP non-internet users were reported as not knowing what the Internet was, while 86% of those surveyed did not know how to use it. Although two of the most likely reasons for boP non-users were related to internet illiteracy, 91% cited having no computer or internet connection compared to 84% of non-users in the 'rest of the pyramid' (RoP). Non-internet users in both the boP and roP also cited the high cost of Internet services as a barrier to use (60.1% and 59.1% respectively). RoP non-users were more likely to state no interest in the Internet (46% as compared to 34% of BoP non-users), whereas 66% of BoP non-users pointed to their friends not using it as the reason (50% of RoP cited this).[84]

Overall, the study report above found that mobile phones were the most popular choice for voice and data communication mainly for maintaining contact between friends and family. Mobiles are increasingly replacing computers as the preferred means to access the internet, though the cost of services represents a major deterrent to internet use. The mobile phone is becoming a multimedia access channel and voice and SMS services, which remain relatively expensive, are being overtaken by social media platforms such as free instant messenger services. Similarly, while early internet users were still choosing to communicate via email, social media is increasingly popular, particularly among more recent users. The study found that 36% of the BoP in South Africa use social media with MXIT, the most used application. It also found that people in rural communities were distrustful of applications and were suspicious of damage to their phones.[85]

the Use of Mobile Phones in KenyA

A study of the use of mobile services by those at the boP in Kenya found that 60% of survey respondents in Kenya owned a mobile phone in 2012. However, few were aware of the various applications and services available to them through their mobile. of services that survey respondents were aware of, mobile money transfer services such as M-PesA scored the highest at 98%. Aside from widely recognised calling and SMS services (100% and 97% respectively), 92% of respondents also knew of airtime borrowing services. A very low proportion of respondents (1%) were familiar with internet bundles/services, despite 25% stating they used the internet on their mobiles. few respondents indicated they were aware of applications such as tracking lost phones (16%), commodity prices (5%), or loyalty schemes (0.3%). A lack of awareness and unsuccessful marketing plans were suggested as the major factors explaining these results. there seemed to be confusion among phone owners at the boP about the difference between applications and functions, with some users listing basic phone functions such as alarm clocks and calculator as 'applications'.[86]

Thus, despite the rapid spread of mobile phones at the 'base of the pyramid' (BoP) it is not necessarily possible to distribute information messages to large numbers of subscribers or to support interaction if they are not using the internet. The idea that access to information necessarily increases in parallel with access to mobile phones seems likely to be more rhetoric than reality,[87] at least for those at the BoP. It is important to understand the actual uses people are making of their mobile phones, often to communicate and share information among themselves, and not to make assumptions that patterns of use that are typical in one country or region will be replicated across the world.

Mobile phones address two important issues of access – the investment costs for terminals and the 'getting started' costs of digital literacy as a pre-condition for using digital services, but there are important limitations. Mobile services remain expensive partly because mobile services provide a tax base in countries where the means to collect taxes are limited. The success of mobile phones also has stimulated companies to build infrastructure quickly to generate short- term profits, resulting in an access infrastructure that may hinder or prevent more sophisticated data communication applications, especially those that rely on high bandwidth video[88]. Mobile phones clearly are capable of supporting poverty alleviation and improving the conditions of life for those with the least income.[89] But it is less clear whether the mobile revolution can support more complex information sharing which is increasingly required, and which has intensive data communication and display needs that often outrun the capacities of low-end mobile phone terminals.

It is also not clear that a focus only on those at the BoP and on their ability to pay (even using small pre-payments) as consumers is sufficient to ensure the inclusive emergence of knowledge societies in all regions of the world. People also need access to participate in their societies as citizens. In India, for instance, internet penetration overall has reached around 10% of the population and only 3% were accessing the internet from home at the end of 2012. Although some see the solution in the build-out of high-speed telecommunication networks, and although the numbers of mobile phone users have climbed rapidly, with a compound annual growth rate near 67% from 2000 to 2012,[90] policy measures in addition to infrastructure investment are needed to enable citizens to take full advantage of online services.

Alternative models aimed at providing better access continue to be experimented with in many parts of the world, although enthusiasm for these models waxes and wanes over time and depending on a given country's emphasis on market-led development. Telecentres, libraries and 'digital cities' continue to be used as a means of extending access to information in parallel with the growth of mobile phone use. Telecentres may be organized as private entrepreneurial activities (cyber-cafés) or as government-sponsored or subsidized facilities. Both can support education and learning and local employment. These developments offer a means of mitigating access problems where widespread access is problematic, where the costs of individual or family access are prohibitive relative to income levels, or where there are substantial shortcomings in skills or knowledge.[91] However, the problem of the economic sustainability of these initiatives continues to face public agencies and civil society organizations as well as entrepreneurial companies, especially when they need to scale up to provide access for data intensive applications. Although resources may be available to establish telecentres, or even new towns which aggregate network capacity, investments often do not include ongoing support for the costs of personnel and maintenance.

Overall, the rapid acceleration of information

access opportunities at the country level has not eliminated the

challenges of physical access to networks. Despite the major expansion in country level connection to the network infrastructure, there are substantial imbalances between countries and within country networks lag behind major or capital city developments; this remains an important policy area. In addition, the challenge of physical access applies to the sites where access is facilitated. Without considering cultural and socio-economic conditions, women and other disadvantaged groups may be excluded even where the technical infrastructure is in place.

The governance of the internet (and of related infrastructure and digital services) raises issues that are too numerous to discuss in this report and we do not address issues of media or telecommunications policy and regulation. It is important, however, to underline the need to coordinate policies in this area and to consider the training needs of those who regulate infrastructure and 'old media' services and who contribute to internet governance decisions. Open access to information will be influenced by whether or not the internet remains a relatively open environment for creative interactions among stakeholders who engage in the information commons. Approaches to internet governance differ at the national level throughout the world and these issues are mostly discussed at the global level, for example, in governance institutions like ICANN or the Internet Governance Forum.[92] Empirical examples of what is being done at the national level are needed so that comparisons can be drawn and examined for the lessons they provide.[93] Developments in this area need to be coordinated with the organizations and agencies that are concerned with *how* the internet and other digital applications are being developed.

5.2 SOCIAL NETWORKING AND OPEN DATA AND INFORMATION

The internet offers the potential for global collaboration in the creation of information resources that can be shared by all and used as a foundation for initiatives in the private sector and for meeting cultural, social and political needs. The variety and volume of open data and information are expanding rapidly.

The open software movement provides a good illustration of the way stakeholder interests can converge around open data and information. From the experience of software developers in the Western industrialized countries to developments in Asia and the Middle East,[94] this form of software development is becoming attractive to governments and companies as well as to distributed developer communities who volunteer their time without being associated with any established institution. There is also increasing evidence of hybrid forms of cooperation between public, private and civil society groups, demonstrating multiple possibilities for effectively managing information in the commons.[95] UNESCO is involved in developing policy guidelines for the development and promotion of open access and this should be continued.[96]

Open data and information activities increasingly involve crowdsourcing. Crowdsourcing refers to voluntary activities engaged in by participants in large-scale planned and spontaneous online interaction. This activity is not always associated with the information commons since it may be steered and captured for commercial purposes.[97]

Nevertheless, crowdsourcing is an increasingly prevalent feature of knowledge societies and often is aimed at scientific or social problem solving. Access to crowdsourcing tools and applications is unevenly distributed globally,[98] but geodata collection, data aggregation, analysis and publication are being supported by information commons platforms.

For example, Ushahidi (Swahili for 'testimony' or 'witness'), a non-profit technology company, was born out of the post-election violence in Kenya in 2008. It is a crowdsourcing platform enabling the mapping of incidents of violence or other activities. 'Citizen journalists', who may be individual citizens or people working with smaller or larger organizations, submit reports, via mobile or through computer access, which are then be hosted on the website. This approach to 'information collection' has attracted attention for its flexibility, both in terms of who can contribute and who can benefit. With clients now including the World Bank, the United Nations and Al Jazeera, the Ushahidi platform has been used to track cases of violence and unrest, humanitarian crises and medical shortages as well swine flu outbreaks and elections. An intention is to democratise information by increasing transparency and encouraging users to share their knowledge. Though it has received a largely positive response, the platform faces some limitations in terms of monitoring the quality of data and the difficulty for some communities to access the technology.[99]

OpenStreetMap[100] is another example which is used for collecting geographical data using an editable map which can be viewed anywhere in the world. Open source information platforms, open mapping and data enable citizens to generate information critical for their lives and livelihoods, although it does not necessarily follow that citizens are able to access the information they generate and apply it to make a difference in their lives. These technologies are often used in conjunction with commercial online services for publishing and sharing content, such as YouTube and an array of digital media such as geographical positioning system (GPS) devices and video cameras.[101] Such tools are being developed as well by companies such as Google's Map Marker, TeleAtlas's Map Insight and Navtek's Map Reporter.[102]

Crowdsourcing sometimes resembles 'crowdpushing' where third parties or intermediaries play a significant role in deciding how information may be accessed and used.[103] It has been suggested that crowdsourcing is being promoted by a 'new elite' that is "wary of overtly signalling the power dimensions of crowdsourcing".[104] Even if this is not always the case, the simple availability of tools provides little insight into the power relations among participants or whether this form of cooperation is sustainable in the information commons.[105]

Analysis shows that open data and information approaches need to be based, not only on open access to content, but also on open processes and participatory approaches if they are to be sustainable in the face of pressures toward closed or proprietary systems.[106]

Open data, 'big data' and 'real time' data and information in today's knowledge societies may be linked to empowerment through the potential for expanding individual freedoms, supporting participatory processes, and enabling learning. The important lesson is that development goals need to take priority when choices are made about whether to support open or proprietary (closed) approaches.[107] Attention also needs to be given to the cultural, social and political contexts in which applications of digital technologies are being introduced, including issues of individual privacy and the ethics and consequences of surveillance.

Social networking is essential for the filtering, referral, and adaptation as well as for sharing information involved in generating and applying knowledge.[108] It offers many new means for sustaining collective action and market-led activities, but not necessarily ones that are fit for building peaceful and sustainable knowledge societies. It does not always follow that particular uses of social networking and the growing amounts of data it generates will be related to the sharing of *useful or relevant* knowledge, especially as perceived by individuals in their daily lives.

All these developments raise important issues about the institutional arrangements that are needed to create incentives for the provision of both proprietary and open media and information services. If there is an imbalance which favours mainly market-led services, there is a risk that people will become locked into the consumption of digital services as consumers. Where this occurs, less emphasis is given to developing citizens' potential to express their creativity by developing abilities to produce content and information through remixing or recombining digital information in open interactive environments. If policy measures encourage a better balance between market and non-market based digital service environments through innovative approaches to the management of intellectual property, a broader spectrum of rights to access and use of digital information could be established. This would create many new opportunities for content creation and sharing, for the preservation of digital content, and for the conditions under which citizens are permitted to circulate information for private and public purposes. In open information environments, the problem of information scarcity is reduced (or different), but the abundance of digital information means there is need for training and education about how to access and share knowledge effectively as well as about innovative approaches to legal arrangements for the treatment of digital information as valuable for public purposes as well as for commercial gain.

5.3 TOWARDS PARTICIPATORY PRACTICE IN KNOWLEDGE SOCIETIES

There is always a tension between those favouring technology-driven strategies, often accompanied by top- down planning and action, and those who favour strategies based on an understanding the local conditions of technology use. Knowledge societies policy and strategic initiatives can be located in the quadrants shown below, depending on whether a 'top down' or 'bottom up' approach is prominent and on whether an initiative is driven by assumptions about what technology 'can do' or by participatory action which takes account of local interests and contexts.

It is important to assess how the conflicting interests among private, public and civil society stakeholders are being addressed through UNESCO and other organizations' strategies and actions. It is crucial to remember that "the realm of the technologically feasible is far greater than the realm of the economically profitable and the socially acceptable".[109] If a renewed vision of the contribution of digital technologies to peaceful and sustainable knowledge societies is to become a reality, strategies and actions must foster new combinations of bottom up and top down approaches that acknowledge differences in stakeholder interests, but work with them to devise creative solutions.[110]

Even when social media are designed to facilitate inclusive participation in knowledge societies, this does not mean they are always applied in this way. An important feature of UNESCO's strategy should be to address measures that favour inclusive, bottom up participation. Participation is a central notion in some areas of development thinking and practice. Following Robert Chambers' and others' work, participatory measures include approaches and methods through which "people are facilitated to do things for themselves".[111]

Participatory approaches seek to emphasize the democratization of information. Examples include initiatives undertaken with coalitions of interested practitioners, action research projects aimed at enabling local voices and preferences to play a substantial role in the development of applications, and studies of the feasibility of involving a more inclusive range stakeholders in policy debates, such as those facilitated by the WSIS and the WSIS+10 reviews.[112] This emphasis is shared with open source software developers, civic hackers, and other online communities of practitioners who address developmental and democratic challenges through bottom up collaboration.

This is not an easy approach because much of the work on the potential of digital technologies for knowledge societies is undertaken by groups or individuals with technical expertise. There are examples of digital applications that draw on technical expertise and try to embed it in their practices. However, apparently empowering and participatory resources (technological or institutional) can entrench the power of minorities or elites that know best how to use

them. It is crucial to reach out to those who are not the key players in policy forums, beyond the "netterati" or internet community, to those who are seeking to improve their everyday and working lives.[113] Experience indicates that: "while obviously needed, neither technological knowledge nor local knowledge and connections are necessarily the most important factors in making open ICTs work for development. What is most essential is a conscious appreciation of the key issue of how to make different actors work together, in a new context which mostly involves breaching and rearranging institutional boundaries and organizational structures".[114]

Specialized organizations need to work with all the actors involved to explore issues of power, new means of organizing volunteerism and how such projects can yield the most useful outcomes for the communities that hope to benefit from them. These issues raise major challenges of accountability for all stakeholders, especially as it is clear that when information asymmetries are not addressed, enhanced participation has relatively little impact.[115]

In addition, when development organizations invest in digital technologies and networks for managing their internal and external operations, they often neglect to invest sufficiently in their local partner organizations. This is becoming an even greater problem in the open data and information era. Efforts are needed to secure open access to information which can be shared; but data also need to be linked and managed in a way that will be seen as meaningful by local participants. Open data initiatives also raise issues of data privacy and the licensing conditions enforced by university. This means that institutional 'open' data archives need to be considered when efforts are made to employ digital data sets to help address development problems.

Questions also need to be addressed about whether complex data visualizations should be given priority for research purposes or whether simpler and more accessible visualizations are better for communicating with local participants so that they can apply the information and take action to address their problems.[116] When considering the implications of 'Web 3.0' technologies for development which go beyond the interactive features of the Web to embrace new semantic tools, it is essential to assess what developmental changes are desired (and by whom) and the potential role of information and knowledge in creating that change. It should not simply be assumed that the new technology applications will lead to the desired change. The communities supporting participatory development and technologists who champion open (linked) data and information rarely intersect. This is so even though they often have a common focus on faster and cheaper data collection, data sharing, data aggregation and transparent publication. Improved cross-fertilization between these groups would support a better understanding of new forms of technologically mediated participation.[117]

In the next section, we highlight lessons from selected areas where efforts are being made to accumulate experience in the development and use of ICTs. Some of these seem to be working, while others are less successful or perceived as failures by some of their stakeholders. Our aim is to highlight the learning opportunities for intergovernmental agencies, donor agencies, governments, businesses, civil society organizations and individuals. In line with the history of innovation in all fields, but especially in the case of ICTs that are widely recognized as General Purpose Technologies (GPTs),[118] it is essential to learn from mistakes, just as it is to learn from practices that are working. Digital technologies and the spread of networks are different from many other technological and organizational innovations because the consequences of their development and use reach into every corner of society with uncertain outcomes. The magnitude of the changes associated with them is also substantially greater than it is for innovations that do not have these characteristics.

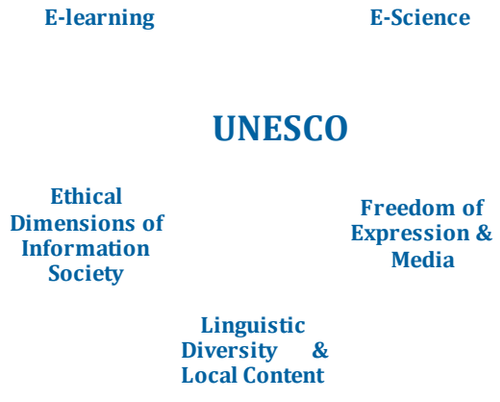
6.

Renewing the Knowledge Societies Vision for Peace and Sustainable Development

SELECTED INITIATIVES: TOWARDS KNOWLEDGE SOCIETIES

Digital technologies are being put to work in line with UNESCO's 2005 vision of knowledge societies and much can be learned from this experience. However, as this vision is renewed to give greater emphasis to peace and sustainable development goals, it is important to examine what has changed and what can be learned from experience. Knowledge societies are about human development. They are not emerging in isolation from other large-scale changes in society including shifts in economic power, major political, social and cultural transitions. Not all ICT-related applications are benign.[119] The WSIS debates and UNESCO's vision were set out before the mobile internet, social networks and other Web 2.0 applications took off. Facebook was founded only in 2004, and cloud computing was a distant dream at the time, at least economically. The governance and policy context for knowledge societies is increasingly unpredictable and this poses many new challenges as well. The policy environment needs to be flexible enough to ensure that stakeholders do not become locked into unsustainable pathways as a result of a failure to reflect and act upon issues as they arise.[120]

UNESCO's mandate following the WSIS in 2003 and 2005 covers the areas shown below: e-learning, e-science, linguistic diversity & local content, freedom of expression & media, and ethical dimensions of the information society. As the overarching vision of knowledge societies for peaceful and sustainable development is renewed, it is timely to consider how the ongoing development of these societies can be better aligned with development priorities which themselves are shifting.



Changes in digital technologies and applications mean that every segment of society needs to learn formally or informally about how best to facilitate access to information and knowledge (local and global) and its *useful* application, especially from the perspective of those whose lives are most affected by values and priorities in the knowledge societies in which they live.

6.1 LEARNING FROM SUCCESSES AND FAILURES

Not all initiatives aimed at building knowledge societies are concerned with the potential for the empowerment of local communities or disadvantaged and excluded groups. Those that emphasize pathways towards peace and sustainable development often take a bottom up, participatory approach. There is a tendency for reports aimed at reviewing the experiences of knowledge societies to highlight mainly the "success" cases, often without providing insight into why they are labeled as successful, or for whom they are successful. In practice, success may be limited in time or reach, or perceived as such by some stakeholders and not by others. Success may be evaluated mainly from the donor agency's perspective or in terms of whether a private sector actor is generating a reasonable rate of return on its investment. However, success needs to be evaluated in the light of the interests and aspirations of all those who hope to engage effectively in knowledge societies.

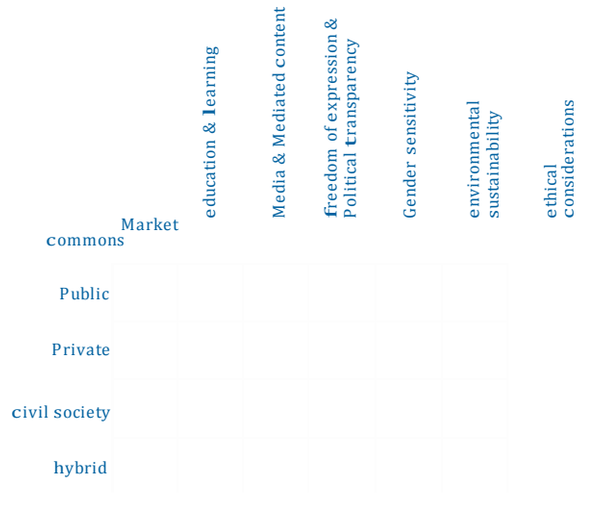
The experience of an ICT project in Tanzania using mobiles to send SMS messages demonstrates this point clearly.

citizen rePortinG in tAnzAniA

Daraji, an NGO in Tanzania, introduced a project 'Maji Matone' (water drops) with the aim of encouraging citizens to bring pressure to bear on authorities to maintain and repair broken water pumps. the local communities were to send sMs messages on the state of the pumps. Some 3,000 text messages were projected at the outset, but only 53 were received. On investigation, the NGO became aware that the sensitivity of relationships between communities and the authorities had not been adequately considered, that water collection was mainly women's and children's work, and that it was men who had the mobile phones. there was also limited mobile coverage and problems with electricity supply. the nGo publicly reported this experience with the aim of learning from this failure.[121] But as they put it, "admitting failure in this way is easy to support in theory, but much harder to do in practice. it may be accepted practice in the for-profit world, but it's uncomfortable for a donor-dependent NGO".[122]

Other organizations which are trying to learn from failures highlight mismatches in expectations about time frames, problems in capturing information, difficulties in engaging with everyone concerned, challenges of scaling up initial projects, and problems in deciding whether to move from public subsidy to commercial operation. Other reasons for failure may be associated with a lack of transparency or changes in internal and external power dynamics.[123] These experiences confirm the importance of learning from both *successes* and *failures*.

In this section, we highlight initiatives involving different combinations of participants. Many initiatives aimed at developing knowledge societies involving digital technologies and access to information are organized around two core themes: Media for Development, which focuses primarily on digital content and its circulation and consumption;[124] and ICT for Development, which focuses primarily on hardware and software and their applications.[125] We cannot offer a systematic review of every segment of society in which digital networks and access to information and knowledge are crucial. We do not give examples from every country or region of the world and we cannot capture all of the accumulated experience in the public, private and civil society sectors. Instead, in this section we draw lessons from illustrative initiatives that we are familiar with or researchers and practitioners known to us are familiar with (in a few instances, we draw on cases cited in the literature). The three dimensional matrix below (i. market/commons; ii. public, private, civil society-led or hybrid collaboration, and iii. the six themes we focus on in this report) provides a guide to the multiple features of these initiatives which are often combined in interesting ways.



The aim of this section is to highlight learning opportunities and to provide an empirical basis for the recommendations for UNESCO's priorities which follow in Section 7.

6.2 FORMAL AND INFORMAL EDUCATION AND LEARNING

Formal and information education are associated with UNESCO's work in response to the WSIS Action Lines - e-learning and e-Science. The 'e' is coming to be associated with an enormously broad range of digital technologies, networks and services. The 'e' draws attention to the significance of the online world, but it needs to complemented by attention to the interactions between the new digital applications and the continuing importance of the offline spaces in which people actively engage in learning. We have emphasized the changes in formal and informal education. But since ICTs are pervasive technologies, they are supporting learning across all segments of society. This means that greater emphasis needs to be given to informal learning, e.g. learning-by-doing and learning-by-using. These developments happen outside the boundaries of 'educational' institutions and, often outside the boundaries – or at least on the borderline – with scientific activity and this is an important relatively new phenomenon.

With the expansion of network connectivity, thousands of students and life-long learners are using open education sites. These vary in scale, language of instruction, whether they provide certificates, and in their approaches to pedagogy. UNESCO's 2012 Paris Open Educational Resources Declaration calls for greater awareness and use of these resources, improved infrastructure and literacy, and understanding of open content licensing frameworks. Many initiatives support worldwide learning opportunities and offer content developed by some of the world's leading western universities. [126] Locally sourced content and mobile enabled learning interactions are being developed in some areas of the world, often involving children, but "from Pakistan to Peru and beyond, experience shows that while there are numerous examples of how technology is used to the great benefit of teachers and learners alike, there are also many cases in which it does little to impact educational processes and outcomes".[127]

Some authors raise critical questions about the dominance of a particularly Western view of education.[128] Following Arendt, education means not only learning 'know what', it also means learning to be, to coexist with others and to care for others as we emphasize in Section 2 of this report. This view of education aligns well with UNESCO's emphasis on cultural diversity and on knowledge societies for peace and sustainable development. This should be an important consideration in UNESCO's future work.

There are many examples of educational initiatives in the creative industry sector which offer training that goes beyond the technical skills base required for media production to enable people to acquire abilities to express themselves. The Wapikoni mobile initiative in Canada is a good illustration.

the WAPiKoni Mobile

the Wapikoni mobile is a ten year old programme initiated by the Canadian film maker Manon Barbeau in cooperation with The Assembly of First Nations' National Youth Council (AFN NYC) and the Atikamekw Nation Council, with the support of the Quebec and Labrador Assembly of first nations and the national Film Board of Canada. Every summer since 2004, the two Wapikoni mobile units, equipped with video and music production facilities, circulate among aboriginal communities where they stop for four weeks, offering young people the opportunity to produce their own works with the support of a professional film maker. At the end of the process, the works are presented and discussed during a community meeting. the products are also accessible on a website and presented at international festivals where they have won several awards.[129]

This initiative gives the young aboriginal people in Canada the opportunity to express their ideas and their feelings, to re-connect with their traditions and their culture, and to contribute to the creation of an aboriginal filmography. It even helps to counter dropping out, drug addiction and suicide. The Wapikoni mobile is a participatory project that involves media professionals, young people and the authorities of First Nations communities. It is funded by government subsidies, companies and lay people's donations demonstrating the feasibility of hybrid organizational approaches.

Another example of an holistic approach to education and learning is being supported in Brazil by the Universidade Católica Don Bosco. In this case, the outreach emphasizes the importance of physical place in the education process, rather than the technology alone.

A brAziliAn holistic APProAch

Antônio Brand, who passed away in 2012, was an historian at the Universidade católica Don bosco in Campo Grande, Rio Grande do Sur, who dedicated his life to the emancipation of the Kaiowa-Guarani communities. noticing that the young aboriginals coming to town to get university degrees were eradicated from their community when they often did not return, Antônio Brand decided to reverse the movement and to bring academic training to the aboriginal villages. the students stayed in their community during and after their training. the approach was systemic and was seen as an opportunity to rediscover and re-appropriate the Kaiowa-Guarani culture and traditions in the agriculture field, in craft production and in environmental protection. efforts were made to stop the monoculture and to reintroduce various traditional seeds that were almost forgotten. The project, conducted with the active participation of the local communities, was funded by the University Don Bosco, the Ford Foundation and public subsidies.[130]

reMote trAcKinG for coffee GroWers in costA ricA

Digital networks are enabling the bean product to be certified as meeting organic and fair trade standards. SourceTrace, a private company working with local cooperatives and companies, developed a system. A software module enables data errors to be reduced and improves information analysis. A web-based dashboard developed with the cooperative, Coopetarrazú, enables visualization of the supply chain and its management. sourcetrace is also operating in india to support agricultural trade in Mumbai, emphasizing 'complex simplicity' to provide point of sale devices and other services relating to transactions. Mobile banking applications are also being developed.[133]

innovAtive APProAches to intellectUAl ProPerty

In Uganda, a joint venture between a local company, Quality Chemicals Industries, was created with a major developing country manufacturer of generic drugs, Cipla Pharmaceuticals, for the production of high quality, low cost antiretroviral drugs and anti-malaria drugs for the east Africa region. the Government of Uganda offered incentives to encourage Cipla to choose a local firm with the aim of building up local production capacity.[135]

Education and learning are equally important in all sectors. Improved access to social media is providing opportunities for learning aimed at improving the coordination of trade across organizational and across international boundaries. Training in this area involves much more than the technical skills of using ICT-based systems to support trade. The coordination of supply networks and changes in the global division of labour which supports the continuing rise in intra-industry trade flows,[131] means that industry component and sub-system supply has to cope with the increasing pace and volume of global trade in commodities. Timely information and very detailed information about product quality, production and logistical timing, are required and this involves collaborative learning.[132]

This example highlights the way digital systems can reduce the need for technical training, and also create opportunities for learning which increases understanding of complex supply-chains involved in global trade. Building the knowledge to support these productive abilities requires improvements in the quality and affordability of the network infrastructure and in the market conditions for technically skilled employees.
It also requires employees who can engage in new forms of collaborative learning. This knowledge is not easily acquired through formal education; it requires experience and opportunities to learn-by-doing that are sensitive to global requirements and to local cultural conditions.

Another crucial area which involves learning relates to the reverse engineering of products. Patenting as a form of knowledge protection is an important issue in knowledge societies. In this case efforts are being made to work within the framework of the TRIPS agreement to develop flexible
'utility models' of intellectual property protection to support industry.[134] This model has been used in China and India to offer a limited amount of patent protection to encourage local firms to invest in reverse engineering to support learning about technological innovation. This weaker form of intellectual property rights protection has lower requirements for inventive steps or novelty and is usually granted for only a few years. It has been used, for example, in the pharmaceutical sector.

This illustrates the need to find flexible ways of rebalancing incentives for intellectual property protection. There is a need to compare and contrast not just the institutional arrangements for accessing information and knowledge, but also the pedagogical approaches that are employed to support formal and informal learning

within all sectors of knowledge societies.

6.3 MEDIA & MEDIATED CONTENT

The arrangements for the production of older and newer media, including the press, play a crucial role in facilitating freedom of expression, especially if open principles are upheld. 'Freedom of Expression & Media' and 'Linguistic Diversity & Local Content' are key components of UNESCO's mandate as are freedom of information, cultural diversity and promoting a multilingual mediated environment. Building on the extension of wireless coverage and access to mobile phone, communities are benefiting from opportunities for artistic and cultural production. However, finding ways of fostering the independence of the media, providing opportunities for the production and distribution of local content through the mainstream media, and finding the financial resources to sustain efforts to develop local content continue to be challenges. Even though the internet offers an enormous variety of opportunities for mediated content which enables the representation of diverse interests, identities and cultures, in practice, there are many lessons to be learned about how to ensure that initiatives are participatory and become sustainable.

Community radio provides an "old media" means of participatory communication when it is permitted to flourish, although it may not always be representative or non-partisan. Combined with other digital technologies such as digital video cameras, opportunities are opening for the production of local content and for training local reporters.

viDeo volUnteers in inDiA

video volunteers does training of trainers and helps to set up community radio and video stations. they started IndiaUnheard which selects "community correspondents" and trains them to record stories from their communities. they have community correspondents in over 15 states, some of whom live in such remote areas that they have to walk several kilometers to post a CD to Video Volunteer's office. the correspondents choose issues relevant to their communities and the videovolunteer team does not interfere in this choice. video volunteers also takes action to overcome problems, e.g. if a story on the Government Food Produce Shop (Ration Shop) shows it is not operating properly, then the team will train the correspondent to take action against the official in charge. Videos are distributed through YouTube, Facebook, and blip.tv and there is a contract with a mainstream national english news channel. A weekly half hour slot is used to present some of the stories and the correspondents are paid directly for the content.[136]

In this case, the aim is to link the local media with mainstream media news, strengthening the reach of community media and enabling people exposed mainly to mainstream media to become aware of community media. There are issues of sustainability and scalability because government policy did not permit commercial sponsorship of community radio in India in early 2013. Indeed, the Government of India only began to allow community radio stations several years ago. Companies like Coca Cola have been ready to put advertisements on community radio to penetrate the rural market, but this was not being permitted and Video Volunteers remains dependent on funding from external organizations.[137] External organizations include UNESCO as well as the United Nations Children's Fund (UNICEF), the Ford Foundation and others which are helping local groups that have received licenses.

The use of video and other modes of visual expression can open up many new possibilities. For example, the Digital Story Telling project involves the co-construction of information artefacts, enabling people to express themselves and evaluate their environments.

DiGitAl story tellinG Project

In this project, the process of story creation and the communication of 'unheard' voices were actively encouraged. Partly sponsored by the Dutch information Knowledge Management Emergent Programme, videos of the personal narratives of women such as dowry victims helped to affirm personal, subjective and domestic perspectives. stories of women about domestic violence were broadcast using digital formats affording strong legitimacy to their voices and struggles.[138]

This project was designed to serve as an outlet of expression for marginalized communities, creating a basis for a bottom up development discourse. 'Digital story telling' enabled diverse audience reactions and interpretations. However, questions about information control and rights to information had to be considered to ensure that this project would be seen to be supporting local communication and linkages among digital storytellers.[139] It serves as an example of an attempt to counter the perception that Northern development organizations lack adequate knowledge of the Southern realities they seek to change and of the perceptions of those realities by local populations.

An example of another participatory media project shows how a mix of older and newer technologies can be used to enable information access and communication within Aboriginal communities in Australia. Until recently, advanced information sources were not well suited to indigenous people in Australia. Visual and oral communication has been the mainstay of their culture, rather than literacy associated with Western forms of reading and writing.

AUstrAliAn Mobile viDeo story tellers in AboriGinAl coMMUnities

Apple iPhone applications were used to bring video stories from outback Australia to Aboriginal people in their own communities. video devices were added to the mobile phone. young people collected stories about remote communities where they live using their own meaning systems and stories told with the visual medium of video. the technology is relatively low cost and operates at the plug and play level. it has been adapted for Northern Territory Mobile Journalists, Mojos – young Aborigines who connect for training with the Bachelor Institute of Indigenous Education, a regional post-secondary institution supported by the Australian federal Government.[140]

Projects such those supporting mobile journalists are considered to signify 'the reinvention of indigenous media'. This approach is serving many purposes. It is sustaining the oral and visual cultural traditions of storytelling; training young people in the use of preferred new media technologies, and capturing and storing potentially lost ethnographic material from tribal elders. It is supporting the development of reporting and journalism skills that can contribute to community development and cultural preservation. It is also generating opportunities for employment through entrepreneurial innovation by connecting to the national television station dedicated to Aboriginal culture, National Indigenous Television (NITV). It is also providing easy to understand health education and support for young people in remote communities and offering opportunities for video blogging about political and traditional matters.[141]

The need for bottom up approaches to media production is also apparent in examples from the global North. The experience of the Philadelphia Public Interest Information Network illustrates how the use of networks can respond to citizen needs for information.

PhilADelPhiA PUblic interest inforMAtion netWorK (PPIIN)

As commercial interests extend their ownership of news and information, the PPIIN has emerged to enhance local access to information for journalists and the public through collaborative journalism. funded by a US$2.4 million grant from the Philadelphia's William Penn Foundation, PPIIN is intended to support citizen information flows. Collaborating with the Philadelphia inquirer and purchasing openData Philly.com means that PPiin offers public interest news and information free of financial considerations and is providing open access to 175 public data sets.[142]

The goal is for PPIIN to influence ideas about what it means to have engaged and knowledgeable citizens who seek news and information about their everyday lives for free and to help to generate new models of digital journalism. It is a response to pressure from commercial media interests to commercialize content, as traditional newspapers and creative industry companies face financial pressures and erect 'pay walls' to protect their content. However, it must be recognized that citizen initiatives such as this one may not always be governed in ways that are consistent with values of freedom of expression
– this is an empirical question and not something that should be assumed.

Traditional formats such as community television are also benefiting from new online opportunities to enable people to become aware of themselves and their communities. In both the global South and the global North they are facing financial challenges as is the case for pop-up Digital Studios in Ireland.

Dctv POP-UP DIGITAl STUDIOS, DUBlIN irelAnD

Dublin Community Television (DCTV) has been broadcasting on the cable system since 2007. In 2011 DCTV responded to the country's economic crisis by developing a model of 'pop up' shop front studios. Digital production facilities have been installed in retail units left empty by the country's economic crash. operated by unemployed young people with the support of media students and community media activists, they produce shows which are broadcast via cable and shared online under a creative commons license. the shop front studio in the city centre provides a base for more than 20 production groups from youth centres, communities of interest and local community development projects. 'Bosco Talks' from the Drimnagh area is entering its fourth season and has been an important community tool in an area marked by high unemployment, drugs and crime. In 2011, a pop up studio was operated for the summer in an empty unit in the ballymun suburb.[143]

In this case, the Irish government›s overly commercial approach has meant that the pop-up Digital Studio project, which was inspired by Brazilian Cultural Hotspots, can access broadband networks only at very high cost even where this connectivity is available. Community television in Ireland is not being transmitted on the newly launched free digital terrestrial television system, Saorview, as the stations have been quoted €800,000 p.a. for transmission of their programming.

These illustrations highlight some of the barriers to achieving bottom up, sustainable and participatory engagement in knowledge societies in the context of media production. This is despite the availability of new outlets, online platforms and infrastructure capacity.

6.4 FREEDOM OF EXPRESSION, FREEDOM OF INFORMATION AND POLITICAL TRANSPARENCY

There are questions about whether and how these media productions and information flows can mobilize action. UNESCO's mandate links freedom of expression, freedom of information, linguistic diversity and local content with democracy. In knowledge societies the practice of democracy is changing and being challenged by the ways digital applications give rise to political transparency and to new forms of participatory action.

There are many examples of the use of digital technologies and social media from Facebook to Twitter to blogs being used by citizens to challenge existing political structures, especially in the case of the Arab Spring or other flashpoints and sites of conflict. These developments are widely seen as providing opportunities for people to exercise their rights to freedom of expression. However, these developments need to be considered in the wider framework of the changes in the information environment and in society. Technologies do not automatically lead to changes aligned with peace and sustainable development. The following sections consider developments in open data, social media, information sharing, and conflict resolution and crisis response.

6.4.1 Open Data and Transparency

In the era of open data and information, government transparency is becoming increasingly feasible, but there are challenges.[144] One challenge is to promote Freedom of Information (FOI) which is understood as the right to access information held by public bodies.[145] Freedom of information was a central concern during the WSIS and has been followed up in a variety of ways. Even in cases where laws are in place, there are additional issues relating to the way digital technologies are implemented with the intention of enhancing open interactions between citizens and government authorities. For example, over the past 13 years Estonia has seen three different e-democracy portals set up by national authorities.

E-DEMOCRACY in estoniA

An e-democracy portal, Rahvakogu.ee, was initiated urgently in early 2013 in response to a political legitimation crisis. However, many Estonians remain sceptical because the previous two e-democracy platforms are seen to have failed. this is despite the fact that citizens in estonia have taken up other e-services provided by the state – 94% declared their taxes online in 2011, and 24% of voters cast ballots online in the 2011 general election.[146]

The reasons for the failure of the e-democracy platforms have been attributed to several factors. First, poor service design when the initial "Today I Decide" platform was launched in 2000. This platform failed to facilitate open discussion on policies among citizens with the result that ideas remained unrefined and there was no consensus on the issues discussed. Second, the portal had no agreed role in the legislative system.

It was initiated by the Prime Minister's office, but had no official status and was easy to ignore by civil servants. Only a very small number of citizens' suggestions were taken into account and most official responses to citizens were rather negative. These were reported in the media and the negative responses had a demotivating effect on the public. Although a new participatory portal, Osale.ee, was set up in 2007, it too remains of marginal importance. In this example, the offline decision making procedures and procedures for public debate with citizens have been mismatched with the design of the online information system. Digital applications are rarely perceived as being useful by their citizen users if they are misaligned with their expectations. In addition, there are often questions about whether platforms of this kind are being designed to encourage participation and about how representative they are when they are used on a larger scale.

The development of an e-Government platform in Ghana is interesting because it demonstrates how national interests can shape these developments and how new forms of partnerships are emerging, especially as Western ideas about the use of ICTs come into contact with ideas supported by the Chinese government. Ghana's eGovernment Network Infrastructure is an example of a form of cooperation that may become more common in the ICT sector in Africa.

E-GOVERNMENT IN A MULTI-ACTOR AID reGiMe

strongly sought by the Ghanaian government to connect public institutions and improve coordination and the delivery of public services, this e-government infrastructure is being implemented in cooperation with traditional and new donors, including the World Bank, China and Denmark. The Chinese government has been instrumental in getting the project off the ground through a loan of US$180 million. After a first phase of implementation, the project has started attracting new funds, for example, from the Danish government, to extend it to rural areas.[147]

In the first phase, traditional donors such as USAID[148] and the European Union did not provide funding when their requests for greater involvement of private operators in the development of the new e-Government infrastructure were rebuffed. Local actors in Africa are gaining access to resources and testing new solutions for their needs, combining ideas and technologies from different contexts, resulting in hybrids combining African ambition, Chinese expertise and Western concepts. The ways these portals differ from the functions and the roles of information access portals developed mainly using Western designs and finance need to be examined to determine whether they are meeting their goals for widespread participation.

Some open government initiatives are stalling because of a reluctance to share information and to engage in transparent policy deliberation and policy making. This is illustrated by the Kenya Open Data Portal which was launched in 2011.

KenyAn oPen DAtA PortAl

The site, with the backing of the World Bank, was launched in 2010 to provide free access to a range of government datasets (census data, public expenditure records, poverty records and data on agriculture). These data are intended for re-use by citizens, journalists and the technology community in Kenya. buoyed by examples of open data leading to the development of many different apps in UK and Us cities where early open data initiatives were established as well as in Kenya, Kenyan open data advocates are seeking to introduce apps developers to datasets to create visualizations, web and mobile applications and other solutions that address pressing social issues. examples of apps so far include water point maps created with government data, and a 'county scorecard', visualizing local performance information and showing where community Development funds have been used.[149]

This initiative is serving as a model for other countries, but concerns have been raised that the open data programme has stalled. Important datasets remain locked up in government with refusals to release them to the public portal and anticipated tools and apps built with the data have yet to materialize.[150] The potential of these initiatives to foster freedom of expression and freedom of information, to enable civic participation and to hold governments to account will be difficult to achieve unless cultural and political barriers to the release of data are reduced. Open data is an important part of the knowledge societies landscape, but making open data work involves more than the deployment of the technical platforms.

6.4.2 Social Media and Elections

Social media platforms are playing an increasing role in the electoral process. In some cases where there are top down initiatives they seem to have been introduced with relatively little controversy, but in others, they have been less successful. For example, in Brazil, electronic voting was introduced successfully in the early 1990s. All votes, even those from the interior of the Amazon, are processed electronically and the results are available on the same day.[151] In contrast, in Estonia the largest share of voters (24%) in the 2011 general election cast their ballots using the internet based on a digital identity card infrastructure. However, the system is controversial because of concerns about privacy and about the comparability of voting situations or the contexts of internet use. The system is regarded as having helped to improve participation.[152]

neW AnD olD coMMUnicAtion in MyAnMAr 2013

confrontations between monks and the government closed communication down in 2007, and a devastating cyclone in 2008 forced it open again. this closing and opening produced a new unplanned flexibility that found an opportunistic affinity with economic pressures to increase internet use and political concessions offered for the creation of political parties, and their allied businesses. As the 2010 and the 2012 elections approached, some people took the world's highest costs for mobile telecommunication ("social media") and combined with them with older low-cost forms of communication – shortwave radio, inexpensive fixed phone lines in the street, photocopiers, used computers, satellite dishes, speaking in code, etc. – all dependent on a very inconstant electricity supply. these media all became more 'social'. As communication proliferated and surveillance diminished slightly, the public began to make more use of the telephone and e-mail, or what is colloquially called in Burmese "jee-mail". Google, Hotmail, and Yahoo were prohibited, but reluctant official acceptance of g-mail addresses, and unofficial encrypted tunnelling and proxy servers helped people to overcome obstacles through the election process and to the present. Dispersion of burmese workers throughout se Asia further opened social communication patterns inside: "social media" probably did not influence these changes much (except among elites), but the shifts in communication patterns were intensely social and intensely communicative, and the changed situation in 2013 is remarkable to all observers.[153]

Mobile communication and social media platforms are playing an important role in elections in countries like Myanmar which have only recently been able to use them openly for political purposes. Two events shook up communication patterns in Myanmar before its recent elections; the first was confrontations between the army and monks in September 2007 (causing communication patterns and systems to turn inward and quiet), and the second was the sudden disastrous cyclone in May 2008 (resulting in a rapid re-opening involving both new and old technologies).

Open digital platforms are playing a major role in election monitoring in other countries. For example, Ushahidi was set up as a crowdsourcing platform in the aftermath of Kenya's disputed 2007 presidential election. Through its website, Ushahidi encouraged Kenyans to submit eyewitness reports of election-related political violence incidents by email or SMS

messages. The Ushahidi platform was used to support Bantu Watch in Zambia, but the following example illustrates that the simple introduction of open platforms is not sufficient to attract citizen's attention. [154]

bAntU WAtch in zAMbiA

bantu Watch was introduced shortly before the hotly contested 2011 elections in zambia. A delay in the announcement of election results by the electoral Commission of Zambia (ECZ) caused widespread anxiety among zambians. the preliminary sharing of election results of selected constituencies by a number of privately owned radio stations was met with a temporary media blackout. Despite the scarcity of information on elections, few Zambians actually submitted information to the crowdsourcing platform. this could be attributed to the relatively short planning period of the project and Zambians' unfamiliarity with the platform. Particularly for middle-class zambians with access to internet-enabled phones, already existing facebook groups such as the popular private television station MUVI TV, emerged as important sites for sharing information, indicating that the new open source platforms are not always favoured by local groups.[155]

When information becomes more accessible through the traditional media or through open platforms, or some combination of both, it becomes subject to multiple interpretations that may challenge the views of authorities. For example, Tactical Tech is a civil society organization that works with a sex worker's collective in Cambodia in their advocacy for changes in anti-trafficking laws and public perceptions of sex workers. The visualization of data about the industry is used in ways that are designed to have political impact. The challenge here is not only about the technical feasibility of gathering data on abuse, health or the impacts of criminalization of the industry, but on how sex workers can gain knowledge about themselves in a way that is empowering for them.[156]

6.4.3 Open Data and Information Sharing

A key lesson from initiatives using digital technologies and platforms is that fragmented information, collected without the close involvement of local participants, and/or which is inaccessible to them, rarely constitutes useful knowledge from the perspective local populations. Technology is not the biggest barrier to success. The development of an agricultural database in India shows how it is possible to learn from early mistakes.

the AGroPeDiA Project in inDiA

this project started in 2008 under the sponsorship of the Indian Council of Agricultural Research (ICAR) and the (Indian) National Agricultural Innovation Project. the project participants started with a better understanding of the domain than the community. india is internet-ready, but Bharat (the Indian name for India) is only mobile phone ready. even the research scientists in agriculture belonging to bharat and the icAr agencies, which are publicly funded institutes, were not willing to share their data on Agropedia: each one wants its own portal or website. one Agropedia innovation is the 'agrotagger', which assigns keywords to documents. It is heavily used by ICAR and several other agribodies, including fAo which supported it and is using it.

Learning was demonstrated when Agropedia started advisory services using mobile phones in 2010. This service seems to have become an instant hit and is likely to be extended to all of India with support from the Indian Planning Commission. Nevertheless, it is reported that it was much easier to focus on the ICT application and to build a database and tag information than on the community dynamics and the politics of information sharing which persist.[157]

Where open data and information applications are expected to be responsive to community needs, the problem of fragmented databases, the lack of priority given to establishing agreed standards for linking data, and the tendency to privilege information that has been validated by professional science or by global or Northern institutions over information that has been gathered by local participants can create problems.[158]
This is illustrated by The Young Lives project.

The Young Lives Project

The young lives linked data demonstrator involves a longitudinal study of child poverty, hosted by the University of Oxford. It is following 12,000 children over 12 years in four countries (Peru, India, Vietnam and Ethiopia) using household and child surveys, inter-household data and community data related to child health, education, employment and income, family status, and welfare, to understand the causes and consequences of child poverty. The demonstrator aims to make these data more accessible to policy makers, researchers, and practitioners. Visualization tools were created to graph local statistics alongside those from organizations such as the World health organisation. The project faced barriers because large organizations rarely publish linked data and were not using data collection or reporting standards compatible with the young lives project.[159]

This example, demonstrates the crucial need to give attention to the standards for 'linked data,' not just to the potential of open data and information in a 'big data' era. When this issue is neglected, it is likely that there will be a proliferation of fragmented and uncoordinated digital information resources.

The need for learning is demonstrated in the case of data environments that are being generated to address development problems to ensure that these initiatives respect participants' privacy. The Map Kibera project is often cited as an illustration of a successful application of ICTs, but it provides important lessons for future developments of this kind.

MAP KiberA in KenyA

This initiative started in 2009 with a small grant from Jumpstart International, a non-governmental association specializing in community-based mapping. The grant was to facilitate the first public digital map of Kibera in Nairobi Kenya, by training local youths in the use of global positioning system (GPS) and open source geographical information system (GIS) tools and working in partnership with local organizations. better publicly available information was intended to enable coordination, planning and advocacy within the community and between Kiberans and the government.[160]

Despite illustrating the success of an open information project, cultural issues and potential conflicts emerged over what local participation meant for local people. One participant said: "in Kibera, being a volunteer usually means receiving compensation in the form of a 'sitting fee' for workshop attendance, and money for lunch and transportation on days dedicated to project work". Dedicating time to the project, however beneficial this could be, might mean missing opportunities that could immediately put food on the table. Participants associated the idea of being a 'volunteer' with being an apprentice on a professional career trajectory. The idea of sharing information was confusing to them and raised questions about the norms of information sharing, including rules for attribution, licensing, and the balance between providing 'stuff for free' and using the content to generate revenue. The meaning of open information sharing and what can be shared and with whom, had to be rethought in this project. [161]

6.4.4 Conflict Resolution and Crisis Response

Digital applications involving open source software and crowdsourcing are being used in response to humanitarian crises, such those following natural disasters and in instances where States are unable to provide for their populations due to political conflicts and war.[162] There are many opportunities for learning by all stakeholders. Among the key issues are who is assumed to own information, who is assumed to be able to validate information, and who is able to access and apply it. These issues are being addressed by the United Nations Development Programme (UNDP), the World Bank and many national governments and civil society organizations with respect to the role of ICTs in post-conflict stabilization and reconstruction. In these contexts there are many questions about the role of the communication infrastructure, the origins and reliability of information, the workability of warning systems, and the capacity of multiple organizations to coordinate their interventions. In addition, there are issues about how new forms of networked governance are emerging in these situations.[163]

Digital applications in this area face challenges of establishing clear relationships with United Nations agencies and governments, and uncertainty about the role of digital mapping in complex political settings, the ownership and use of data, standards for data architectures, the management and data sharing within digital mapping communities, which are often fragmented. The ICT4 Peace Foundation is a partnership which has encountered some of these problems.

ict4 PeAce foUnDAtion

this is a policy and action-oriented organization focusing on the use of ICTs for crisis management, humanitarian aid and peace building. it is fostering the exchange of best practices and broad principles for multistakeholders and training modules for peacekeeping and peace-building missions in the spirit of 'shared learning'. It aims to use digital platforms to improve humanitarian information sharing, facilitate crisis mapping, and is developing and supporting online tools such as the crisis information Management (CIM) Platform and country specific Wikis, e.g. covering the Haiti and Chile earthquakes, the Pakistan floods, the Deepwater Horizon oil spill in the Gulf of Mexico and riots in South Kyrgyzstan. It uses media, the Web, and mobile technologies and it works with intergovernmental agencies, governments and the private sector.[164]

ICT4 Peace aims to facilitate effective communication between communities and stakeholders, thereby improving the performance of the international community in crisis management. This initiative has experienced a lack of willingness among stakeholders to share information, again reminding us that technology alone cannot overcome culturally or politically inspired efforts to restrict access to valuable information.

The United Nations' Global Pulse project is another 'big data' initiative which has experienced barriers to sharing information horizontally and vertically with local participants.

UniteD nAtions GlobAl PUlse Project

This project aims to build partnerships among public, private and civil society organizations to curate large volumes of digital information. this real-time big data initiative was launched in 2009 to "help decision-makers gain a real-time understanding of how crises impact vulnerable populations",[165] by supporting call logs, mobile banking transactions, user-generated content (blog posts and Tweets), online searches, and satellite imagery. it relies partly on crowdsourced data collection and analysis to provide information that complements official statistics, survey data, and early warning systems. the goal is to combine or link sources of information and to provide feedback to policy makers and practitioners in the field for humanitarian assistance and emergency relief.

Global Pulse brings together information commons-based organizations such as OpenStreetMap with United Nations agencies. Similar attempts to employ digital technologies in support of humanitarian response indicate that "balancing top-down and bottom-up requires more serious reflection than its previously been given".[166] In crisis and emergency situations, information is needed to support citizens through immediate action with little time for data verification. Global Pulse illustrates the possibilities for building bridges among institutions, some of which want to control access to information and others which do not. The challenge is not only achieving access to information and the diffusion of technologies. Conflicts arise because companies, scientific labs and governments hold some of the data. There have been legal challenges over information access, disputes about information secrecy, and concerns about the reputations of the participating organizations.

Crowdsourcing examples of this kind suggest that these open digital platforms do not always provide the solutions to humanitarian problems that are sometimes assumed. For example, a crowdsourcing project - Holoda.info ("Holoda" means "cold" in Russian) developed a map for monitoring the damage caused by a cold snap in Russia in 2010. Using the Ushahidi platform, the aim was to collect information from citizens about various types of harm (e.g. collapse of heating, lack of electricity) and requests for help from citizens mainly in remote areas. The Russian liberal newspaper, *Novaya Gazeta*, initiated this project. Although it relied on the success of other bottom up crowdsourcing initiatives in Russia, Holoda.info attracted a low number of participants and the number of cases of help provided was not recorded. Affected communities had little awareness of the project, limited access to internet, and there was little outreach to them. In this example, it was unclear who was accountable for taking action once a problem had been identified.[167]

This illustrates the importance of accountability in situations where information is mediated using traditional media outlets or by new social media platforms especially in contexts where States have 'failed' or are unresponsive to citizen concerns in fragile situations.[168]

6.5 GENDER SENSITIVITY IN KNOWLEDGE SOCIETIES

Gender issues matter for the design of digital technology and for the content of media and information resources in every area of cultural, social, political and economic activity within knowledge societies. UNESCO Director-General, Irina Bokova, has said that "sustainable development, human rights and peace can only be realized if women and men enjoy expanded and equal opportunities to live in freedom and dignity. Equality exists when women and men have equal access to quality education, resources and productive work in all domains and when they are able to share power and knowledge on this basis. Gender equality must be seen as both a practical necessity and an ethical requirement".[169]

In Europe there are initiatives to promote gender equality in science and technology, and particularly in the ICT sector. For example, the genderSTE (Science, Technology and Environment) programme is a response to the fact that women are scarce in ICT professions at all levels, and particularly in senior roles. This has consequences for the design of technologies and their application. When women are poorly represented they are unable to fully influence innovations, and are excluded from career progression in some of the most knowledge-intensive and well-rewarded occupations.

netWorKinG the WAy to GenDer EQUAlITY IN SCIENCE AND technoloGy

the genderste programme is an initiative of european cooperation in science and technology (COST) which is designed to tackle the exclusion of women. A network of policy makers and experts promotes measures for gender equality across science and technology institutions, and particularly good practices in recruitment to courses and jobs, in progression, recognition, and pay. GenderSTE aims to enhance sustainable development in critical ict application areas: energy use and climate change, urban environments, and transport.

Initiatives in this area historically consisted of programmes to help individual women pursue technical careers, but these have proven insufficient to address the reasons for women's systematically poor participation. GenderSTE capitalizes on a growing awareness of the need for structural transformation within institutions, and benefits from the biggest critical mass of institutional support ever created in Europe, although its long-term effectiveness will take time to show.[170] All UNESCO initiatives for knowledge societies need to be designed, not only to be inclusive of individual women, but also to support the kinds of structural changes that are needed to make progress in this area.

This lesson needs to be applied not only to the design and development of software applications, methods of accessing information, and crowdsourcing open data, but also to network infrastructure development itself.

GenDer EQUAlITY SUPPORTS INNOVATION in sWeDish FIBRE-OPTICS

The Swedish innovation agency, Vinnova, promotes the inclusion of gender equality in its innovation support. this is expected to contribute to economic development through increased women's workforce participation, increased GDP, fiscal contribution, and creativity. vinnova supports organisations in improving gender equality in their innovation activities. Fibre Optic Valley, for example, works to position Sweden as world leader in the development of products and services based on fibre-optics. The organisation assists the growth of local and global companies through unique support in the form of research, training, financing, contacts and business development. its top managers are given tailor-made training in understanding how the lack of a gender perspective affects processes and product design, leading change processes, applying knowledge of gender issues, and creating an innovative environment.

A wider 'learning community' has been rolled out for equality-aware product and service development in this case. Embedding such learning in organizational processes is very difficult to achieve, and the success of this project in changing the culture of technical innovation will be difficult to gauge.[171]
Nevertheless, this is an example of how the benefits of equality can multiply when quality of life and well being are factored into the development process.

Women's health is receiving attention as an area in which digital technologies and access to information can be potentially empowering. Applications to support women's health are being developed for front-line workers and, despite the top down initiation of many of these programmes, where lessons of inclusive participation are applied well, there is evidence of success, despite the problems in financing strongly user-centred initiatives. The challenges in the initiative described below have included ensuring the initiative is cost neutral for both the

beneficiaries and the health care clinic, and obtaining financial support in competition with top-down e-health schemes.

Mobile TELEPHONES, WOMEN AND heAlth cAre in venezUelA

front-line workers in health clinics in caracas are concerned about reproductive health issues (e.g. sexually transmitted diseases, teen pregnancy, cervical cancer). Researchers from the University of Ottawa and the Universidad católica Andrés bello are working with a local community health care clinic, Centro de Salud Santa Inés, to identify ways of using mobile phones to improve health care access and education among poor women in impoverished communities within the la vega district. initially researchers worked with local health practitioners to identify maternal health priorities and to investigate day-to-day mobile phone and communication practices of the women. based on the findings, a pilot health care initiative that builds on actual mobile usage routines is being designed and implemented.[172]

Another example is a Health Information System in Malawi. This illustrates the complexity of gender aware project implementation. Here the challenges include the unavailability of organizational structures and networks to provide reliable and timely health information to end-users, and the lack of adequate human resources especially in remote areas.

heAlth centre by Phone Project in MAlAWi

this project is being pioneered in Malawi to provide information to mothers about maternal and child health issues (from prevention to treatment). The project aims to help women access quality services without having to travel long distances to the main hospital at balaka.[173]

The project was initiated from the top down but it seems to be filling an important gap in health information systems in a country where illiteracy rates are very high, especially in rural areas. The quality of health information that is being provided to the women in the face of insufficient training of qualified medical personnel is of concern. Hospitals are themselves over-stretched due to the shortage of qualified personnel, and the introduction of this potentially beneficial service is stretching those resources even further. The lesson is that ICT projects should not be isolated or divert financial resources in a way that reduces capacity in adjacent areas.

Other initiatives concerned with women's health demonstrate the importance of combining digital media in an 'ecology'. A project sponsored by the Bill & Melinda Gates Foundation's Ananya programme shows how this can be done.

bbc MeDiA Action in inDiA

this initiative adopted a multiplatform using mobile phones, mass media and community workers to support efforts to reduce maternal and infant mortality in the northern indian state of bihar by 2015. Despite improvements to the state's health infrastructure, awareness of critical family health issues remains low. With only 27% of young mothers having access to traditional media, the BBC Media Action's '360 degree approach', using multiple channels of communication is expected to improve the chances of vital information reaching the audience. in addition to tv advertisements and a radio series, community performances and women's listening clubs have been engaging more families and reinforcing health messages. As part of the multiplatform approach, BBC Media Action also developed two mobile phone services to support community health workers and refresh their knowledge: a training course, 'Mobile Academy', and an on-demand health service, 'Mobile Kunji'. Accessible to 40,000 community health workers and across all major operators and mobile phones in 2012, the training programme is expected to reach 200,000 workers in bihar by 2015.[174]

The BBC actions in India and other countries highlight the fact that there is a need for substantial funding especially when multiple kinds of ICTs are used, even though the costs of digital technologies are declining. It is crucial to take into account the real costs of extending information-related projects of this and other kinds.

Digital technologies are also providing opportunities for women's communication. However, if access to mobile phones, telecentres and other means of communicating are not organized with attention to gender issues they may never achieve expectations for empowerment. One study of engagement of women through state *Nenasala* (community telecentres) in Sri Lanka showed that these opened up work opportunities for women and provided a social space for learning in some communities. However, it was also found that it was difficult for women to negotiate their social roles

and participate effectively in these spaces because access issues for women were not part of the design of the *Nensalas*.[175] In contrast, *Minmini Seithihal* (Fireflies News), an SMS news network introduced in the same region was found to be empowering for women. A blog featuring female candidates in 2011 heightened awareness of the need for women's involvement in local and national politics, but resulted in no significant increase in the number of women elected to local government. An audit of the blog showed it was used mainly for personal diary entries and creative writing posts, and suggested the need for education about privacy issues.

These illustrations highlight the need for learning about the importance of ICTs for democracy, development and social transformation, not only for the economy. It is crucial to acknowledge that information gate-keeping is gendered at many levels. Much more could be done to use ICTs strategically for the empowerment of women and to protect them from violence and harassment through cyber stalking, hidden surveillance and e-mail tampering, through global positioning system tracking and video use.[176]

The development of digital applications and better access to information is often assumed to enable women's empowerment, but this is difficult to achieve in the absence of a feminist perspective.[177] Feminist groups continue to warn about the potential for the abuse of these technologies, especially with regard to their association with cyber bullying, invasions of privacy and digitally mediated violence. In some countries, the way new applications are being introduced is still characterized by top-down decision making and non-participatory processes and this is especially apparent in the area of gender equality. This means that accountable leadership is needed which champions equality within the household and the workplace.

Changes in knowledge societies mean changes in political action: "who gets noticed, who is absent". With the shift away from debates about human rights which has been observed in the years following the WSIS particularly in international forums which are considering the role of ICTs in knowledge societies, and towards a growing emphasis specifically on issues of freedom of expression and privacy, other rights are at risk of being neglected. This suggests that what is needed is a pedagogy of citizenship to tackle gender issues from a critical perspective. For 'citizen participation' to be meaningful, it must offer opportunities to exercise voice and hold others to account, not just to be invited to participate.[178]

6.6 ENVIRONMENTAL SUSTAINABILITY AND LEARNING

Environmental sustainability raises issues for all those whose businesses and private lives are affected by environmental risks and problems. The issues in this area are about the impacts of ICTs on climate-related environmental sustainability and the potential energy and environmental gains from the increasing availability of 'smart' systems (networks and applications) including the use of cloud computing services. Beyond these issues, there are concerns about the role of access to information and the role of the media in communicating these issues within and across different stakeholder groups.

An OECD review of policies and programmes relating to ICTs and the environment found that "initiatives concentrate on greening ICTs rather than tackling global warming and environmental degradation through the use of ICT applications".[179] Very few business associations or private consortia had strategies to apply digital technologies outside the ICT sector, although there were examples such as the Global e-Sustainability Initiative which operates within the sector.[180] In Europe, there are efforts to push a green knowledge society higher up on the policy agenda.[181] In the academic literature there are studies of the applications of ICTs and information to assist in responding to water-related crises, reducing greenhouse gas emissions and household energy consumption, embedding sustainable ICTs in the construction industry, using ICTs to monitor and pay for electricity, and on how to tackle standards issues.[182]

There is also a large and increasing amount of documentation produced by governments, civil society organizations and practitioners who work in specific sectors. The ITU's 2012 review of sustainable development projects and initiatives shows that although globally there is much activity in this area, there is a need for consistent empirical study of whether initiatives are being implemented and making a difference in people's lives on a sustained basis, both with respect to the ongoing costs of change and quality of life experience.[183]

Environmental sustainability goals sit uncomfortably alongside the drive to achieve more inclusive and interconnected knowledge societies.[184] Innovations in digital technologies are expected to stimulate economic growth through investment in the network infrastructure or in digital

applications. However,

digital technologies are also exacerbating environmental threats because the spread of digital devices is increasing energy consumption and contributing to environmental degradation, for example, from coal burning power plants in some countries.

It is also consuming natural resources at an increasing rate. These developments are sometimes associated with violent contestations over control and benefit from resources such as 'coltan.'[185] These technologies are generating growing quantities of electronic waste, and they are implicated in climate change as a result of greenhouse gas emissions. How effectively the fruits of technical innovation and knowledge are coordinated to address the challenges will depend on access to information, sharing information and on the ability to use it to make choices about which developments should be encouraged and which should be redirected to achieve sustainable development goals.[186]

Online networks are linking up decision makers in this area in the public, private and non-governmental sectors.

cliMAte & DeveloPMent KnoWleDGe netWorK (CDKN)

CDKN provides research, technical assistance and advisory services to developing countries. this network is attempting to help improve the 'knowledge infrastructure' around climate and development by addressing issues ranging from information gaps within the sector to the proliferation of online resource platforms which is resulting in duplication. the climate Knowledge brokers Group is a collaborative community of online knowledge brokers. collaborative projects including a climate & Development Knowledge Navigator serve as, interactive tool directing users to relevant online resources. 'InfoAmazonia' supports journalists and citizens to report evidence of climate change in the Amazon region. Reegle's Application Programming Interface (API) is an automated tagging tool designed to harmonise the presentation of climate information across websites.

This is an example of a top-down initiative that is forging partnerships and cutting across different sub-sectors within the climate sphere. It includes initiatives focusing on adaptation, mitigation, climate finance, energy, and broader development issues. It is seeking to build a somewhat centralized model to cope with the challenges of what has been called the 'portal proliferation syndrome', where the World Bank, and portals in Latin America, Africa, the Asia and Pacific region, and in Europe are hosting information that is becoming part of a fragmented infrastructure for tackling climate change,[187] indicating once

again the crucial role of linked data initiatives and the need to coordinate information sharing activities.

These initiatives do not necessarily connect with the way learning about environmental risks occurs among local communities.[188] Examples of bottom up initiatives aimed at enabling local communities to identify and report environmental risks to their local governments are also taking advantage of online platforms, although not always in a way that is consistent with the projects of top down agencies.

YOUTH-lED DiGitAl MAPPinG of environMentAl risKs AnD vUlnerAbilities in fAvelAs of rio De jAneiro

A Unicef funded project is enabling young people to learn how to map their favela with cameras attached to kites or balloons. images of environmental hazards are then taken by mobile phone, geo-tagged and uploaded onto an online map that is accessible to local policy makers. Unicef claims that this is an empowering project which fosters civic engagement and creates community change. it is clearly successful in a number of ways in that it educates the community and encourages people to anticipate environmental problems but there are problems.[189]

In this initiative it was assumed that the use of social media would foster bottom up communication. However, information cascades down from 'international' experts to country offices, to community leaders, to selected youths to "firmly establish the cultural principles and practicalities of digital community mapping". The participants are being trained to identify environmental hazards from pre-established categories which are not necessarily those which they would have identified as crucial for them. The information gathered is then verified by UNICEF before being passed on to policy makers. The focus on identifying tangible dangers means that little attention is being given to the structures within which these risks and vulnerabilities are developing. While the digital systems and platforms could, in principle, be used to map issues chosen by favela residents, it is difficult to see where the resources to do so could be found without the support bought to the project by UNICEF. This illustrates the importance of encouraging information gathering that is consistent with the experience and knowledge of local communities if the goal of facilitating participatory learning is to be achieved.

6.7 ETHICAL CONSIDERATIONS FOR KNOWLEDGE SOCIETIES

The need for education and learning about the ethics of information for knowledge societies cuts across all contexts in which digital network connectivity is accomplished by whatever means, e.g. mobile phones, social media websites accessed via computer, voice telephony and traditional printed and broadcast media. Ethical dimensions are closely linked to human rights issues reaching beyond that of freedom of expression. What is regarded as 'good' or ethical behaviour online intersects in complex ways with ethical behaviour offline.

The global reach of mediated representations of close and distant others raises ethical issues for professional journalists, for 'citizen journalists', and for all the individuals who create textual and visual images that become intentionally or inadvertently available to others.[190] There are potential conflicts between the goals of transparency and freedom of expression in line with democracy and the risks associated with flows of information, especially for those who are at risk of harm in conflict situations or are otherwise disempowered by prevailing structures of inequality.

These tensions are becoming especially acute in the era of open, big, or real time data. Crowdsourced information means that data are collected from local populations. These data are analysed to serve as information for evidence-based policy making, but the results may never become accessible to the local communities that provided them so that they can play a role in their decisions. Local people's contributions are likely to be translated so that they can be incorporated into larger data sets held by inter-governmental organizations, donor organizations and national institutions. Once translated, the information loses its context and its meaning may be lost to those who provided it in the first place. This is acutely evident in crisis situations as illustrated by the experience suggested by Haitian text messages following the 2010 earthquake.

sMs MessAGes sent by hAitiAn EARTHQUAKE victiMs

sMs 1: What role will teachers play in the reconstruction of haiti?

sMs 2: name: br--- profession: dock worker: telephone number--- I am asking you to find me a job because my house was cr[ushed]

In this instance, thousands of SMS messages contained information that did not fit into a simple online form: name, age, gender, location, etc. Volunteer translators discarded messages for containing "too little information" to send to rescue teams. Information Haitians had contributed often was unattended to

or was responded to in English. The design of the digital platform precluded those who provided information from accessing or acting upon the data they provided. Clearly, designing ICT applications for crisis contexts raises ethical issues about participation from the outset.[191] A similar issue arose in the Map Kibera project (discussed above). For information contributors, being known as an originator of an idea, having the right to ask for and receive information, and being in a position to manage the risks of increased visibility, involves more than adopting the ideals of open commons-based information production. The claims, rights and responsibilities of all participants are influenced by relations of trust, authority and concerns about their livelihoods. There is an uneasy relationship between the open information model and participatory values and practices which needs to be discussed openly and acknowledged.[192]

Ethical issues and practices need to be embedded in the processes and standards for open information access. These need continuous re-assessment in every context in which people are invited to contribute (or contribute voluntarily) to social media and other kinds of information platforms. This is especially so when it is essential to protect the lives of people who offer stories, for instance, on topics like sex and sexuality or on war crimes which they cannot remove from these platforms and with which they may be identified, e.g. if an international non-governmental organisation uses a story for fund-raising purposes at its website without permission and then refuses to remove it. 'Citizen journalism', video reports, and digital story telling open up many new spaces for dialogue and potential empowerment, but risks are associated with the 'digital shadows' which circulate online.[193]

As digital information accumulates in databases around the world, and especially as increasing investment is made in 'big data' initiatives, ethical issues also are present with respect to the coding or tagging of data. If standards for taxonomies and classification systems are devised by experts in the global North with little consideration about whether these are meaningful for those in other the cultural contexts who may wish to retrieve and apply the information, standards for the coding and classification or linking of data need to be devised in ways that renders meaningful for all its potential users. For example,

the IKM Vines project attempted to develop ways of combining information from different journal sources to highlight content from the global South. The issues of standards for linking and sharing information apply to information access between the global North and South, within the South and to information and communication relationships within and among emerging markets such as the BRICs (Brazil, Russia, India and China). In this respect a 'North/South' labeling of issues confronting knowledge societies is no longer appropriate.[194]

the iKM vines Project

in this project articles were tagged using the Delicious bookmarking platform, RSS feeds were read and 'tag extraction' tools were used to find additional tags and key words relating to content of potential interest to those in the south. this was a small step towards supporting the discovery of information from the south that might be made more accessible to those in the South, based on search terms which local communities themselves use to discuss a given subject.[195]

It is also clear that much greater attention needs to be given to the capacity to listen and hear what it is that people value in their knowledge societies. This is clear in studies of the way in which young digital 'natives' discuss issues of interest to them in different regions of the world. One study conducted conversations with young people in Asia, Africa and Latin America, finding that they were interested in the role of media and the internet and issues of geo-politics, gender, sexuality, class, education and language. They did not express their views in line with topics often associated with children's online lives by policy actors, researchers, academics, practitioners and artists, e.g. digital piracy, privacy, cyber-bullying, or sexting.[196]

Issues concerning ethical norms and practices are always associated with the generation of informational content by participants in or for their own local communities. The right to freedom of expression needs to be assessed in the light of related rights to the protection of identity and physical safety as well as in the light of who benefits from the availability of a new information resource. Complete openness and transparency may lead to breaches of trust and privacy and raises complex ethical issues that need to be addressed in any initiative aimed at taking advantage of the potential of digital technologies and networks.[197]

ICTs play a role as intermediaries alongside a variety of external stakeholders – whether they are database or digital platform designers or concerned individuals and organizations. There are cases where ICT platforms can facilitate new participatory interactions that are valued by those who are expected to benefit from them in local communities. For example, in Uganda, the Collecting and Exchange of Local Agriculture Content (CELAC) Project is facilitating participatory interactions between farmers and locally generated agriculture knowledge, using the ICT platforms. The local farmers' groups are at the centre of the knowledge brokering process. They share the information with local communities (after it has been validated by the national agriculture research organization). In this case, although the project was initiated from the top down, it has been running for some 10 years and is seen by its local participants as empowering them to make better choices.[198]

In the wake of the global financial crisis, the role of information intermediaries in supporting commercial activity and financial transactions is coming under increasingly close scrutiny. As the goals of sustainable development start to be coupled with policies aimed at building knowledge societies there is a need for flexibility and mobility in the economy and digital networks and information are playing a vital role in supporting lives and livelihoods in all regions and countries. However, the new information services provided by the private sector are raising a host of new ethical issues similar to those which emerge when services are supplied by governments.

For example, networks are becoming the virtual lifelines of entrepreneurial businesses in lower income countries and for disadvantaged or marginalized workers in more affluent regions of the world. Mobile funds transfer is playing an increasing role in transmitting remittances within globally dispersed communities as documented in recent ethnographic studies.[199] While these transfers may still be a relatively small proportion of overall remittances, the shift to online money transfer raises ethical issues for recipient country governments and companies based within them. For the less-developed countries (UN definition), remittance receipts increased from US$3.5 billion in 1990 to $6.3 billion in 2000, and to almost $27 billion in 2011. The growth of mobile bank branches and branchless banking should facilitate these transfers but this depends on the trustworthiness of the policy environment for e-banking services, including restrictions on money laundering and whether costs come down.[200] It also requires that ethical issues are addressed from the users' perspective because many who could benefit

from mobile funds

transfers to support their livelihoods are often unwilling to trust

these services. However, the often-cited experience of M-PESA in Kenya shows what can be accomplished although it is unclear whether this case can be transferred in any straightforward way to other countries, because similar initiatives elsewhere have grown more slowly than M-PESA. In one survey in 2011 only 16% of respondents had a mobile money account in South Africa; and only 3% in Nigeria.[201]

Money trAnsfer in KenyA

Since M-PESA was launched in Kenya in 2007 by Safaricom, an affiliate of Vodafone, it has been cited as a model for financial information exchange. By mid-2012 it had 19.5 million m-money users, The Kenyan success may be explained by the liberalization of the mobile market, investment in infrastructure, and relatively light regulations which have enabled safaricom to achieve market dominance and permitted the company to serve as a 'bank'. M-PESA's success might also be due to efforts to train enable people so that they understand how the system works and to learn to trust it.[202] it might also be due to the fact that users cannot easily shift to a service provided by a competitor for contractual reasons.[203]

For most providers of these services, profit margins are relatively low creating little incentive for them to engage in the outreach and training that are needed to build trust.[204] The ethical treatment of financial information and the provision of services that people feel able to use in their political and economic environments are important considerations in emerging knowledge societies.[205]

Reluctance to address these kinds of issues is not restricted to the low income countries. In the UK, for example, electronic payments networks for citizens have been developed largely through industry-led public policy with relatively little response to the needs of some groups of citizens as indicated by the example of the British Payments Council's effort to introduce mobile payments.

british PAyMents coUncil AnD Mobile PAyMents

the council which includes all major banks announced a plan to manage the decline of paper cheques in 2009. The plan was opposed, especially by older people and charities. A Parliamentary committee criticized the plan and eventually the council announced that cheques would be kept indefinitely. Meanwhile, the "eighty-something project" published its participatory research findings on electronic imitation cheques. And still, in early 2013, UK citizens were waiting for the arrival of mobile payments, an important option for low-income people.[206]

This example indicates the resistance of certain stakeholders to making changes in the information environment in line with the needs or preferences of underrepresented groups, in this case, the elderly. Financial intermediaries need to be responsive to the needs of those for whom their e-payments systems are designed. A high priority must be given to the ethical treatment of information in these contexts to ensure that transactions are private and not subject to various types of State surveillance. [207] Education about ethical codes of conduct for online transactions is crucial for ensuring the security of financial transactions themselves and for reducing the risk that hackers will steal identities or divert money from its intended recipients.

Information intermediaries or 'knowledge brokers' are playing a growing role in other areas such as in science and education.[208] The sharing and commercial exchange of scientific and technical knowledge increasingly involves 'knowledge brokers' and other intermediaries.[209] Lower income countries face the paradox that, while membership and participation in scientific and technical societies is open and inclusive (though not without cost), access to and use of a considerable share of scientific and technical information is commercialized and is less accessible and usable as a result. Scientists, engineers and medical researchers are making efforts to develop improved means of accessing scientific and technical knowledge. They are forming international collaboration networks that link professionals across the world with the result that there are growing numbers of knowledge brokers with interests in development issues.[210] Many of their activities are organized on a non-profit basis. For example, UNESCO has been involved in encouraging open access to academic journals for developing countries and National Research and Education Networks (NREN) are being developed.[211] However, commercial

enterprises are also engaged in these activities. Their interests

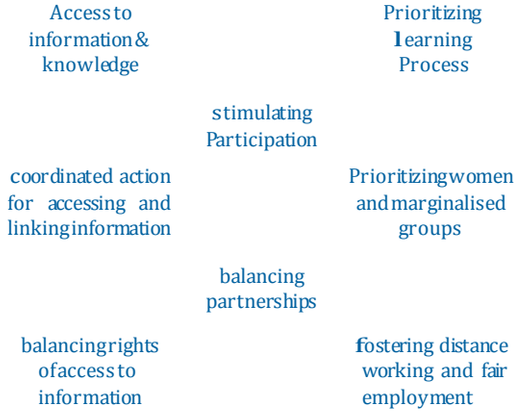
are in enclosing information and this raises questions about the ethics of scientific activity in the global networked environment. It underlines the need for attention to issues of information control, ownership and intellectual property rights.

Information ethics are also important in the trend towards online outsourcing of work. This offers new employment opportunities for distant workers, but it also raises questions about how these workers are remunerated for the information handling activities that they engage in. Online freelancing is a growing activity in many lower income countries. For example, around 10,000 freelancers are estimated to be active online in Bangladesh. They mainly work for clients in the United States and Europe but also for local government institutions, non-governmental organisations, and individuals. They provide services such as software development, graphics design, search engine optimization, social media marketing, blogging, and data entry. The online portals where these freelancers are hired are popular, but while the revenues generated by very successful workers can be in the tens of thousands of dollars, the average is around a few hundred to a few thousand dollars. In Bangladesh freelancers have overtaken the formal ICT- and ICT-enabled services industry in sales volume.[212] The outsourcing of information-related activities is seen in some countries as a viable strategy for building economic strength in knowledge societies. But open data and information outsourcing projects and private services, whether driven by companies or publicly supported, raise ethical issues around whether participation by those in lower income countries in the knowledge production process is sufficiently well-compensated,[213] and whether local participants who contribute information have opportunities to benefit from it so that they can use it to bring about social or political change.

In all the areas where intermediaries are playing a role in brokering knowledge there are experiments with ICT platforms and demonstrations of success in providing the technical capacity for both open and market-led applications. However, there are relatively few examples of sustained deployment in places where they are needed most. The policies that guide these initiatives need to promote models which embrace strong bottom up participation and education and learning about ethical conduct in all information activities from the media and journalism to other key public and private sector activities.

CONCLUSION
The Role of UNESCO – Guidelines for a Strategy for Action

We do not intend to elaborate a detailed plan of action or work programme; instead we propose guidelines for a strategy with clear priorities in each of the areas shown below.



There is nothing straightforward about the relationship between advances in digital technology and social transformation. Investment in hardware and software cannot serve as a proxy for the abilities of people to make sense of their information and communication environment. A universal global knowledge base would not alleviate social and economic disadvantage even if it was accessible through global networks because knowledge is only partly comprised of information. The other part is comprised of a mix of personal, interpersonal and contextual understanding which is acquired through learning (historically only face-to-face, but now in some cases through online interactions). In the light of the continuing over-emphasis on technology in many knowledge societies policy domains, our recommendations underline the crucial importance of people, education and learning – both formal and informal – and the policies needed to strengthen people's capacities for self-determination.

1 Giving priority to learning processes and the organisation of networked learning in the light of UNESCO's mission is essential.

All people need the abilities to evaluate digital information critically in the light of other sources of knowledge. For this reason education through formal and informal learning processes, mixing online with offline where necessary, should be given a high priority, as should multilingualism to foster diverse and inclusive learning environments. This also means that information and media literacies must be strengthened throughout all segments of society and that context specific factors must be taken into account. Other institutions can take care of the development of information and communication infrastructure although there is a need for coordination with respect to the organisation of its supply and design features to ensure that it is open and inclusive. UNESCO should foster networking and distance learning and encourage universities in the wealthy countries to integrate their networks with

institutions from lower income countries while, at the same time, providing support for local content and local sources of knowledge.

2 Strong emphasis should be given to the training of trainers, combining effectively all the resources available from face-to-face interaction to digital networking.

Autonomy, one of the main aims of education, is not given at the beginning of the process and obviously requires the help of competent trainers to be achieved effectively. The dramatic lack of teachers in many parts of the world remains the biggest barrier to access high quality education. The development of digital networks offers new opportunities that should be taken and given the appropriate financial and technical resources, to enlarge and improve the training of teachers.

3 Facilitating the rapid circulation of scientific knowledge in all parts of the world, especially in less developed areas, should be given priority.

Scientific knowledge is a key factor in the innovation process leading to economic competitiveness. It is also crucial in finding pathways to industrial development that are respectful of the environment. Unfortunately its production is concentrated in a few leading laboratories and universities. Science should be acknowledged as a common or public good and it should be shared universally. Well-established universities and laboratories should be encouraged to share their discoveries and their know-how at an early stage, especially with institutions located in less developed areas.

4 Encouraging research and debate on a balanced legal system to protect intellectual property and to favour access for all is essential.

Market exchange and creative commons models should be articulated together to stimulate the processes of creation and sharing of information. When securing the scarcity of digital information by enforcing intellectual property rights to foster economic growth suppresses creative activity this is detrimental to a flourishing collaborative and sharing culture in knowledge societies. Arrangements are needed to devise new business models and to promote the sharing of information. At the same time it is essential to consider the implications of knowledge sharing for the protection of individual privacy. Knowledge societies should not be enclosed to the degree that the intellectual property rights holders claim. But this does not mean that there is no place for laws of ownership of information and rewards to creators.

5 Fostering balanced partnerships among the private sector, the public sector and civil society organizations, as well as among individuals and other groups, should be a priority.

Digital networks and access to information are being developed through private and open applications of ICTs to support the media and freedom of expression, democracy and political transparency, improved access to banking facilities, financial resources and participation in commerce and trade, more timely and effective responses to humanitarian crises, and renewed efforts to tackle global warming and climate change. These are just a few of the areas across the whole of the economy, polity and social environment in which companies, governments and civil society organisations are often working in isolation. When they work in partnerships their relationships are often contested and unequal or fail when it comes to privileging participatory bottom up action. In all of these contexts, efforts are need to privilege participatory bottom up action.

6 Stimulating participatory initiatives, valuing diversity and giving individuals and local communities visibility and voice should be a very high priority.

Even when efforts are made to promote local participation, insufficient attention is given to what is necessary to ensure that applications of digital technologies are participatory in sense that they are empowering for all those involved in local communities. In many cases it is not acknowledged that change does not happen rapidly or in a way that is consistent with initial expectations. Innovation and learning processes are most successful when they are open to the unexpected and to change in the immediate and distant environment.

7 Responsiveness to the interests of women, people with disabilities, native peoples, and marginalized people and groups should be a consideration of the highest priority in all measures to promote knowledge societies.

In today's knowledge societies there are numerous replications of disadvantage and exclusion, whether for reasons of socio-economic status, class, race, ethnicity, or gender. In all areas

of its work, UNESCO must seek ways of addressing inequality and social injustice by promoting measures that respect human rights. Consideration should be given to addressing these issues wherever they feature in strategies to develop new digital applications and services. Networking offers opportunities for the empowerment of women and other marginalised and excluded groups, but the opportunities cannot be realised without attention to discriminatory practices, privacy concerns and ethical practice.

8 UNESCO should take a leading role in all the areas covered by its mandate, encouraging collaborations among those in and outside the UN System with resources to host information portals, to foster measures which support open data initiatives and make information more accessible, and provide guidance about how to link data and interpret it in ways that are meaningful to those whose interests are often neglected.

UNESCO should increase its presence on the internet. More could be done to promote awareness of the successes and failures of initiatives aimed at applying digital information in support of learning in all areas of society, providing access to information and fostering interconnections among groups working on similar problems. This may include establishing website pages that host information about what practices have worked well and which ones have not or it may involve targeted efforts to collaborate with those who host portals to give a higher profile to specific issues as they gain in significance on the policy agenda. This includes attention to open standards for information sharing, the implications of the increasing scale of data resources, including 'big data', and the growing importance of cloud computing for data and information access.

9 Fostering environments in knowledge societies that employ fair employment practices and respect the human rights of voluntary contributors and paid workers is essential for diversifying and improving livelihoods and should be an important priority for UNESCO in collaboration with other organizations.

Knowledge societies are increasingly enabling distributed voluntary efforts to apply digital information for problem solving of all kinds in both the commercial and non- commercial sectors. Open data and information are making it easier to generate new knowledge for applications in support of development goals and many of these activities fall directly within UNESCO's mandate. UNESCO should strengthen its coordination with other agencies such as the International Labour Organization (ILO) which have mandates with respect to labour practices. Attempts to include local communities in generating and applying knowledge, gained partly from the use of ICTs and software applications (e.g. Ushahidi platforms, crowdsourcing, open data and information sharing, e-science, etc.), suggest that in some cases voluntary working is incompatible with the ability to maintain or build livelihoods. This may be because voluntarism is inconsistent with the local culture of contributing to society or it may be a reflection of the practice of paying citizens to participate in various ICT related projects over the years. In addition, where distant working and online employment is flourishing, virtual outsourcing labour practices and environments may be inconsistent with employment standards that respect workers' rights and this has implications for workers in the media (e.g. professional journalism) and in the creative industries, more generally.

In conclusion, some political philosophers argue that "control over linguistic sense and meaning and the networks of communication" is the core issue in political struggle.[214]
They look to digital 'tools' to create the conditions where decentralized citizens and civic sector organizations self- organize in a way that leads to fundamental societal change. However, in renewing the vision of knowledge societies for peace and sustainable development, UNESCO, with other intergovernmental, State and private sector actors will play a role alongside citizens and civil society organizations in establishing the way financial and information resources, including media content, are produced and applied to build societies. This means that all stakeholders must be held accountable for their strategies and actions.

Since the MDGs were agreed in 2000 and the challenges of knowledge societies were given a high profile at the WSIS in 2003 and 2005, it has become obvious that the abilities required to achieve the goals of peace and sustainable development can be facilitated by digital technologies and information, but this is far from being sufficient to empower people to find the means of making the necessary changes.

In the early 1990s there was a strong assumption that modernizing network infrastructures and

providing universal access to these networks would result in and human development
improved performance of countries on both income

indicators. By the mid-2000s, however, it was clear that there is no straightforward relationship between the diffusion of digital technologies and poverty reduction,[215] much less between their diffusion and cultural and social values consistent with equity and social justice. These relationships are complex. The financial crisis and its aftermath have shown that inequality and social injustice can thrive in the midst of the highest levels of penetration of digital technologies. For this reason, we cannot rely on markets and technological innovation to bootstrap people out of poverty or onto a sustainable development path. Complementary non-market activities that increasingly underpin collective action in digital and everyday life worlds are essential. As UNESCO renews its knowledge societies vision it benefits from evidence that it is only through the combined efforts of all stakeholders that the goals of peace and sustainable development will have a chance of being met in the future. Access to information and knowledge and its application will be essential for all if future strategies and actions are to work effectively towards these goals.

The renewal of UNESCO's vision of knowledge societies can provide leadership in embracing the consequences of ICTs and knowledge societies. As Marcelle comments: "success will require creative leadership to design and implement solutions. That leadership will involve processes by which visions, dreams and aspirations are transformed into manifest realities. It requires collective engagement and sustained, disciplined effort and the application of mental, emotional and spiritual faculties. The leadership that wil made a difference will be designed to work collaboratively in multi-stakeholder networks".[216] To understand how societies are changing, it is essential to examine the role of information and knowledge within them. There is sound empirical evidence that these developments can both include and exclude people and that they can be both empowering and disempowering. UNESCO's vision can provide a framework for focusing on what is happening in knowledge societies and on why the interests of stakeholders often diverge and conflict, as well as what can be done to address conflicts. Being willing to acknowledge that knowledge societies are neither uniform, nor always beneficial for citizens and consumers, is a crucial step towards formulating effective policies to address exclusion and disempowerment when it occurs.

Through its work programme, UNESCO has the opportunity to provide exemplary insight, not into uniform or universal solutions, but into how to invoke participatory collective action in an open information commons and to encourage the commercial development of innovative information and media related production in the creative industries. UNESCO's special focus gives it a firm basis upon which to demonstrate the consequences of changes in the information and knowledge spheres; changes that are deeply connected with every aspect of cultural, social, political and economic life.[217]

UNESCO's facilitation of projects, research and networks in key areas can play a key role in demonstrating that digital technologies and information access can enable empowerment and conflict resolution, but only if the role of ICTs is understood within the wider social, political, cultural and economic contexts in which people live their lives. With respect to environmental sustainability, UNESCO can work with its stakeholders to show how ICTs and networked communities can mitigate some of the negative environmental impacts associated with knowledge societies. It can also emphasize the priorities for human development and demonstrate that technological innovations are never entirely benign in their consequences. The renewal of UNESCO's vision of knowledge societies should call for continuous evaluation of the opportunities and risks, and for the principles, enabling policies and programmes that will help to accelerate inclusive knowledge societies that also contribute to peace and sustainable development.

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NOTES

1 See Machlup (1962).

2 See Albagli and Maciel (2010); Mansell (2010a, 2009); Webster (2006).

3 See Hamelink (2011).

4 See UNESCO (2005).

5 Reinforced in UNESCO (2009) and see Frau-Meigs (2011).

6 See http://www.unesco.org/new/en/unesco/about-us/who-we-are/introducing-unesco/.

7 UNESCO (2003c; 2005: 22).

8 UNESCO (2005: 27).

9 For example, UNDP (2012) on Arab Knowledge Societies.

10 World Bank (2012); for a review of research on approaches to mobiles, see Donner (2008).

11 See Jorgensen (2011, 2006); Souter (2012b); UNDP (2012).

12 See UN/ITU (2003a, 2003b, 2005a, 2005b).

13 See UN ECOSOC (2012); UN/ITU (2010a, 2010b; UNESCO 2010b).

14 The WSIS Action Lines are C1: Role of public governance authorities and all stakeholders in the promotion of ICTs for development; C2: Information and Communication Infrastructure; C3: Access to Information and Knowledge; C4: Capacity Building (Mobile Learning); C5: Building Confidence and Security in the Use of ICTs; C6: Enabling environment; C7: Applications (e-Government; e-Business; e-Science; e-Learning; e-Health; e-Environment; e-Agriculture; C8: Cultural diversity and identity, linguistic diversity and local content; C9: Media; C10: Ethical Dimensions of the Information Society; C11: International and regional cooperation (ITU 2012b, 2012d).

15 See United Nations (2000), Resolution 55/2.

16 See UN (2010).

17 See Karver, *et al.* (2012).

18 UNDP (1990: 1) and in line with the view of development as enlarging people's freedoms (Sen 1999, 2009).

19 There is convergence around the core definitions of sustainable development as set out in the Brundtland Report: intergenerational equity, consumption standards within the 'ecological possible', and non-endangerment of life-supporting natural systems with goals including economic prosperity, inclusive social equity and environmental protection (World Commission on Environment and Development 1987).

20 See http://portal.unesco.org/education/fr/ev.php-URL_ID=3247&URL_DO=DO_TOPIC&URL_SECTION=201.html.

21 http://www.upeace.org/

22 See Tremblay (2008).

23 See Marcelle (2013).

24 See, for example Batchelor, *et al.* (2003); Heeks (2005); Maciel and Albagli (2010); Servaes and Carpentier (2006); Sumner and Melamed (2010).

25 Adam, *et al.* (2011: 16).

26 See Banaji, *et al.* (2009) and Guttman (2003); UNDP (2012); UNESCO (2011).

27 See Trucano (2012).

28 See Lee (2013)Final report submitted to the Communication and Information Division, UNESCO, 29 January</publisher><urls></urls></record></Cite></EndNote> and also Livingstone, *et al.* (2012); van Deursen, *et al.* (2012).

29 See (Leblois 2013).

30 See Mokyr (2002).

31 We refer here to the Universal Declaration of Human Rights, http://www.un.org/en/documents/udhr/index.shtml, especially Article 19, and to the International Covenant on Civil and Political Rights, http://www2.ohchr.org/english/law/ccpr.htm, especially Articles 18 and 19.

32 Albornoz (2013). And see 'Manifeste pour le changement culturel et communicationnel'. (2012) Spanish Section of l'association scientifique Union latine de l'économie politique de l'information, las communications et al culture (ULEPICC-Espagne) at http//www.ulepicc.es/images/stories/AdhesionesaMarzo2012%281%29.pdf

33 See Pimienta, *et al.* (2009); UNESCO (2003a).

34 See Tremblay (2011b).

35 See Moeglin (2005).

36 See Tremblay and Freire Vieira (2012).

37 See Mœglin and Tremblay (2012).

38 Frau-Meigs (2013) distinguishes between traditional 'broadcast' media and 'broadband' media which enable interactivity, calling attention to the fact that many of the new players that previously operated as conduits for the media and digital information are increasingly involved in shaping what content or information flows through their networks.

39 See UNESCO (2007).

40 See UNESCO's 'Recommendation Concerning the Promotion and Use of Multilingualism and Universal Access to Cyberspace' 2003, and http://www.unesco.org/new/en/communication-and-information/about-us/how-we-work/strategy-and-programme/promotion-and-use-of-multilingualism-and-universal-access-to-cyberspace/.

41 See ITU and UNESCO (2010); UNCTAD (2010, 2011, 2012a) and Geldof, *et al.* (2011); UNCTAD (2012c); Unwin (2005) on the problems encountered in forming sustainable partnerships. There are many examples of partnerships in the ICT sector, see for instance, http://www.usaid.gov/what-we-do/economic-growth-and-trade/information-technology/partnerships-ict.

42 Berger (2009: 12).

43 See Gagliardone (2010).

44 See Dutton, *et al.* (2011); Mendel, *et al.* (2012); Mendel and Salomon (2011).

45 See Silverstone (2007).

46 See Mansell (2012b).

47 Castells (2012: 254).

48 See Hamelink (2002, 2004, 2011); Mansell (2010b); Mansell and Wehn (1998).

49 See Hanna (2010); George and Granjon (2008); Miège (2007).

50 See Archambault (2011); Madianou and Miller (2011); Silverstone (2005); Ureta (2008).

51 See Grimshaw and Kala (2011); Yonazi, *et al.* (2011).

52 See Samarajiva (2011); Samarajiva and Zainudeen (2008); Silva, *et al.* (2011); Zainudeen and Ratnadiwakara (2011).

53 See Freeman (1995); Freeman and Louça (2001); Manyozo (2012); Steinmueller (2001, 2011).

54 See Mansell (2012a).

55 See Mœglin and Tremblay (2012).

56 See Constantinides (2012); Lessig (2008).

57 See Mœglin and Tremblay (2012).

58 WIPO administers 25 treaties related to intellectual property including the Bern Convention, while the WTO oversees the TRIPS agreement. UNCTAD (2008) address specific issues relating to the creative economy.

59 See Hess and Estrom (2007); Ostrom (1990).

60 See Hardin (1968).

61 See Heller (1998).

62 See http://creativecommons.org/.

63 See Bilton (2007).

64 See Bouquillion (2012).

65 See Boyle (2008); Reilly and Smith (forthcoming 2013); Tremblay (2011a); UNCTAD (2008).

66 Benkler (2006: 3).

67 See Krikorian and Kapczynski (2010).

68 See Fitzgerald (2008).

69 See Reilly and Smith (forthcoming 2013).

70 See de Beer and Oguamanam (forthcoming 2013) and de Beer (2009).

71 See Mansell (Under Review 2013).

72 See UNESCO (2003b).

73 See Rodes, *et al.* (2003); UNESCO (2010a).

74 See Hess (2012).

75 See DuLong de Rosnay and Carlos De Martin (2012).

76 See Benkler and Nissenbaum (2006).

77 See Dutton (2004).

78 See Foray (2009).

79 There is a vast literature on digital divides, see e.g. Heeks (2008, 2010); Mansell (2006); Norris (2001); van Dijk (2006); Warschauer (2003). ICTs are increasingly bound together by the internet. They include the 'terminals' permitting information access and communication, but they also involve the telecommunication and computational infrastructures that connect devices. In the industrialized world, the internet has been built upon a well-developed telecommunication infrastructure offering near-universal connectivity which is being technically upgraded daily to afford ever greater capacities. Non-Internet based ICTs play an important role in establishing links within and between communities.

80 See Mansell and Wehn (1998); World Bank (2009).

81 See Goldstein (2004); ITU (2012c).

82 See CITIGEN (2012).

83 See Meeker (2012).

84 infoDev (2012b: Table 9).

85 infoDev (2012b: Table 13). MXIT is a free instant messaging application developed by Mxit Lifestyle Ltd in South Africa which by 2011 had more than 10 million users.

86 infoDev (2012a: Table 32).

87 See Etzo and Collender (2010).

88 See Beard (2008).

89 A special issue of the *Journal of Information Technologies and International Development*, contains articles supporting this claim, see Agüero, *et al.* (2011); Samarajiva (2011); M L Smith, *et al.* (2011a); Ayesha Zainudeen, *et al.* (2011).

90 See http://www.albrightstonebridge.com/telecom_03-21-2013/.

91 See Gomez (2010); Madon (2009); Rothenberg-Aalami and Pal (2005); Sey (2008).

92 ICANN is the Internet Corporation for Assigned Names and Numbers, a private sector, non-profit corporation created in 1998 to define policies and address technical issues to enable the internet to operate. As in the case of the recent ITU WCIT-12 Conference, see http://www.itu.int/en/wcit-12/Pages/default.aspx; see Mueller (2010); Souter (2012a).

93 See Souter and Kerretts-Makau (2012).

94 See Osama (2012) which discusses challenges for countries in Organization for Islamic Cooperation, and Noda, *et al.* (2010, 2011) which discuss the experience of Open Source Software development in Japan and elsewhere in the Asian region.

95 See Berdou (2011b); Mateos-Garcia and Steinmueller (2008).

96 See Swan (2012).

97 See Brabham (2012); Howe (2008); Malone, *et al.* (2009); Surowiecki (2004).

98 See Graham (2011).

99 See http://ushahidi.com/ compiled by Jo Antoniadis, MSc SOAS and Wendy Willems, LSE Lecturer.

100 http://www.openstreetmap.org/

101 See Berdou (2011a).

102 See Berdou, *et al.* (2012); Chilton (2010); Haklay (2010); Okolloh (2009).

103 See Rudmark, *et al.* (2012).

104 Wexler (2011: 15).

105 See Quinn and Bederson (2011); Yap (2011).

106 See Reilly and Smith (forthcoming 2013) and (M. L. Smith and Elder (2010); M L Smith, *et al.* (2011b).

107 See Reilly and Smith (forthcoming 2013).

108 In the economics of technological innovation literature this is usually call technology 'transfer' which carries with it connotations of a mechanistic process. However, in recent years it has been recognized that transfer is not linear, that it involves learning, and appropriation in local contexts (Roffe and Tesfachew 2002).

109 See Freeman (1992).

110 See Candano (2011); Grimshaw and Kala (2011); Hilty and Hercheui (2010); Houston and Reay (2011); Martiskainen and Coburn (2011); Mitrea, *et al.* (2010); Souter and MacLean (2012); Tineke and Sachiko (2011).

111 Chambers (2010: 9).

112 See Beardon, *et al.* (2010); Padovani (2005); Raboy, *et al.* (2010); Tacchi, *et al.* (2009); Wessels, *et al.* (2008).

113 See Mansell (2012b: ch. 8) and David Souter, personal communication 16 October 2012. The term 'netterati' was coined in the popular press in the 2000s to refer to those engaged in debates about network neutrality and those concerned with any of the issues relating to the spread of the Internet.

114 See Singh and Gurumurthy (2011).

115 See Björkman, *et al.* (2012).

116 See Green (2007).

117 See Berdou (2013).

118 See Bresnahan and Trajtenberg (1995).

119 See Mansell (2012b).

120 See UNCSTD (2011).

121 See Barnett (2012).

122 See Daraja (2011).

123 See Engineers Without Borders (2011).

124 We acknowledge that these labels are not the only ones and that some argue that are misapplied in some cases. For relevant websites see for example, http://www.mediafordevelopment.org.uk; http://cima.ned.org/media-development/media-development-vs-media-for-development ; http://www.mfdi.org and http://www.cmfd.org.

125 See for example, http://ict4dblog.wordpress.com or http://niccd.wordpress.com; http://www.eldis.org/go/topics/resource-guides/icts-for-development on green challenges, corruption, crop science/agriculture, mobile governance, water sanitation and hygiene, e-learning, health, women's empowerment, education, electronic payments and cash transfers, telecentres and public access, and banking. The Bangladesh Institute of ICT in Development website covers multiple sectors - http://www.biid.org.bd; Bytes for All in Pakistan focuses on ICT for Development, Democracy and Social Justice - http://content.bytesforall.pk; CARICOM ICT4D: http://www.caricomict4d.org; ICTforDevelopment Information Anywhere blog - http://ict4dev.org; SciDevNET on New Technologies' ICTs website http://www.scidev.net/en/new-technologies/icts/; the Democracy, Governance and ICTs Soul-Beat Africa website http://www.comminit.com/africa/content/soul-beat-201-—-icts-development-africa; IDIA International Development Informatics Association Conference, Istanbul website http://www.comminit.com/africa/content/soul-beat-201-—-icts-development-africa; and the ICT4D blog at http://ict.ez-blogs.de.

126 See M. L. Smith (forthcoming 2013). See the International Covenant on Economic, Social and Cultural Rights (Article 13.1), which recognizes "the right of everyone to education".

127 M. S. Smith and Winthrop (2012: 4).

128 See Sodre (2012) for a view from Brazil.

129 See http://wapikoni.tv. Case contributed by Professor Gaëtan Tremblay, QUAM, Québec.

130 Case contributed by Professor Gaëtan Tremblay, QUAM, Québec.

131 Adam, Souter, *et al.* (2011).

132 See Heeks and Jagun (2007); Steinmueller (2011).

133 See www.sourcetrace.com.

134 TRIPS – Trade Related Aspects of Intellectual Property Rights at http://www.wto.org/english/docs_e/legal_e/27-trips_01_e.htm.

135 UNCTAD (2012c: 86).

136 See http://indiaunheard.videovolunteers.org/, case by Chetasi Kane, MSc student in Media, Communication and Development at LSE.

137 See http://indiaunheard.videovolunteers.org/, case by Chetasi Kane, MSc student in Media, Communication and Development at LSE.

138 See IT for Change and IKM Emergent (2008) and http://ikmemergent.wordpress.com/about/.

139 See IT for Change and IKM Emergent (2008) and http://ikmemergent.wordpress.com/about/.

140 Case contributed by Marcus Breen, Bond University, Australia, and see http://ntmojos.indigenous.gov.au/about/; http://www.nitv.org.au/about-nitv/dsp-default.cfm?loadref=67 ; http://www.youthhealth20.com/mobile-health/2011/07/27/video-blogging-in-remote-indigenous-australia/; and http://www.sisr.net/flagships/communications/projects/indigenousmedia.htm.

141 Case contributed by Marcus Breen, Bond University, Australia, and see http://ntmojos.indigenous.gov.au/about/; http://www.nitv.org.au/about-nitv/dsp-default.cfm?loadref=67 ; http://www.youthhealth20.com/mobile-health/2011/07/27/video-blogging-in-remote-indigenous-australia/ ; and http://www.sisr.net/flagships/communications/projects/indigenousmedia.htm.

142 Case contributed by Marcus Breen, Bond University, Australia, and see http://ppiin.org/ and http://www.opendataphilly.org.

143 Case contributed by Ciaran Moore, Station Manager, DCTV, Ireland.

144 See Bertot, *et al.* (2010); Eggli and Park (2012) and the http://ict4dblog.wordpress.com which often focuses on e-government and other ICT applications.

145 UNESCO has been involved actively in encouraging the implementation of FOI provisions, see http://www.unesco.org/new/en/communication-and-information/freedom-of-expression/freedom-of-information/.

146 Case provided by Indrek Ibrus, Tallin University, Estonia.

147 Case contributed by Iginio Gagliardone, British Academy Post-Doctoral Fellow, Oxford University and see http://www.nita.gov.gh/pages.aspx?id=5 and Gagliardone, *et al.* (2012). http://www.huffingtonpost.com/iginio-gagliardone/china-africa-media-relations_b_1443868.html.

148 USAID – United States Agency for International Development.

149 See www.opendata.go.ke . Open Data Research Network www.opendataresearch.org; and Majeed (2012) and Rahemtulla, *et al.* (2011). See also http://www.ihub.co.ke/blog/2012/07/is-open-data-making-an-impact/ and http://www.nation.co.ke/business/news/Open-data-initiative-has-hit-a-dead-end/-/1006/1617026/-/n18uhrz/-/index.html commenting on how the Kenya open data initiative project has stalled with organizations refusing to release data to be uploaded to the public portal. Case contributed by Tim Davies, PhD student, University of Southampton and co-director of Practical Participation.

150 This was confirmed by Information and Communications Permanent Secretary Bitange Ndemo in February 2013 (Sunday Nation 2013).

151 Case contributed by Ana Carolina Machado Arroio, Gerência de Desenvolvimento e Inovação, Brazil.

152 Case provided by Indrek Ibrus, Tallin University, Estonia and see http://e-estonia.com/components/i-voting.

153 This case contributed by Professor Robert Anderson, Simon Fraser University.

154 Case contributed by Wendy Willems, Lecturer, LSE. And see Goldstein and Rotich (2008) and Okolloh (2009).

155 Case contributed by Wendy Willems, Lecturer, LSE. See Bantu Watch website http://bantuwatch.org/ and http://iconnect-online.org/blogs/bantu-watch-helps-zambia-turn-ict-mass-vote-monitoring-tool. See also ICT Election Watch projects run by Dutch NGO *Hivos* enable citizens to report electoral offences such as intimidation, hate speech, vote buying, polling clerk bias and voting misinformation. The project challenges civil society to work together on one platform to improve democracy provided by Josine Stemmelaar, Hivos, The Hague, NL.

156 See Reilly (forthcoming 2013).

157 Case contributed by Paolo Dini, Senior Research Associate, LSE and Prof. T V Prabhakar, IITK, India and see agropedia.iitk.ac.in.

158 See Mansell (Under Review).

159 See http://linkedinfo.ikmemergent.net/content/young-lives-linked-data-demonstrator.

160 See http://www.mapkibera.org/ and www.jumpstartinternational.org and Berdou (2011a). Case by Evangelia Berdou, IDS, Sussex.

161 See http://www.mapkibera.org/ and www.jumpstartinternational.org and Berdou (2011a). Case by Evangelia Berdou, IDS, Sussex.

162 See Reilly and Smith (forthcoming 2013) and see Gow and Waidyanatha (2011); Maitland, *et al.* (2006) on disaster relief applications.

163 See Leonard (2013).

164 See http://ict4peace.org/; http://wiki.ict4peace.org and(ICT for Peace Foundation 2012) case from Tim Unwin, Commonwealth Telecommunications Organisation.

165 UN Global Pulse (2012: i).

166 Currion (2011: 40).

167 Case contributed by Gregory Asmolov, PhD candidate, LSE. The model for the project relied on a project "Help Map for Russian Wildfires" (Russian-fires.ru) which earlier had provided crowd-to-crowd assistance to victims of wildfires and coordinated volunteers. The project was embedded later within a general platform for facilitation of mutual aid Rynda.org.

168 See Institute of Development Studies and BBC World Service Trust (2009).

169 UNESCO (2012: 1) and see Buskens and Webb (2009); Hambuba and Kagoiya (2009); Primo (2003).

170 Case contributed by Juliet Webster, Work & Equality Research, UK and see http://www.cost.eu/about_cost/governance/genderste.

171 Case contributed by Juliet Webster, Work & Equality Research, UK and see Danilda and Thorslund (2011). http://www.vinnova.se/en/Publications-and-events/Publications/Products/Innovation--Gender/.

172 Some 400 women were surveyed and two focus groups. 85% of women had a mobile phone, 96% used prepaid service; 90% used texting as first or second use option, with only 10% using the phone to access the internet. 24% had made an appointment at a clinic using the phone and 70% preferred to receive an appointment call rather than a text message. Texting was not seen as desirable for personal matters and focus group participants wanted to receive other information about follow-up activities, e.g. prevention, health promotion). Case provided by Dan Paré, University of Ottawa. See http://www.aucc.ca/wp-content/uploads/2011/05/uniworld-fall-2010.pdf; and http://www.aucc.ca/wp-content/uploads/2012/01/lacreg-partnerships-for-knowledge-2011.pdf.

173 Case contributed by Linje Manyozo, Social and Behaviour Change Interventions Specialist at National AIDS Commission, Malawi, and see http://villagereach.org/where-we-work/malawi/ and http://villagereach.org/vrsite/wp-content/uploads/2009/08/Project-Profile-ICT-for- MNCH-in-Balaka-Malawi-approved-updated.pdf.

174 See BBC (2013) and see http://www.bbc.co.uk/mediaaction/where_we_work/asia/india/india_sdp_overview_august_2012.html.

175 See Kottegoda, *et al.* (2012).

176 See Kottegoda, *et al.* (2012).

177 See CITIGEN (2012).

178 See CITIGEN (2012).

179 OECD (2009: 5).

180 See http://gesi.org

181 Forge, *et al.* (2009: 6).

182 See Adera and Finlay (2012); Houston and Reay (2011); Ibrahim-Dasuki, *et al.* (2012); Martiskainen and Coburn (2011); Mitrea, *et al.* (2010); Tineke and Sachiko (2011).

183 See ITU (2012a) and Collier (2011).

184 See Mansell (2012a); Souter and MacLean (2012).

185 Coltan or columbite–tantalite is used to make capacitors used in many electronic products (McQuillan 2012).

186 See Pauli's (2010) report to the Club of Rome on ecologically sound approaches to innovation and the sustainability agenda.

187 See Bernard (2011).

188 Case contributed by Geoff Barnard, CDKN: Climate and Development Knowledge Network.

189 Case contributed by Pollyanna Ruiz, LSE Fellow, and see Link to project video - http://vimeo.com/30097326 ; Link to project methodology – http://www.unicef-gis.org/tour.htm ; Link to presentation slides - http://www.slideshare.net/socialandcivic/youthled-digital-mapping-of-environmental-risks-vulnerabilities-in-the-favelas-of-rio-de-janeiro

190 See Beckett (2008); Beckett and with Ball (2012); Chouliaraki (2012); Orgad (2012).

191 Case contributed by Gwyneth Sutherlin, University of Bradford, UK and see Sutherlin (In Press).

192 See Berdou (2013).

193 See CITIGEN (2012).

194 See Haddad and Knowles (2007); Lewin, *et al.* (2012).

195 See Powell, *et al.* (2012), case provided by Mike Powell, IKMEmergent and http://linkedinfo.ikmemergent.net.

196 See books edited by Nishant Shah and Fieke Jansen at http://www.hivos.net/Hivos-Knowledge-Programme/Themes/Digital-Natives-with-a-Cause/Publications/Digital-AlterNatives-with-a-Cause, contributed by Josine Stemmelaar, Hivos, The Hague, NL.

197 See Berdou (2013); Berdou, *et al.* (2012).

198 Case contributed by Linje Manyozo, Social and Behaviour Change Interventions Specialist at National AIDS Commission, Malawi, and see http://www.celac.or.ug/ and http://www.celac.or.ug/about_us.html.

199 See Jack and Suri (2011); Madianou and Miller (2011).

200 See UNCTAD (2012b). The top recipient, Bangladesh, expanded its share of total remittance inflows from 31 to 44%. Other countries substantially reliant on these money flows are Nepal, Sudan, Cambodia, Ethiopia, Haiti, Lesotho, Mali, Senegal, Togo, Uganda and Yemen

201 See Donovan (2012).

202 See Heeks (2012).

203 See Donovan (2012).

204 See Zuckerman (2010).

205 See Reilly and Smith (forthcoming 2013) and Jack and Suri (2011).

206 This case contributed by Claire Milne, Antelope Consulting and LSE visiting fellow. See Payments Council http://www.paymentscouncil.org.uk/; Parliamentary Committee report http://www.publications.parliament.uk/pa/cm201012/cmselect/cmtreasy/1147/1147.pdf ; for the announcement http://www.paymentscouncil.org.uk/media_centre/press_releases/-/page/1575/ ; alternatives to cheques http://www.eightysomething.org/design/cheque-mates and http://www.paymentscouncil.org.uk/media_centre/press_releases/-/page/2378/ on future mobile payments in the UK>

207 See Hilty and Hercheui (2010).

208 See Moeglin (2010).

209 See Arora, *et al.* (2001).

210 See for example, CODATA (1997) and the continuing activities of CODATA (International Council for Science: Committee on Data for Science and Technology) at http://www.codata.org/

211 See UNESCO open access at http://www.unesco.org/new/en/communication-and-information/access-to-knowledge/open-access-to-scientific-information/ and for a list of NRENs see http://en.wikipedia.org/wiki/National_research_and_education_network.

212 This case is drawn from UNCTAD (2011).

213 Kleeman, *et al.* (2008: 23).

214 Hardt and Negri (2001: 404).

215 See UNDP (2004).

216 Marcelle (2013: 9).

217 See http://www.unesco.org/new/en/communication-and-information/flagship-project-activities/wsis-10-review-event-25-27-february-2013/about-wsis-10/ for information about WSIS+10; The 'Final Statement – Information and Knowledge for All An Expanded Vision and a Renewed Commitment' of UNESCO's First WSIS+10 Review meeting is at http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/CI/CI/pdf/wsis/WSIS_10_Event/wsis10_final_statement_en.pdf and the 'Final Recommendations' from the panels at the meeting are at http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/CI/CI/pdf/wsis/WSIS_10_Event/wsis10_recommendations_en.pdf