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# Examining "Digital Development": *The Shape of Things to Come?*

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# Examining "Digital Development": *The Shape of Things to Come?*

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2016

## Abstract

For at least a generation, the current ICT4D paradigm will dominate the relationship between digital technologies and international development. But there are signs of change. Diffusion and use of ICTs is such that we can start to talk about a "digital nervous system" for development. And ICTs are becoming more deeply integrated into all aspects of development. So we can foresee a "digital development" paradigm in which ICTs are no longer just tools to enable particular aspects of development, but the platform that mediates development.

This paper proposes a model for understanding what digital development consists of, and then investigates the patterns of economic, political and social transformation that may be associated with digital development. To frame this investigation, it sees economic and political life dominated by a competitive logic that contests with a subordinate cooperative logic. The signs from digital development to date are that five broad patterns can be seen. "Copy", "Spread", "Curve" and "Boost" are patterns involving the dominant competitive logic. "Shift" involves strengthening of the subordinate cooperative logic.

These patterns have implications – often negative implications – for the wider digital ecosystem, for digital inclusion, digital sustainability, and digital harm; all of which are explained and explored. These implications in turn require action to be taken on digital policy, and the paper ends by discussing not just the worldview and content of future digital policy, but also the "Digital Development Policy Collaboratories" through which the process and structure of digital development policy-making needs to be implemented.

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# A. An Emerging Digital Development Paradigm

Taking a longer-term view, the relationship between digital information and communication technologies (ICTs) and international development can be divided into three paradigms – "pre-digital", "ICT4D", and "digital development" – that rise and fall over time (see Figure 1).

The ***pre-digital paradigm*** dominated from the mid-1940s to mid-1990s, and conceptualised a separation between digital ICTs and development (Heeks 2009). During this period, digital ICTs were increasingly available but they were initially ignored by the development mainstream. When, later, digital technologies began to diffuse into developing countries, they were still isolated from the development mainstream. ICTs were used to support the internal processes of large public and private organisations, or to create elite IT sector jobs in a few countries. But they did not touch the lives of the great majority of those living in the global South.

The ***ICT4D paradigm*** has emerged since the mid-1990s, and conceptualised digital ICTs as a useful tool for development (*ibid.*). The paradigm arose because of the rough synchrony between general availability of the Internet – a tool in search of purposes, and the Millennium Development Goals – a purpose in search of tools. ICTs were initially idolised as the tool for delivery of development but later began to be integrated more into development plans and projects as a tool for delivery of development.

The isolationism of the pre-digital paradigm remains present: we still find policy content and policy structures that segregate ICTs. But integrationism is progressing, mainstreaming ICTs as a tool to achieve the various development goals. From the development side, we see this expressed in national policy portfolios, in Poverty Reduction Strategy Papers, in UN Development Assistance Frameworks. From the ICT side, we see this expressed in national ICT policies and World Summit on the Information Society action lines.

Yet just at the moment when this paradigm is starting to be widely adopted within national and international development systems, a new form is hoving into view: a ***digital development paradigm*** which conceptualises ICT not as one tool among many that enables particular aspects of development, but as the platform that increasingly mediates development.

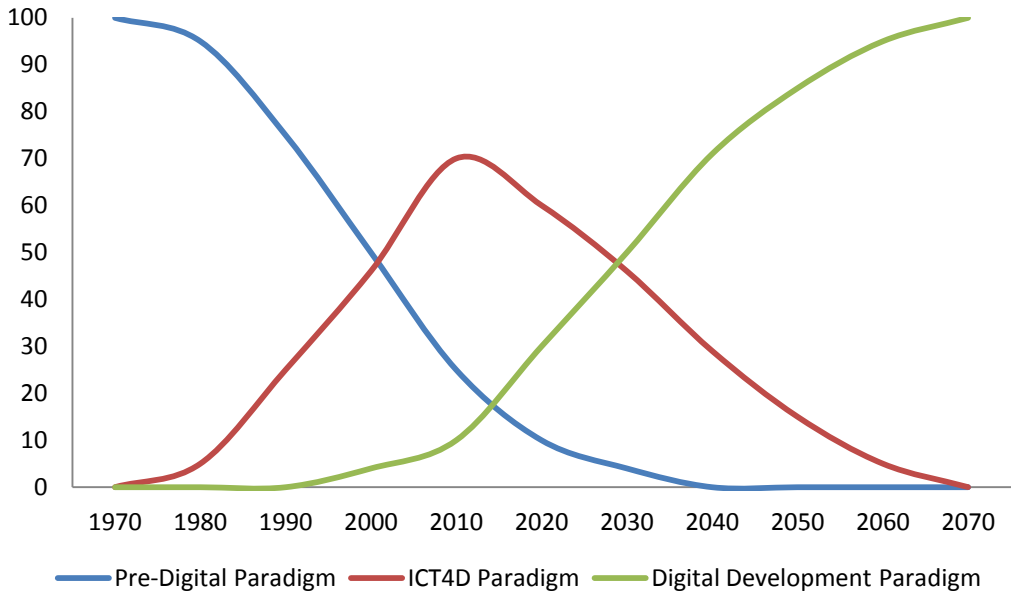



**Figure 1: Changing Paradigms of ICTs and Development**

Section B will analyse the foundational changes impelling this gradual paradigm shift. Section C will outline the manifestations of digital development. Section D will discuss the policy implications of digital development.

**Caveat**

*The owl of Minerva takes flight only when the shades of night are gathering*
(Hegel 1821: 28)

Hegel's meaning is that the wisdom to understand a phenomenon comes only when it is nearly past. Digital development is far from nearly past; it has only just begun. We stand roughly 70 years from the invention of the digital computer; 50 years from the invention of the personal computer; 30 years from the introduction of the TCP/IP Internet protocol. Kondratieff's (1935) long-wave theory – which posits a period of 48-60 years for an innovation to move from invention to boom to bust[1] – might suggest ICTs have already peaked in terms of impact. That they have not comes down to three reasons:

a) Impact timescales are longer than Kondratieff's analysis (Edgerton 2006). For example, Perez (2002) cites a typical 30-year initial installation period for technologies, a 10-year turning point when a new mode of growth is identified, and a 70-year deployment period.
b) Even these longer estimates relate to the core private sector in the global North. Timescales are lagged back for the public sector, smaller firms, and civil society; lagged even further back for these organisations in the global South; and yet further back for the world's poor living in the global South.

[1] Some (e.g. Moody & Nogrady 2010) argue cycle times are speeding up, particularly for ICTs, and we do see evidence, for example that mobile telephony has diffused very much faster than fixed-line telephony (Heeks 2010a).

c) Digital ICTs are not a one-time, long-wave innovation but a continuous series of waves and wavelets. Digital processing represents one wave; digital communication a second, later wave (Adams & Mouatt 2010). And alongside these are the wavelets – broadband, smartphones, 3D-printing – each one of which partly restarts the clock at zero.

Recalibrating long-wave theory on these three grounds, we see that it is still very early days in the history of ICTs and development. We should seek to understand but any analysis must be tentative and subject to change as new evidence emerges. Naughton (2010) suggests the following thought experiment: imagine yourself standing in Mainz in the late 15th century – a couple of decades after Johannes Gutenberg has produced the first printed bibles – asking passers-by how likely they think it is that Herr Gutenberg's invention will undermine the Catholic church's authority, power the Reformation, and enable the rise of modern science. Book printing did go on to have those effects but no-one could have known that at the time.

Just so with ICTs and development – the owl of Minerva can only ruffle her feathers because we simply do not know what the long-term patterns will be. All we can do is handle the current evidence with caution, knowing we suffer from the cognitive bias laid out in Amara's Law: that we tend to overestimate the extent of change in the short term, and underestimate the extent of change in the long term.

**Box 1: Conceptualising ICTs and Development**

The analysis that follows makes four conceptual assumptions about ICTs and development which are summarised in Figure 2 (from Heeks 1999; Heeks 2002; Fuchs 2008; Heeks & Stanforth 2015):

1) Technology and Society: there is an inter-relation between technology and society with each connected to, and influencing the other. ICTs shape society; society shapes ICTs.
2) Technology: because of this inter-relation, ICTs cannot be thought of as just hardware and software. ICTs are always socio-technical systems: a network of software, hardware, people, processes, institutions, etc involved in design, use and governance.
3) Society: can be thought of as operating in three, interlocked systems – economic, political, social. Each of these shapes and is shaped by ICTs.
4) People: because ICT systems contain people, we also recognise the inter-relation between agency and structure. Human actions shape the organisations and institutions of society; the organisations and institutions of society shape human action.

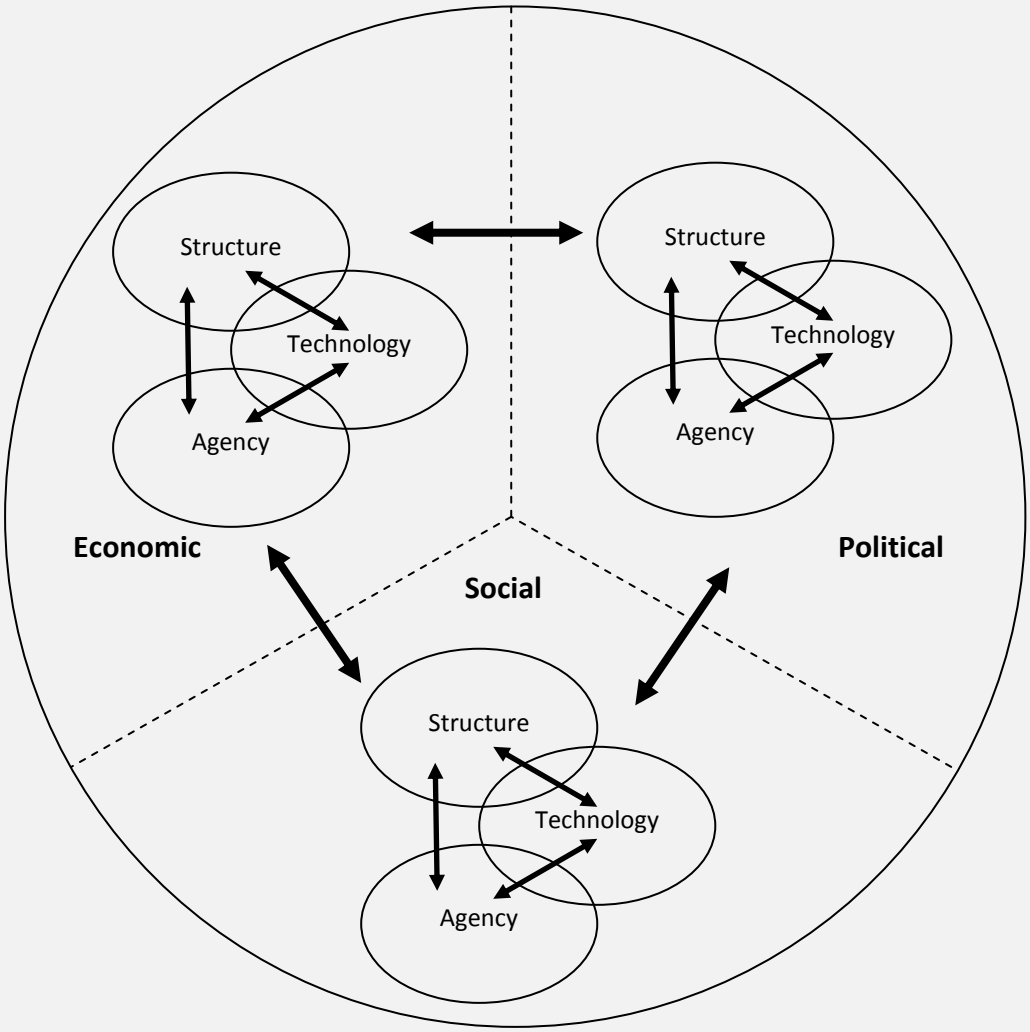



**Figure 2: Conceptual Frame for Digital Development**

One analogy may be to think of ICTs as a blank canvas. At first sight one might see that as allowing anyone to do anything. But in reality, it shapes behaviour to communicate in a particular way, to favour those with particular skills and resources, and with the result valued according to dominant social norms yet also potentially changing those norms.

The underlying ideas presented in this paper are not new. They draw directly on ideas of the "network society" (e.g. Barney 2004, Castells 2010). In turn, the network society thesis drew on earlier ideas about shifts from an industrial society to an information or knowledge society (Webster 1995, Mansell & Wehn 1998) and the broader shift from a modern to a post-modern society (Kumar 2005, Pritchett 2009).

What is new is that ICT diffusion in developing countries – while still limited – is now sufficient in breadth and time-span for us to increasingly test network society ideas against developing country realities, rather than solely rely on prognostications, pilots and prototypes.

# B. The Changing World of ICTs and Development

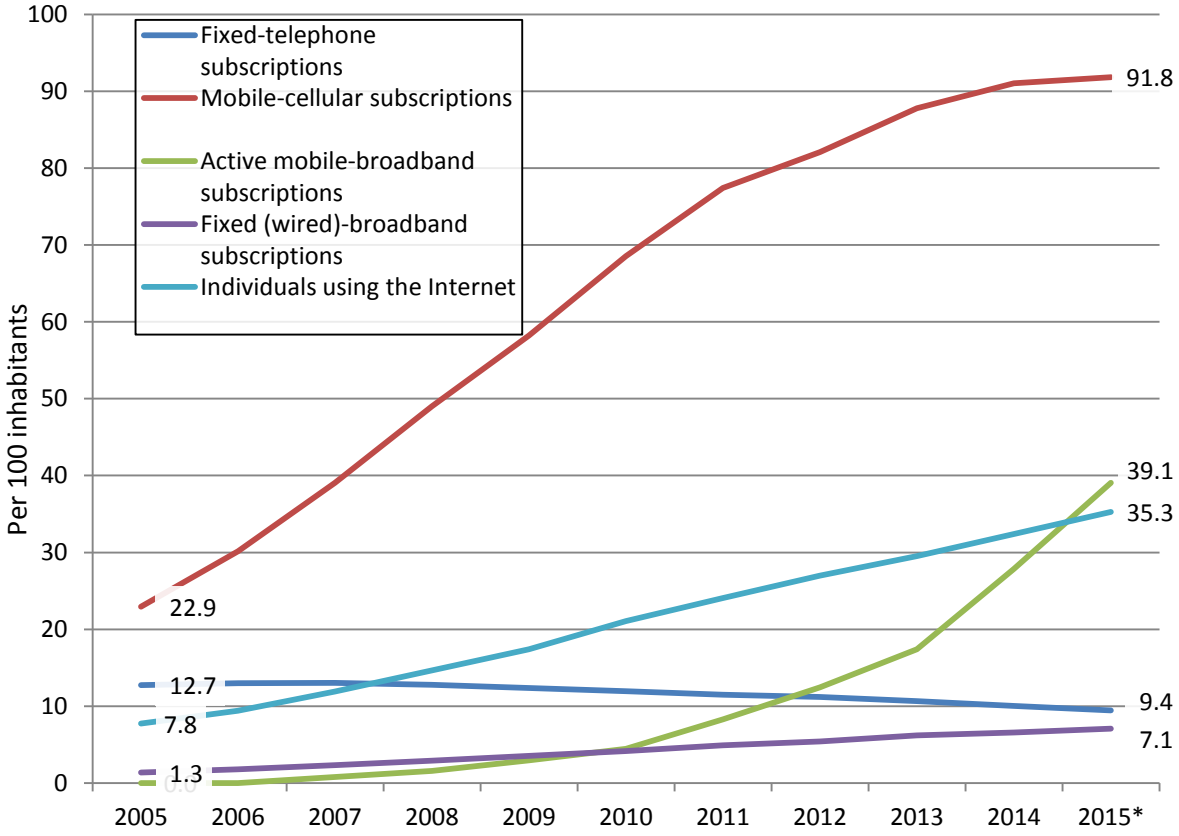
Why is a digital development paradigm emerging? In simple terms, because the world of ICTs and development has changed in three significant and foundational ways: development priorities, digital technologies, and demographics.

**Development Priorities**: the ICT4D paradigm – including the two World Summits on the Information Society in 2003 and 2005 – was significantly shaped by the Millennium Development Goals. The MDGs completed their term in office at the end of 2015, and were replaced by the post-2015 Sustainable Development Goals agenda. These can be analysed to identify the changing patterns of development priorities, with three core themes emerging (Heeks 2014a, Heeks 2014c):

- Transformation: "a belief that the incremental developmental changes achieved to date will no longer be sufficient in the remainder of the 21st century; and an aspiration for a step-change in approach" (*ibid.*: 27).
- Inclusion: "development that provides opportunities and benefits for all, including those who have to a relative or absolute extent been excluded by development to date" (*ibid.*: 26).
- Sustainability: "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED 1987:43).

It is these – plus concerns about digital ecosystems and harm – that will be significantly used to shape the discussion of digital development in Section C.

**Digital Technologies**: key ICT trends in developing countries are summarised in Figure 3.




Note: * Estimate
Source: ITU World Telecommunication /ICT Indicators database

**Figure 3: Key ICT Indicators for Developing Countries (2005-2015)**

These figures smooth over many inequalities which will be discussed later but the overall change is clear: in ten years, digital ICTs have moved from a peripheral to a core role in developing countries. This can be understood as three associated expansions along different dimensions of international development:

- Reach: ten years ago – bar some subsidised incursions – digital technologies were largely the preserve of an urban elite in developing countries. No longer so, with a significant geographic and demographic expansion of ICTs such that they now reach most low-income communities; both urban and rural.
- Scope: ten years ago , ICTs tended to cluster around a few focal development issues and applications. Now, ICTs are imbricated with all development issues and sectors.
- Depth: ten years ago, ICTs tended to skate across the surface of development processes, adding a patina of email or perhaps a static website. Now, ICTs are increasingly part of all aspects of development processes: gathering the data, supporting or making the decision, underpinning the actions, and communicating the results.

As a result, we can talk seriously about the existence of a digital "nervous system" for development – a pervasive digital infrastructure in which most development organisations from international agencies through government departments to small community-based

organisations have Internet access – often broadband Internet access – and in which most individuals in developing countries have digital mobile phone access.

ICTs are therefore moving from the exotic to the mundane in developing countries; from a specialist tool to an everyday utility with digital mediation emerging as the dominant mechanism for many processes of economic, political and cultural development. These changes both lay the ground and create the requirement for the digital development paradigm, as discussed further in Section C. They also increasingly embed ICTs into development, requiring changes in policy as discussed in Section D.

**Box 2: Emerging Technologies for Digital Development**

As Niels Bohr stated, "prediction is very difficult, especially about the future". Just so in seeking to understand which emerging ICTs will have a mainstream – as opposed to peripheral – impact on international development. As Figure 3 shows, we already have enough data to know that mobile, broadband, and mobile broadband (hence smartphones[2] and tablets) will be a key foundation for the digital development paradigm. Social media is also a racing certainty: by 2016 North America and Europe made up just 26% of global social network users, with 52% in Asia (including Oceania), 13% in Central/South America, and 9% in the Middle East and Africa (WAS 2016)[3] and growth rates are faster in the global South than the global North.

It is very likely that cloud technologies – "a model of computing in which both data *and applications* are held in large data centres (or groups of data centres) which are remote from users' own terminal devices" (UNCSTD 2013:16) – will have a significant impact in developing countries. Most social media users – perhaps unwittingly – use cloud and:

> "60 per cent of ... cloud traffic on the Internet emanated from Europe and North America. Asia–Pacific was responsible for another third while Latin America and the Middle East and Africa together accounted for only 5 per cent. However, the highest growth rates in the next few years are expected in the Middle East and Africa." (UNCTAD 2013:xiii).[4]

Cloud will reduce financial and time costs and increase flexibility and digital accessibility for organisations in developing countries while simultaneously increasing their dependency and vulnerabilities to cybercrime and surveillance (Kshetri 2010, UNCSTD 2013).

Of technologies likely to have a significant impact on development, the Internet of things is a main contender (e.g. ITU 2005): the Internet connectivity of increasing numbers of objects. This has already happened in familiar ways with the increasing connectivity of mobile phones, tablets, laptops, PCs – 13 billion devices were Internet-connected in 2013

[2] Average (not population-weighted) smartphone subscription penetration rates in a sample of ten middle-income global South countries were equivalent to 24% of the population, with 40% average annual growth rates (Cartesian 2014).

[3] After the US, the top five countries in terms of Facebook users were India, Brazil, Indonesia and Mexico (IWS 2016).

[4] In addition, the relative share of cloud is already higher in some parts of the global South: 33.5% of company applications are cloud-based in Asia and Latin America, compared to 15.5% in Europe and the US; and the former two regions reported significantly higher benefits from cloud (TCS 2012).

(Pew Research Center 2014). But the main growth area – 50 billion devices predicted by 2020 – is seen to be two types of connection. First, stand-alone sensors – for example providing agricultural readings from fields, or medical readings from health centres (Panchard et al 2007, Dlodlo 2013). Second, sensors integrated into mainstream objects from cars and refrigerators to toilets and shoes (MIT Technology Review 2014). All these applications become smart when they move from a passive ability to collect and transmit data to an active ability to take a decision and action on the basis of that data (Huijsing 2008)[5]: smart irrigation systems that automatically water dry crops; smart electricity grids that automatically isolate and re-route around transmission failures. Even more than cloud, smart systems bring significant potential to increase efficiency and effectiveness of infrastructure and business, alongside significant potential to increase dependency and vulnerabilities to cybercrime and surveillance (UNCSTD 2013).

Also likely to have an impact is an emerging set of telecommunications technologies that are helping to fill gaps in network coverage or speed. These derive from various technological directions but all have an aim of addressing digital inclusion (see below). Examples include:

- Local-scale cellular networks, typically serving a few hundred or thousand users and using mesh or WiFi-based long distance networks (Heimerl et al 2013, Rey-Moreno et al 2013).
- Local-scale wireless networking using the television white space spectrum: those frequencies within the TV broadcast range that are unused in a particular region (Chavez et al 2016).
- Wider-scale networking via use of small or micro satellites (the latter weighing the same as a human being or less), particularly of value in providing telecommunications coverage in the most-remote areas (Jakhu & Pelton 2014). As with TV white space, use of micro-satellites for low-income user access is still at an initial stage.

All of these are pushing the digital development paradigm towards geographic universality.

There are fewer certainties as yet about more formative technologies that are only approaching the mainstream in the global North, let alone the global South. Examples include 3D-printing, wearable computing and robotics.

Digital ICTs have already moved us along the time dimension to a world of 24/7 *everywhen* connectivity (see Figure 4, adapted from ITU 2005). Thanks to telecommunications advances, *anywhere* can now be connected, and we are slowly erasing the blank spaces on the digital map and moving towards *everywhere* being connected. In terms of nodes, pretty well *anyone* and *anything* could now be connected thanks to ubiquitous computing. There is a still a very long way to go but within a generation almost *everyone* will be connected, and we will be steadily moving closer to *everything* being connected (Greenfield 2006) thus vastly multiplying the number of "points of potential control, resistance, and contestation" (Deibert & Rohozinsky 2012:24).

[5] Though some usages of the term 'smart' vary from this definition. Sensors/systems become 'expert' or 'intelligent' when they have the autonomous ability to learn; that is to modify initially-programmed patterns of decision and action on the basis of their past cycles of "behaviour".

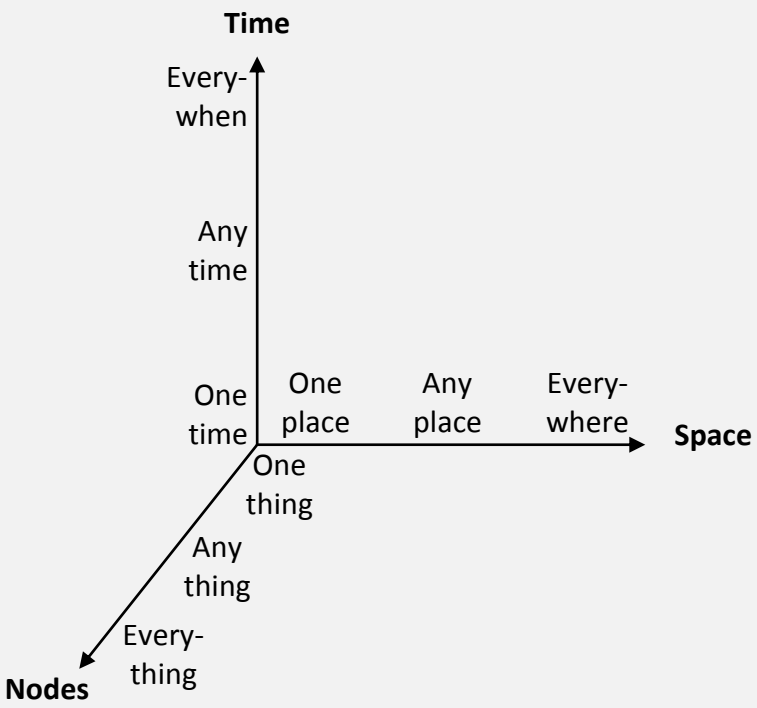



**Figure 4: The Growing Domain of Digital Connectivity**

We can therefore think of three generations of digital infrastructure for development (see Figure 5). The first, already well-rooted, is based largely around mobile phones. The second, emerging at the time of writing, is based around the Internet including Web 2.0 applications. The third, currently nascent, will be based around a ubiquitous computing model of sensors, embedded processing and near-universal connectivity, and widespread use of smart applications.

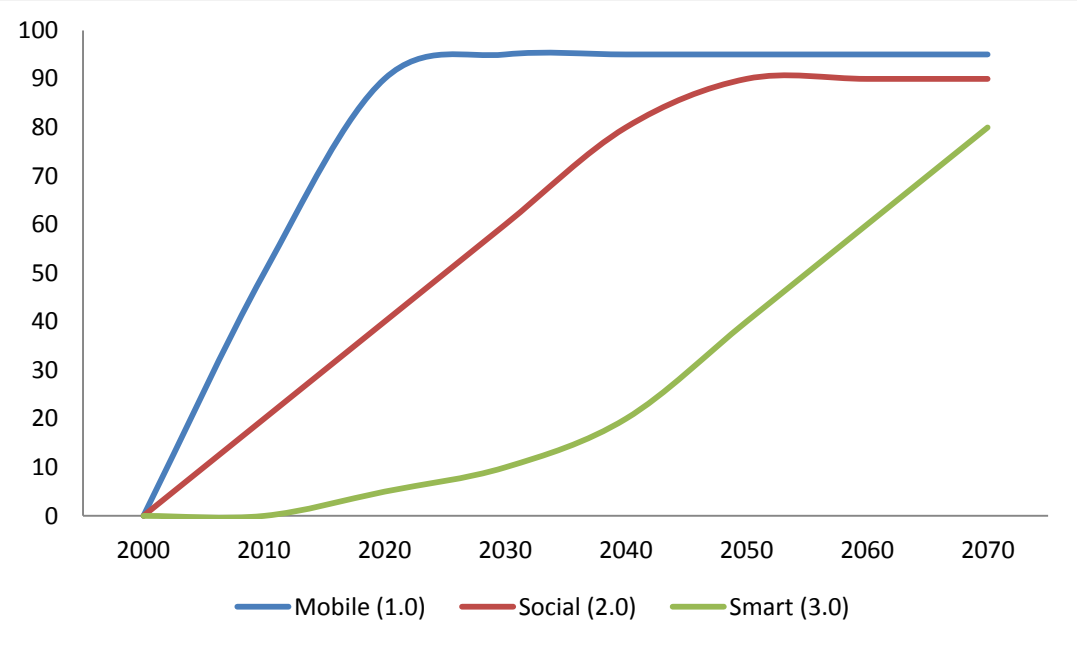



**Figure 5: The Generations of Digital Infrastructure for Development**

**Demographics**: the technology changes outlined have had both geographical, maturational and experiential impacts on the demographics of ICT usage.

Geographically, we have already moved from domination of the old Internet world (the US and Europe) to domination of the new Internet world (emerging nations of the global East and South) (Bolsover et al 2014). The changing share of global Internet users is summarised in Table 1 (IWS 2016)[6].

| ***Region*** | ***% Share in 2001*** | ***% Share in 2016*** |
|---|---|---|
| **RISING SHARE** | | |
| Africa | 1% | 10% |
| Middle East | 1% | 4% |
| Latin America/Caribbean | 5% | 10% |
| Asia | 32% | 48% |
| **FALLING SHARE** | | |
| North America | 30% | 9% |
| Oceania | 2% | 1% |
| Europe | 29% | 18% |

**Table 1: Regional Share of Global Internet Users (2001, 2016)**

The global shift from old to new world is both changing and perpetuating behaviour and values online. Compared to their old Internet world counterparts, new Internet world users are more sociable (in terms of willingness to connect with strangers online), produce more online content, are much more politically active, source more of their audio-visual content online, and make use of a wider range of languages[7] (Bolsover et al 2014). They also spend more time online. As an example, in a global sample of 28 countries, all of the top ten countries in terms of average number of daily hours of Internet usage were emerging/developing countries; as were all of the top ten in terms of average number of daily hours of social media use (WAS 2016). However, there is a consistency of old and new world online attitudes towards issues like censorship and monitoring online, which "suggests that there is a distinctive set of global Internet values, supporting privacy and freedom of expression that cuts across geographical, economic and social boundaries" (Bolsover et al 2014:129).

[6] These aggregates hide various shifts e.g. Japan shrinking from 40% to 7% of Asian Internet users and India growing from 4% to 23%, and China from 20% to 42%. China's online population surpassed that of the US in 2008 and there are more than twice as many Chinese online as there are US citizens. Nigeria has nearly twice as many Internet users as the UK; the Middle East and Africa have more users than Western and Central Europe (IWS 2016).

[7] There are far more Chinese-as-a-first-language than English-as-a-first language Internet users as of 2016 (ILS 2016) though Web content lags far behind – 54% of websites are identified as being in English, less than 2% as Chinese (W3Techs 2016).

Maturationally, there are individuals who are "growing up digital" (Tapscott 1998). Digital natives can be defined as those 15-24 year olds with five or more years of online experience (ITU 2013)[8]. The rationale for separate identification of these individuals is three-fold:

a) Youth differ from older adults. For example, compared to the older adult population, young people are nearly three times more likely to be unemployed; are less likely to vote or to participate politically in other ways; do not protest more unless there is a direct connection to personal circumstances (e.g. unemployment) and are generally less likely to seek collective solutions to issues; are more likely to subscribe to cultures that are alternative or resistant to dominant structures, and less likely to trust mainstream political institutions; and perceive themselves to be more innovative and creative (Nilan & Feixa 2006, Resnick & Casale 2011, Hoffman & Jamal 2012, ILO 2013, Kew et al 2013, Economist 2014).
b) Experienced digital users differ from inexperienced. For example, more experienced "next-generation users" – those who access the Internet from multiple devices and multiple locations – are more likely than less experienced users to be content producers and to consume their entertainment- and leisure-based content online (Blank & Dutton 2014).
c) Growing up in a digital-dominated environment differs from doing so in an analogue-dominated environment. This currently falls into the category of "unproven" because few schools and perhaps few homes can yet be described as "digitally-dominated". Like all experiences, use of ICTs will have some impact on the way we think and learn but what exactly those changes are is still a matter of debate (e.g. Lehrer 2010).

The notion of digital natives is problematic for a number of reasons (ITU 2013, Nash 2014):

- The danger of homogenising the experiences of young people, the great majority (70%) of whom across the world are <u>not</u> digital natives.
- The danger of privileging age as a distinguishing feature worthy of attention above other divisions in society – income, class, gender, geography, race, etc.
- The danger of "othering" older people and older ICT users as somehow less important or less valuable[9].
- The danger of slipping from the positive – evidence-based descriptions of digital natives, to the normative – assuming digital natives are a "good thing" that we need policy prescriptions to encourage.

[8] Many different terms have been used to identify similar groups. A number send the message that this is a solid global cohort or generation: net generation (Tapscott 2008), millennials (Howe & Strauss 2000), Generation C (connected, computerised, and content-producing) (Friedrich et al 2011). But these are inappropriate: even in the global North any individual age cohort grows up with radically varying digital experiences from total immersion to total exclusion (ITU 2013), and the staggered diffusion of technology means global experiences differ (Thinyane 2010).

[9] At least in the global North, evidence to distinguish young users can seem limited. For example, UK evidence is that next-generation users are found equally across pre-retirement age cohorts but increase from less than 40% of low-income groups to 75% of high-income groups (Blank & Dutton 2014). This also mirrors evidence that ownership rates for ICTs are similar across pre-retirement age groups (e.g. Ofcom 2014). Common generational assumptions often find limited evidence in practice. For example, there is evidence that for some digital skills – e.g. searching for and evaluating digital information – young people are worse than older people (ITU 2013). And while "there is a widespread impression that younger people are less concerned with privacy than older people ... young people are actually more likely to have taken action to protect their privacy than older people" (Blank et al 2014:1).

What can be said is that while only around one-fifth of the youth cohort in developing countries are digital natives (compared to four-fifths in the global North), youth in the global South as twice as likely to be digital natives as the total population, and so they have a disproportionate role which might be worth specific encouragement (ITU 2013). Given they see ICTs as more important and more beneficial than others do, and given they make proportionately greater use of digital technologies and of social networks, then engagement of digital natives – for example in education or politics – may be enhanced by ensuring there are effective digital channels in these sectors. However, there is evidence that even for digital natives, this should be in addition to, rather than merely instead of, traditional channels (*ibid.*).

Experientially, ICT users are experiencing changes that include (Barney 2004, Ridley 2009, Boettiger et al 2012, Molony 2012):

- Time-space compression: a shortening of timespans for activities moving towards Castells' (2000) notion of "timeless time" in which biological and clock time are replaced by compressed, desequenced notions of time; and a new geography that replaces physical distance with virtual space so that individual experience moves from a "space of places" to a "space of flows" (*ibid.*).
- Public to private: moving from shared-use to individual-use models of ICT interaction. Voice communication is moving from public payphones to shared mobile phones to individually-owned mobile phones. Internet access is moving from public access telecentres and cybercafés to semi-public home or work computers to personal mobile devices. The digital experience thus becomes increasingly private and personal.
- Fixed to mobile: as mobile devices become the dominant means of access to digital infrastructure and content[10].
- Text/audio to audio-visual: while it may be premature to call the emergence of a post-literate society, increasing bandwidth and technical capabilities mean digital experiences can increasingly resemble rich, natural real-life experiences rather than the artificial restrictions of just text or just audio[11].

One can argue that all four cases, represent an increasing presence yet decreasing visibility of the digital as its mediation merges more seamlessly into everyday life and activities (Ruckreim 2009, Deuze 2012). This growth-but-disappearance of mediation thus represents a final experiential trend – that digital technologies more-and-more intercede between us and our experiences, and yet we notice them doing this less-and-less. If the medium is the message, our conscious awareness of the message may be diminishing.

All three of these trends – geographical, maturational and experiential – form the emerging background underlying discussions in Sections C and D.

[10] For example, in 2005 100% of global broadband subscriptions were fixed; in 2015, only 19% were fixed and 81% were mobile (ITU 2016).

[11] For example, comparing 1986 to 2007 text fell from >70% of Internet-based content to <30% while video rose from 0% to >50% (Hilbert 2014). (Though Hilbert notes if we take the same time period and expand from just the Internet to all globally-telecommunicated data (which was dominated by video broadcasting in 1986) then text rises from 0.3% to 27% and video falls from 99.7% to 51% of all content.)

# C. Understanding Digital Development

The technological foundations for the emerging digital development paradigm were outlined above, alongside some of the associated demographic changes which are creating growing numbers in the global South for whom economic, political and social life is increasingly digitally-mediated; for whom ICTs are changing from a specific development tool to a general development platform. From this foundation, we can chart the overall shape of the digital development paradigm, discussed in Section C1. The remainder of Section C discusses the connection between the digital development paradigm and the major components of the post-2015 development agenda. This deals first (Sections C2 and C3) with the type of transformation that is associated with digital development and then (Section C4) with some of the broader development implications for inclusion and sustainability, for the digital ecosystem overall, and for the specific impacts of digital harm.

## C1. The Components of Digital Development

An overview of the digital development paradigm is shown in Figure 6.

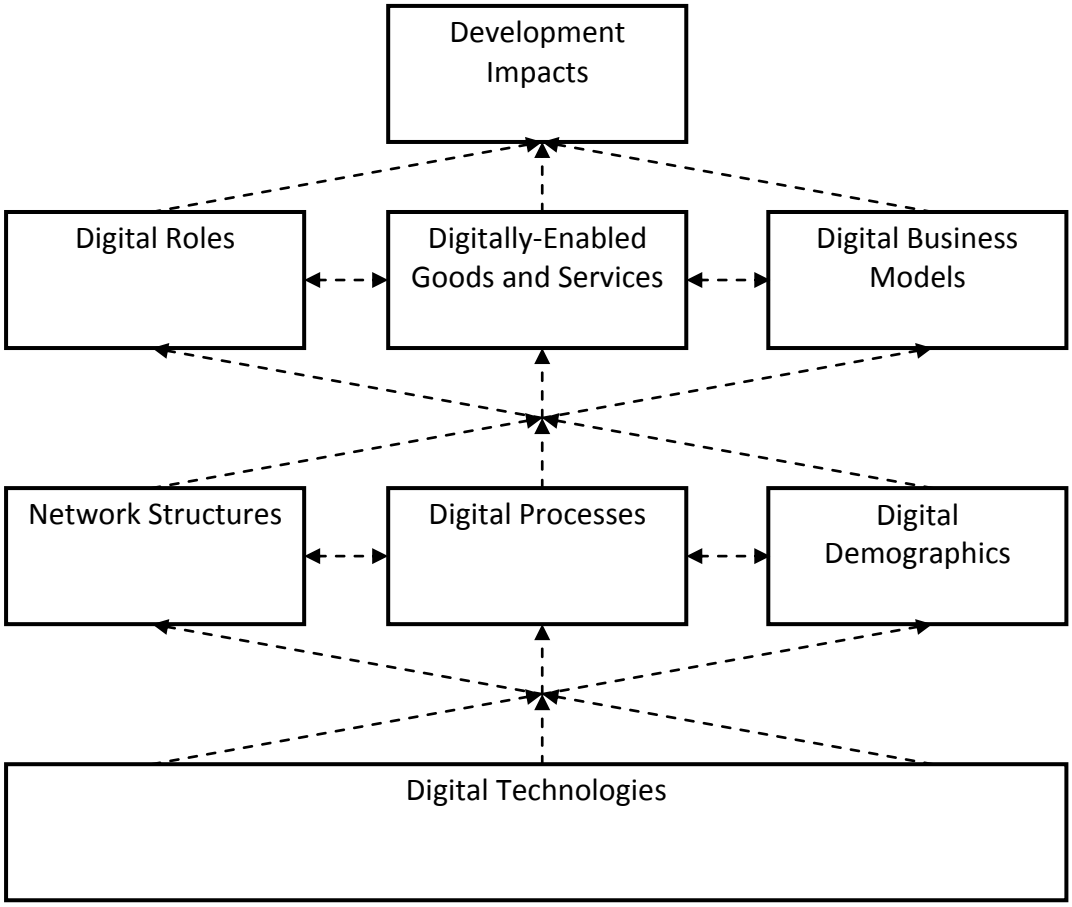



**Figure 6: The Digital Development Paradigm**

Section B discussed the foundation of digital technologies and demographics. The remaining elements of the digital development paradigm are discussed next.

**C1a. Foundations of Digital Development**

**Digital processes**: while analogue processes (such as face-to-face conversations) remain important in digital development, digital processes will dominate. These would increasingly be fully-digital processes – ones that are automated and without human intervention – but will also include digitally-mediated processes in which humans act with or through ICTs. Whether automated or not, the processes of decision and (trans)action will be fed by growth of the 5Vs of data that arises from the digital technologies (adapted from IBM 2013):

- Volume: increasing amounts of data being produced[12].
- Velocity: decreasing time between any process and the widespread availability of data about it.
- Variety: data from an increasing diversity of sources in an increasing variety of forms (including unstructured forms such as audio, video, conversations).
- Veracity: increasing objectivity of data as humans are disintermediated from the data capture and processing chain.
- Visibility: greater awareness and availability of data about processes.

This move to "data-intensive development" is therefore not just a question of big data but also real-time data and open data (Heeks 2014c).

Digital processes remain embedded in socio-technical contexts that constrain them, and there have been concerns that they become less, not more, flexible than their analogue counterparts; being set in "electronic concrete" (Heeks 2006). In general, though, digitisation of processes has made them more flexible, enabling three abilities (Sambamurthy et al 2003, Dunleavy et al 2006):

- Process reengineering: the ability to redesign processes in order to maximise their efficiency.
- Process agility: the ability to redesign processes rapidly in response to environmental change.
- Process holism: the ability to redesign processes so that they integrate previously separate elements into a whole, larger process.

**Network structures**: because the digital infrastructure is networked, there is a natural affinity between ICTs and real-world network structures. Hence, the association with ideas such as "network society" (Castells 2010) and the association with features of networks. However, some of these ideas appear to have been overstated:

- Chains: there has been an association of digital development with disintermediation – the removal of one or more nodes in a chain of connections; for example removal of "middlemen" between a buyer and seller. But it is just as topographically feasible for ICTs to enable reintermediation – the insertion of new nodes in a chain of connections as, for example, happens with third-party suppliers working through Amazon or eBay (Jallat & Capek 2001).

[12] "Every two days, more data is created than in the whole of human history up until 2003" (Piotrowski 2014).

- Networks: the Internet particularly is seen as a networked technology with a flat structure and without central control that is innately open (Naughton 2010) and this has led to an association of digital development with flat, peer-to-peer network structures – for example, social activists joining together in a social movement (e.g. Castells 2012). But the exceptionalism of networks rests on the assumption that they are inherently different from the other two dominant forms of structure: markets and hierarchies. While that might be true of one particular form – the self-organised network[13] – markets and hierarchies are both networks in a more general sense of a set of interconnected nodes. ICTs have levelled a part of the playing field: hierarchies were better than self-organised networks at tasks such as coordination or focusing resources, and with ICTs in place this is no longer the case (Castells 2000). However, as discussed further below, ICTs enable every type of network and have thus been able to strengthen both markets and hierarchies as well.

The structural form of digital development will therefore be networks in the general sense but there is less technological determinism (and more social determinism) in this than might initially be expected from the discourse on networks. We are left with two structural features of digital development:

- Complexity: the network structures that exist in digital development will involve more connections with more nodes (people, devices, organisations, etc) and will thus be increasingly complex (Hanseth 2007). Managing this complexity is beyond the capabilities of analogue systems and can only be done by digital systems which, in turn, add further connectivity and complexity. We thus have a positive feedback loop – "like the tightening of a knot" (Deibert 1997:152) – that increases our dependency on digital technology[14].
- Virtualisation: because of the digitisation of processes, network structures will have less of a physical and more of a virtual existence (Mowshowitz 1997). They therefore cut across the physical barriers of time and space, and they are more flexible – for example, easier to restructure by removing some nodes or adding others.

Three of the trends outlined so far – digitisation, datafication, virtualisation – can be seen as inherent to the technology and thus to the digital development paradigm. Two – the "Southernisation" and "nativisation" of users – can be accepted as inherent to technology diffusion. The others[15] – individualisation, mobilisation, and "real"isation of digital experience; flexibilisation and complexification – are so universal as to be effectively inherent to the digital development paradigm though they all reflect design or implementation decisions with human input.

[13] "We define a network form of organization as any collection of actors (N ≥2) that pursue repeated, enduring exchange relations with one another and, at the same time, lack a legitimate organizational authority to arbitrate and resolve disputes that may arise during the exchange" (Podolny & Page 1998: 59).

[14] A further example of this relates to time since ICTs "both manage and exacerbate time intensification" (Henman 2010:208); helping us to control ever-accelerating schedules while simultaneously accelerating those schedules yet further.

[15] Lexicographers, please look away now.

**C1b. Building Blocks of Digital Development**

The remaining elements of the digital development paradigm move further away from the technology, and increasingly reflect human intervention and choice. Put another way, they shift along the continuum from technology shaping society to society shaping the way technology is implemented and used.

**Digital roles**: as humans interact with digital technology, they take on a range of different roles, which can be understood as a "role ladder" (see Figure 7; Heeks 2014b). In simple terms, climbing the ladder could be read as a greater intensity of engagement with digital technology, moving from no direct use to direct use to use sufficient to be classified as falling within the ICT sector. It is also a ladder of technological capability; each step reflecting higher-level competencies (skills, knowledge and perhaps also attitudes) that are required for this type of ICT use but which are also created by this type of ICT use.

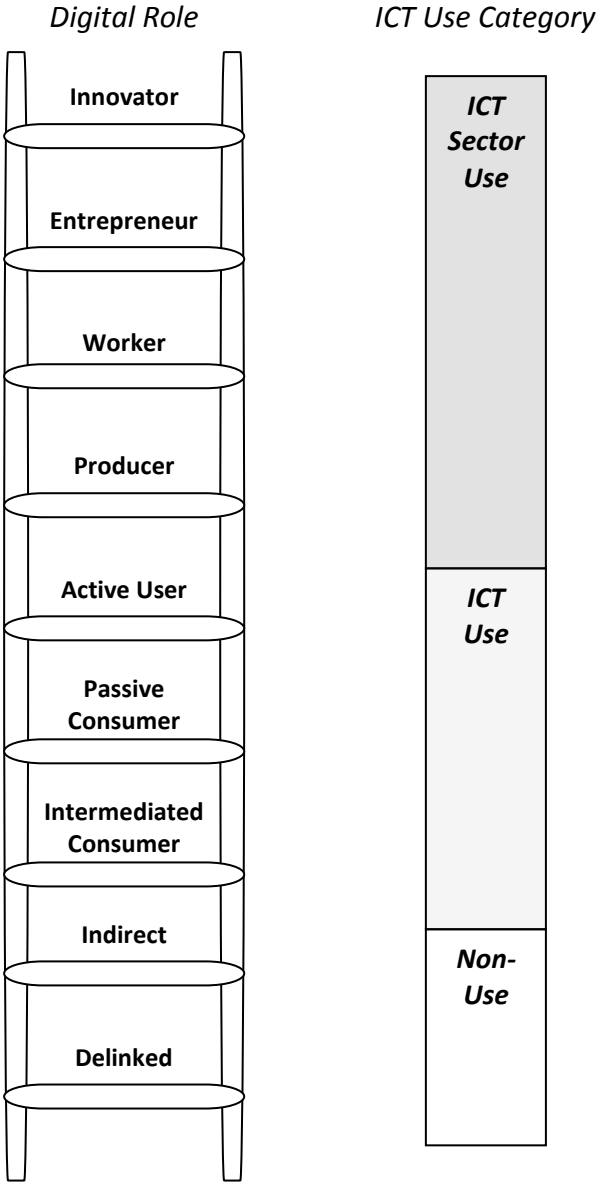



**Figure 7: Ladder of Digital Roles**

Digital technologies have accelerated a conflation of roles; in particular "prosumption" – the conflation of roles of consumer and producer (Ritzer & Jurgenson 2010). Examples include:

- Active prosumption: users of social networking sites are responsible for producing much of the content of those sites – what would Facebook or Weibo look like without their users?
- Semi-active prosumption: e-business and e-government users take on a small production role in consuming services; for example in entering various details about themselves or the particular product or service they want.
- Passive prosumption: everything users do online produces a trail – their "digital shadow" or "digital exhaust" or "digital footprint" – that creates value which is increasingly captured and monetised.

In the great majority of cases, this free labour is given willingly or at least unwittingly but it helps power important parts of the digital economy.[16]

**Digitally-enabled products**: there are attempts to measure the size of the ICT sector[17] or the Internet economy[18] (e.g. McKinsey 2011, BCG 2012, OECD 2013a, EC 2014). These sources suggest that – even together and allowing for overlaps – these elements of the digital economy typically represent less than 10% of GDP, even in the more developed economies of the world. These sectors are growing faster than the general economy but the majority of ICT gains are captured by the "traditional" economy. Measuring the total digital economy – i.e. all value addition from digital activity – has always been a near-impossible task due to problems of definition, measurement, and availability of data; and EC (2014:6) flatly concludes: "Given that digital business models are present in more and more sectors of the economy it is not possible to come up with the size of the digital economy as a percentage of GDP".

What one can conclude, at least presently, is that there are two trends around digital outputs – goods and services (Coyle 1997):

a) A smaller trend for the creation of new digital products that did not previously exist ("amaterialisation"). An obvious example would be software.
b) A larger trend for the digitisation of existing products, causing their "dematerialisation"; that is, their conversion from a physical to a virtual product. This is occurring in almost all sectors and examples include the conversion of books into e-books, conversion of newspapers into news websites, and conversion of classroom education into e-learning. Mobile payment systems like M-Pesa not only dematerialise money but also create a

[16] Estimates of its value vary because they are difficult to define. Facebook's estimate of just under US$5 per "prosumer" per year could be used. This would translate into around 7.5 US cents per hour average unpaid "wage" given the average user spends 65 hours per year on Facebook (Gross 2012, Fuchs 2014) (tiny per-user figures but with more than 1.3 billion users it explains how the company earns c.US$8 billion in revenue with less than 7,000 employees (Sedghi 2014)). An alternative valuation – admittedly by privacy protection firm reputation.com – puts the value of personal data released online at between US$50 and US$5,000 per person per year (Fottrell 2012).

[17] Covering telecommunication services, web/cloud-based services, device manufacturers, component manufacturers, and software (EC 2012).

[18] Covering "the full range of our economic, social and cultural activities supported by the Internet and related information and communications technologies" (OECD 2008:4).

platform that enables dematerialisation of a whole range of other financial services such as banking and insurance.

Because new and existing products and/or the processes used to create them are increasingly digital and thus flexible, another trend is enabled: customisation (Wind & Rangaswamy 2001, Wirtz et al 2010). This is the increasing ability of goods and services to be differentiated to meet the needs or wants of particular consumers.

**Digital business models**: as just noted, the major uses of digital ICTs are still in traditional organisations. As a result, most digital business models are just business models – traditional ways of doing things but with the overlayering of ICTs. What will be new in digital development, though, will be truly digital business models. Drawing from the business sector, these are summarised in Table 2 (adapted from Wirtz et al 2010, Laudon & Laudon 2016).

| Main Category | Sub-Category | Example |
|---|---|---|
| **Content**: collection, selection, compilation, distribution and/or presentation of online content | ***Content provider***: organisation provides digital content | iTunes |
| | ***Community provider***: provides framework for communication of digital content between users with common interests | Facebook |
| | ***Service provider***: organisation adds value to user-provided digital content | Dropbox |
| **Commerce**: initiation, negotiation and/or fulfilment of online transactions | ***e-Tailer***: sells on-inventory goods or services direct to consumers | Amazon |
| | ***Transaction broker***: processes online transactions for off-inventory goods or services | eTrade |
| | ***Market creator***: enables buyers and sellers to transact | eBay |
| **Context**: aggregation and sorting of online content | ***Portal***: adds value to existing digital content | Google |
| **Connection**: provision of physical or virtual network infrastructure | ***Internet service provider***: provides access to digital infrastructure | China Telecom |

**Table 2: Digital Business Models**

However, Table 2's categorisation does not expose some of the key novelties around digital business models, particularly for organisations which are not commercial businesses. These can be better summed up as four features that some business models reflect (Mowshowitz 1997, Benkler 2004, Chesborough 2006, Walter & Back 2010):

- Virtual: the untying of business models from physical restrictions, therefore enabling value chain activities (sourcing inputs, processing inputs into outputs, distributing outputs, managing the value chain, etc) to locate anywhere (that has a digital connection).
- Open: the breaking of traditional boundaries and opacity of value chain activities to enable much greater transparency and involvement of a wider range of external

stakeholders including models of co-sourcing, co-production, co-distribution and co-consumption.
- Crowd: the opening of value chain activities to a large group of not-pre-identified individuals which may include sourcing inputs (e.g. crowdfunding), processing inputs into outputs (e.g. crowdsourcing completion of digital tasks), and distributing outputs (e.g. crowdsharing).
- Shared: the sharing of the value of any resource beyond a single individual (e.g. owner) relating to any value chain activity though typically related to final consumption of the resource.

## C2. What Kind of Transformation?

Having laid out the components of the digital development model, we know turn to consider its impacts and its implications.

### C2a. Micro-Level Impacts

Much of the evidence about ICTs and socio-economic development is micro-level, typically reporting the impact of relatively small-scale applications on individual livelihoods. Drawing from Heeks (2014b) – particularly the role ladder shown in Figure 7 – we can differentiate two main ways in which individuals interact with ICTs[19]:
- Consumer roles involve use of a digital good or service. Examples could be a farmer using their mobile to find the price of cassava in the local market, to access health information, or to confirm a title deed to their land.
- Producer roles involve creation of a digital good or service. Examples would include selling mobile money services, undertaking data entry work, or running a telecentre. These all fall within the ICT sector, broadly defined.

Impact can be measured through one of three lenses that conceptualise development in different ways:
- Economic: development as accumulation of financial capital.
- Livelihood: development as accumulation of livelihood assets; not just money but also health, skills, information, etc.
- Capability: development as greater freedom to be and to do.

A matrix can therefore be constructed, as shown in Table 3, incorporating examples of evidence of micro-level ICT impact.

[19] The trend, noted above, to prosumption muddies these waters – as a Facebook user, for example, you are both consumer and producer.

| Impact Lens | Consumer Role | Producer Role |
|---|---|---|
| ***Economic*** | Increased income: e.g. due to more direct access to consumers and market information (Katengeza et al 2014). Reduced expenditure: e.g. due to more efficient use of inputs (Raj et al 2011) or journey substitution (Boateng et al 2014). Reduced uncertainty: e.g. due to lower price volatility (Lokanathan et al 2011). | Increased income: due to earnings from running a digital enterprise (Hong 2006) or undertaking digital work (Clemens 2013). |
| ***Livelihood*** | Increased livelihood assets: e.g. via communication – human capital (health: Denkinger et al 2013; education: Khan & Ghadially 2010); social capital (Ilavarasan & Levy 2012). | Increased livelihood assets: e.g. via employment – human capital (Madon & Sharanappa 2013); social capital (Rangaswamy & Nair 2012); political capital (Heeks & Arun 2010). |
| ***Capability*** | Development to active user (Duncombe 2012) and producer (Agarwal et al 2010) digital roles. | Development to worker (Nandi 2014), entrepreneur (Baro & Endouware 2013) and innovator (Foster & Heeks 2013b) digital roles. |

**Table 3: Micro-Level Development Impact of ICTs**

### C2b. Macro-Level Economic Impacts

But these micro-level changes, restricted to individual initiatives, represent very small drops in a very large development bucket. To understand if and how digital development will be transformative, our focus must pull out to the macro-level.

One approach here is to review national-level economic data. Following from long-known, similar findings for telecommunications generally, there is understood to be a strong association between digital ICTs – such as use of the Internet or of mobile telephony – and national wealth as measured, for example, as GDP per capita (e.g. Kiiski & Pohjola 2002, Madden & Coble-Neal 2004). But causality was initially more certain in one direction: richer countries could afford to invest more in ICTs, than the other: that higher levels of ICTs caused greater national wealth. Evidence for the latter – deriving from micro-level productivity gains of using ICTs – was initially found in the global North but not the global South (Souter 2004). However, subsequent work – as ICTs diffused further – has found digital ICTs to have a significant and positive impact on economic growth in developing countries (e.g. Dimelis & Papaioannou 2010, Vu 2011, Sassi & Goaied 2013)[20].

[20] The size of the reported effect varies but examples include: a 10% increase in Internet users increases GDP by 0.35% (Dimelis & Papaioannou 2010); a 10% increase in user levels has the following effects on GDP: personal computers (0.15%), mobile phones (0.25%), Internet (0.8%) (Vu 2011); "every 10 percent increase in broadband penetration results in additional growth of 1.3 percent in national gross domestic product" (Williams 2013:67); "countries that had a 10 percent higher 3G penetration between 2008 and 2011 experienced an increase in their average annual GDP per capita growth rate of 0.15 percentage points" (Williams et al 2013:78).
Various differentiations are reported – for example that the Internet has a greater growth impact than mobile phones which in turn have more impact than PCs (Vu 2011); and that developed economies tend to achieve

As might be expected given they face greater barriers to data processing and flow than richer countries (Graham 2014), there is some evidence that the growth benefits of ICTs are greater in poorer countries, so long as they have the right institutional structures in place (Qiang & Rossotto 2009, Sabbagh et al 2013). There are also likely to be thresholds: that – due to network effects – ICTs only have significant growth impacts once they exceed a certain minimum penetration which has been variously estimated between 10 and 40 users per 100 population depending on the technology (Roller & Waverman 2001, Czernich et al 2011, Sassi & Goaied 2013).

A second macro-economic perspective looks at employment. Here the picture is more mixed because automation and productivity gains can reduce the need for labour in ICT-consuming sectors, while there are simultaneous employment gains in ICT-producing sectors. On the latter, it is estimated that the mobile sector alone directly contributed 3.3 million jobs in sub-Saharan Africa (in mobile infrastructure, network operation, distribution/retail, and services: GSMA 2013). There are also secondary employment effects; for example as economic growth increases demand for products and, hence demand for jobs to produce those products. Not surprisingly, then, there is little evidence to date that ICTs are associated with falling employment levels (Barney 2004). There remain concerns that new generations of digital technology – particularly robotics and decision-making applications – will significantly decrease the quantum of overall employment, and lead to a reduction in labour-intensity (Spence 2014).[21]

**C2c. Macro-Level Structural Impacts: Background**

However, this macro-economic view – which remains short on evidence, and debated if not contested – provides only evidence of incremental change in growth rates, and still says nothing about transformation. We must therefore shift from hard evidence to softer interpretation of patterns; an interpretation made harder by the formative state of digital development in many developing countries. What follows, then, and remembering Minerva's Owl, will be subject to revision in future years as experience and evidence builds.

Revisions will be needed because of the inevitable confusion that arises from being immersed in change with multiple, sometimes-conflicting streams of evidence about digital development:

- ICTs are great: they help increase income for those at the base-of-the-pyramid (Abraham 2007).
- ICTs are terrible: they help increase street crime and consumption of pornography (Doron & Jeffrey 2013).

- ICTs are transformative: ICTs are transforming development to a people-centred paradigm (Qureshi 2013).
- ICTs make no difference: ICT does not change development but merely reinforces existing dispensations of wealth and power (Pieterse 2010).

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more growth than employment effects from ICTs whereas developing countries achieve more employment than growth effects (Sabbagh et al 2013).

[21] Though there have always been such concerns (Rowe 1990).

- ICTs succeed: as outlined in the majority of literature on ICTs and development cited in this paper.
- ICTs fail: see Dada (2006) and Dodson et al (2012).

And so forth.

David Edgerton (2006) notes a general problem that our gaze on technology focuses too much on new technologies and innovations, when we should focus on "technology-in-use":

> "In the new picture, twentieth-century technology is not just a matter of electricity, mass production, aerospace, nuclear power, the internet and the contraceptive pill. It will involve the rickshaw, the condom, the horse, the sewing machine, the spinning wheel, the Haber-Bosch process, the hydrogenation of coal, cemented-carbide tools, bicycles, corrugated iron, cement, asbestos, DDT, the chain saw and the refrigerator. The horse made a greater contribution to Nazi conquest than the V2." (Edgerton 2006:xii).

In trying to make sense of the conflicting patterns when one is amidst them, I will try – though likely not always succeed – to focus on technology-in-use, which brings with it four implications:

- The rule not the exceptions: when considering digital development it is easy to be fixated on interesting cases of new digital business models or new digital politics. But these are often outliers; minority examples that do not reflect the digital mainstream of technology-in-use. That mainstream is often rather mundane and everyday: office email and enterprise resource planning systems rather than crowdfunding; Facebook interactions with family and friends rather than e-participatory budgeting: "Most people, most of the time, experience digital technologies as technologies of work, consumption, entertainment and socializing" (Barney 2004:142).
- Beware early-adopter effects: as a sub-set of the previous point, it is easy to focus on early experiences with digital technologies – taking the long view we so far only have early experiences – and assume they represent the long-run impact. That may well not be the case. Internet users in the global South are reported as showing different values and behaviours to non-users (e.g. Bolsover et al 2014, De Souza et al 2012); such differences may disappear as the majority of the population become Internet users. It is relatively easy to gain attention in the early days of a communication channel – as the Zapatistas shortly after the Internet became an international phenomenon (Froehling 1997); but much more difficult to do so when every national and international social movement is online. Intermediaries seem to strengthen their position in markets when digital technologies are first introduced (e.g. Jagun et al 2008); but may struggle when technologies are more fully-diffused to all market actors. And so on.
- Technology in context: when technology is being used, it is being used in a context, and those contexts differ. This is particularly problematic because the majority of experiences with ICTs have so far been in the global North and for this and other reasons relating to skews in global production of knowledge, most evidence about ICTs relates to the global North. But experiences with the same digital technologies may be quite different in North and South (and, indeed, within further different fragments of geography). One especial issue is the question of what precedes. A mobile phone means something very different to someone with pre-existing fixed line and Internet

access than it does to someone with little or no prior access to telecommunications. Ability to trade via ICTs means something very different to someone surrounded by a market economy than it does to someone who can only trade via corrupt or clientelist intermediaries.

- The ideological gaze: when we look at evidence about technology-in-use and development, we do so with a lens clouded by ideology. What we see depends on what we believe. Al-Qaeda and Islamic State make significant of ICTs including arguably particularly-effective use of social media (Espeseth et al 2013, Melki & Jabado 2016). From a perspective of Western liberal ideology, this is a cause for great concern. From a perspective of jihadist ideology, this is a cause for great celebration.

**C2d. Macro-Level Structural Impacts: Overall Model**

Our understanding of the macro-level impacts of digital development is founded on two different logics under which economic, political and social relations can operate: competition logic and cooperation logic (Fuchs 2008, Postigo 2011). The logic of competition can be reflected in two different manifestations: a commercial manifestation in which the market would be the archetypal structure; and a control manifestation in which hierarchy would be the archetypal structure. The logic of cooperation has a collaborative manifestation in which the community would be the archetypal structure[22]. In any given context, the dominant mode of operation (combination of logic and archetype of organising) will vary. Each context can be placed somewhere on the space of modes shown in Figure 8.

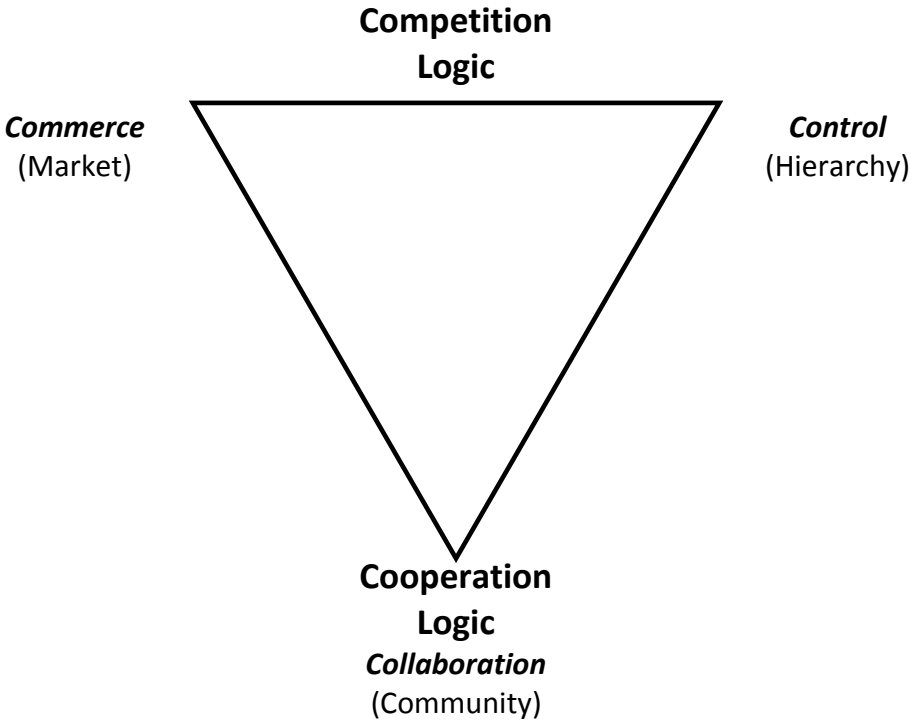


**Figure 8: The Logics and Organising Modes and Structures of Society**

[22] Networks are often identified as the third archetype but, as noted above, the cooperative model of a self-organised network is only one form of network, and so "community" is used here instead.

However, we can conclude that competition/markets is the dominant mode in many economic contexts, certainly as far as global trade and production are concerned; that control/hierarchy is the dominant mode in many political contexts, certainly as far as international and national politics is concerned; and that some mix of competition and control is dominant in many social contexts (for example, provision of health and education) (Cerny 1990, Smith & Meiksins 1995, Adler 2001, Fuchs 2008). As digital development diffuses, what happens to these dominant modes of organising?

Five different outcomes can be discerned (individual initiatives or studies may report some combination or overlap). These will be exemplified in further detail below, dealing with each development sector in turn, but here they will be summarised, each with its own keyword (see also Figure 9):

- Copy: digital technology enables a simple reproduction of the existing dominant mode of organising.
- Spread: digital technology enables the dominant mode of organising to diffuse into a space that it did not previously occupy.
- Curve: digital technology enables the dominant mode of organising to mutate and take on a new form.
- Boost: digital technology enables an intensification of the dominant mode of organising.
- Shift: digital technology enables a strengthening of the subordinate mode of organising; potentially to itself become the dominant mode.

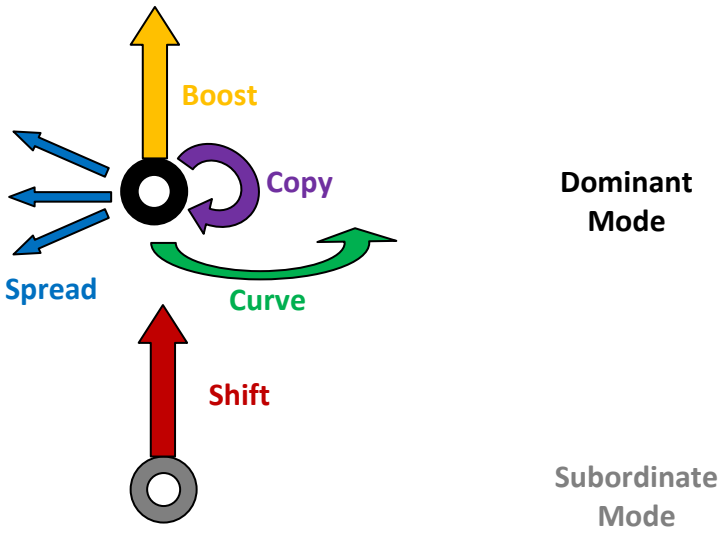


**Figure 9: The Outcomes of Digital Development**

## C3. Surveying Digital Transformation

Having explained the changes associated with a digital development paradigm in outline, we can now look at evidence within the three different sectors of development: economics, politics, and society.

### C3a. Digital Economy

As noted above, the dominant mode of economic organisation worldwide is the market for commerce, and hierarchy within economic units of production, both operating under competitive logic. We see below ways in which these are and are not being reshaped within digital development.

***Copy***: many initial applications of digital technology are, in Michael Hammer's (1990:104) famous phrase, just "paving the cow paths". That is, they make no change to the structural relations of economic activity and the only change to economic processes is the medium through which they are undertaken. For example, early applications of computers in commercial organisations reinforced the centralisation of management control within those organisations (e.g. Robey 1977). Early use of mobile phones reinforced existing economic relations rather than building new economic relations (e.g. Molony 2006, Jagun et al 2008).

***Spread***: as digital technologies diffuse and draw ever-more economic actors into the digital net, so they tend to incorporate those actors into the dominant mode of organising. In particular, we see those at the base of the economic pyramid incorporated into an increasing number of markets. For example, many low-income communities have no formal market for jobs: waged work is found through informal connections and word-of-mouth. Through ICTs, a market for jobs can be created – employers submit job details to a database that can be viewed by those looking for work; would-be workers submit their details for employers to view; contact between the two is facilitated by mobile (SMS/call) or email. Faster filling of vacancies, better employee-job match, and improved wages are reported benefits (e.g. Balasuriya & de Silva 2011).

More generally, the diffusion of mobiles enables the spread of markets in various ways:

- Higher-quality information delivered by mobile overcomes informational barriers to market operation (Aker & Mbiti 2010).
- Use of mobile money removes or reduces some of the physical barriers to participation in markets (Muto & Yamano 2009). The micro-payments feasible via mobile contracts enable increasing market-based consumption of digital products such as games, ringtones and mobile services (Aker & Mbiti 2010). And they also allow markets to be created for services such as water (Haas & Nagarajan 2011).
- Induction of informal retailers as mobile handset or mobile money retailers incorporates them into more formal chains of market relations (Foster & Heeks 2013b).

**Box 4: The Spread of Digital Employment to Low-Income Communities**

These last are examples of a broader pattern in which those on low incomes are inducted into semi-formal digital livelihoods: they are the final pre-consumer node in a long formal value chain but operate in a milieu of largely informal relations (Foster & Heeks 2013b). They represent a sizeable proportion of the employment dividend of digital development: for example probably around 80% of employment created in the mobile sector in Africa and Asia (Foster & Heeks 2011, GSMA 2013). But they remain highly-vulnerable to technological change: often via some combination of automation and the change from shared to individual modes of digital ownership and consumption.

This vulnerability has already been seen in the case of those making a living from selling calls from public fixed/mobile phones. The best known case is probably GrameenPhone's "village phone ladies" in Bangladesh with claims of up to 300,000 women employed in the mid-2000s (Yunus 2006) earning net annual income of around US$600-800 (Alam et al 2009). But later surveys (Shaffer 2007, Yusuf & Alam 2011, Boettinger et al 2012, Jebin 2013) indicated a dramatic decline: numbers were down to less than 60,000 and average net income was reported anywhere from US$70-400. Loss of GrameenPhone's earlier quasi-monopoly and subsidies plus poorer quality of "phone ladies" as the programme scaled are a partial explanation: sizeable numbers in surveys reported still using shared phones but shifting to a competitor. But a significant explanator was growth in individual ownership of phones.

One can identify similar vulnerabilities for hundreds of thousands who have set up cybercafés and kiosks (threats of replacement by Internet access at home, work and on mobile devices), or act as mobile money agents (threats of replacement by ATMs that can accept or dispense cash). The spread of the market-oriented digital economy has therefore created jobs, incomes, empowerment and capabilities for millions on low incomes. But it has also created vulnerabilities to technological change.

The largely unanswered question – because digital employment for those on low incomes is at such an early stage – is what happens next. There are signs that the capabilities and empowerment may remain, enabling a transition to emerging digital livelihoods. In Bangladesh, for example, "as they lose their Village Phone business, VPOs [*Village Phone Operators*] most frequently transition to selling other mobile-related products, whether it is talk time or mobile accessories." (Boettinger et al 2012: 226). One can also see this in retrospect – mobile handset retailers working in Kenya's low-income communities "had histories in one or more of: video hire, music cassette sales, photo shops, TV / video / computer repair and shared public phone use" (Foster & Heeks 2013b: 344-345).

Overall, "these patterns speak to both the opportunities for learning and change ... but also to the uncertainties of growth and fragility of survival" (*ibid.*: 345).

***Curve***: alongside Shift, this is a core construct of those writing about digital development. Under various terminologies – "informational capitalism" (Castells 2010), "digital capitalism" (Schiller 2000), "distributed capitalism" (Zuboff 2010) – the main argument is that for the dominant mode of economic organisation, the "*substance* is continuous from previous forms of capitalism, whereas the level of *form*, from industrial to informational, and *praxis*, from hierarchical to decentralized operations and management, is characterized by change" (Gripenberg 2006:120).

Examples of changes in form/practice that still retain the substance of capitalism[23] include:

- Scale: the digital development paradigm – by eroding the barriers of time and space, and by enabling the management of complex systems – has pushed capitalist enterprise to a transnational scale. Of course since the first emergence of mercantilism and then capitalism there have been transnational operations: think East India Company. But ICTs have enabled this to become a much more significant model within the overall sphere of economic operations (Dicken 2011).
- Organisational structure: shifts from the Weberian hierarchies of old towards more networked forms of organisation both internally and externally. For example, networks of small and medium enterprises collaborating via digital technologies in the post-Fordist model (Kawira 2013). As well as their nature at any given time, these networks – because of their digital foundation – have another essence, which is their flexibility (Barney 2004). They therefore both allow and require capitalism to constantly re-form.
- Business models/products: the digital economy – as described above – represents new types of digital goods, services, and business models. All of these have successfully been incorporated into capitalist modes of organising.
- Management process: direct managerial control of activities is no longer feasible as scale and complexity increase, and decentralisation is therefore required for large, complex network-structure firms. But ICTs enable this to happen while managers retain an increasingly real-time overview of activities in decentralised parts of the value chains (*ibid.*). New approaches such as virtual teams or knowledge management can also be understood as operating within a broadly competitive-driven logic (Fuchs 2008). Even the new digital relations with customers – sometimes argued to shift the balance of power from producer to consumer (Pires et al 2006) – can be coopted by enabling anything from passive surveillance of their online consumption through creation of online brand communities to active "co-creation" of value (McWilliam 2000, Alreck & Settle 2007, Fuller et al 2010).

What this essentially argues is that the digital development paradigm shown above exists within a broader social structure: a combination of power, discourse and institutions that makes up the substance of a mode of organisation. While the content of specific organisational structures, processes, models, etc may alter under Curve; the broader structure does not.

[23] Barney (2004:71) describes that substance to "include, for example, private property; commodification; class relations; free markets; massive public and private systems for the stimulation and management of consumption; accumulation as a central strategic motivation, etc".

***Boost***: there are a number of informational barriers to the proper functioning of both markets (e.g. Jagun et al 2008) and hierarchies (e.g. Morrison & Milliken 2000), particularly in developing countries. Because an innate feature of digital networks is their ability to enable freer flow of information, they have a tendency to improve the operations of both markets and hierarchies (as well – see next – as self-organised networks). Examples are now emerging where this improvement occurs to such an extent that parts of digital development may best be labelled "hyper-competitive" – either hyper-commercial or hyper-controlling.

Three examples will be given here:

- Frictionless markets: the acme of digital development could be seen as a situation in which the entire value chain is digitised – suppliers are located and inputs are transferred digitally; the production process and product are digital; and payments, oversight and distribution are digital. "Human cloud" models such as those used by Mechanical Turk provide this by combining crowdsourcing and microsourcing (Kaganer et al 2013). They involve atomisation of work into microtasks with relative anonymity and atomisation of clients and contractors, and with little institutional, regulatory oversight[24]. This is leading to convergence of payment (Beerepoot & Lambregts 2015). At present this is a convergence to the middle, with contractors in the global North paid less than their typical rates and contractors in the global South paid more. But there is potential for this to migrate over time to a convergence to the bottom, with evidence that digital work often pays less than minimum wage levels in the global North (Cherry 2009).
- Info-monopolies: because of network effects (the more people that join a network, the greater the value of joining that network) there is a natural tendency towards monopoly in the provision of some digital services (Wu 2010). Examples include Google, Facebook, Twitter, Skype, Amazon and eBay for consumers in the global North[25]. While the network effects mean using these is beneficial for the consumer, monopoly effects mean that significant power and control is vested in these firms vis-a-vis their consumers and vis-a-vis nation states (Jelen & Kolakovic 2009, West & Valentini 2012).[26]
- Panopticon hierarchies: the growing digitisation of work activities means those activities can readily be monitored, recorded and analysed by managers – creating a version of Jeremy Bentham's Panopticon in which a single jailer could monitor the activities of all prisoners. For example, in Indian call centres, "agents' performance is extensively and intensively monitored and measured [*with*] ... a claustrophobic intensity of controls" (Taylor & Bain 2006:46). And in some Chinese factories, mobile phones are "a 'wireless leash' that shop-floor management can use as a nearly complete control and surveillance system over employees" (Qiu 2009:188).

[24] Barney (2004) describes a deinstitutionalisation of work within the digital economy with loss of traditional institutions that govern work: unions, governments, workplace groups.

[25] These are often dominant in the global South also, though some markets have their own quasi-monopolies e.g. Taobao, Alibaba, Tencent, Sina Weibo in China (Cainey et al 2012)

[26] Though, while monopoly may be a natural outcome of digital development, the longevity of any individual monopoly is questionable. "The half-life of market domination seems to be dwindling" (Schonfeld 2010; see also Haucap & Heimeshoff 2013): where today are erstwhile monopolies like MySpace (see Keegan 2007), Friendster, Netscape Navigator, etc?

***Shift***: as argued above, digital networks can be seen as innately protagonistic to cooperative models of economic organisation: the Internet is founded on a lack of central control; digital information is hard to control or monopolise in a network; its intangibility and replicability militates against private ownership; networks seek to establish connections and thus negate individuality (Fuchs 2008). Digital development has therefore been associated with cooperative, community-based economic models which stretch across the value chain. Examples include[27]:

- Supply: such as crowdfunding models that (largely) disintermediate between a network of peer funders and those seeking funding. In development, true peer-to-peer micro-lending communities have so far been relatively rare but one example is Zidisha which allows virtually-direct microlending to farmers and micro-entrepreneurs in a number of African and Asian countries (van Damme 2011).
- Production: such as open source models of software production. While these were initially restricted to the global North, they are now increasingly used in developing countries with example of both South-South and North-South collaboration (Sowe et al 2012). There are a number of different models for open source software production but must are based on a commitment to sharing and open participation among a community of peers.
- Consumption: such as peer-to-peer file sharing. This can be on an individual basis sharing multimedia clips (pirated and non-pirated) and items of political interest (Pearce 2011). Or it can be on a more organised basis based around pirated materials for example using BitTorrent (Wang 2010) or based around open access to scientific and other research knowledge (Ahmed 2007).

There are a lot of reported examples of "Shift": of ways in which ICTs enable transformative examples of economic organisation based around a cooperative logic. The unanswered questions – likely unanswerable given we are at such early stages of digital development – relate to weight and trend. In comparative terms, how much are ICTs helping strengthen capitalism vs. strengthening alternatives to capitalism? And which of these two is growing faster?

***Hybrids***: real-world examples of digital development often combine two or more of the outcomes described above. Indeed, pure instances of each outcome can be hard to find – as an example, cooperative models of digital development can find themselves partly reproducing institutional values and hierarchies: reproducing gender discrimination (both positive and negative) in peer-to-peer lending (Chen et al 2014); reproducing hierarchies in open source such that all programmers may be equal but some are more equal than others (Crowston & Howison 2006).

One pattern that can be observed in Shift-then-Curve: the expansion of the digital commons through a cooperative model, with parts of those new commons then colonised by a competitive model. Examples include:

- Social media: there was an initial colonisation by forces that challenge the status quo – for example, services like TripAdvisor that empower communities of consumers vis-a-vis

[27] Other examples include use of ICTs to support the operations of cooperatives (Veeraraghavan et al 2009), and other cooperative production models e.g. wikis (Cooper 2006).

producers. While these continue, they are then challenged as the dominant forces learn to use the new technologies: thus social media becomes the forum for new forms of "relationship marketing" and "social customer relationship management" (e.g. Evans 2010). One can see a similar dynamic at play around the incorporation of social networking – which could readily be seen as a self-organised, cooperative network of participants – into new models of capitalism in which users get the service – Facebook, Google, Twitter, etc – free of charge but also "work" for free by providing the service providers with monetisable data (e.g. Gross 2012). The old saying needs modification to: "If you're not paying for it, you are the producer".

- Sharing economy: the same has been true of the ICT-enabled "sharing economy". While there are a growing number of examples of this built around the cooperative ethic, there are also a growing number of non-profit sharing sites becoming for-profit businesses (e.g. CouchSurfing.org) and "pseudo-sharing" sites that are actually driven by the competitive logic of "money, egoistic motives, expectations of reciprocity, and lack of a sense of community" (Belk 2014:16).

One particular hybrid pattern – combining Spread, Curve and Shift – of which examples are reported is ICT-enabled social enterprise. IT impact sourcing falls into this category: the outsourcing of digital work processes to marginalised communities (Heeks 2013a). It integrates community members into market-based value chains, though typically insulates them from the competitive component; it represents a new digital business model; and it provides a more welfare-oriented alternative to traditional commercial outsourcing (Heeks & Arun 2010; Heeks 2013b)

**C3b. Digital Politics**

Political arrangements for nation-states (and for many other units of larger and smaller geographic scope) involve hierarchy: an imbalance of power between states and citizens with the former much more able to control the latter than vice versa. Scandinavian-model democracies may place at a different point along the continuum to totalitarian dictatorships, but the hierarchy and the logic of competition for political capital is present for all currently-dominant models. What do we find under a digital development paradigm?

***Copy***: in some situations – particularly where ICTs are relatively new to parts of the political system – the technology provides a digital wrapper but does not change the nature of political relations and behaviours. For example, in relation to the administrative functions of government, introduction of ICTs into the Thai justice system "has come to reinforce a certain power structure ... [*with*] no real change in responsibilities or the structure of workflow" (Chongthammakun & Pal 2012). One can also see this in citizen relations, as shown in the application of ICTs in the Chilean Senate via online citizen-senator chat sessions and e-participation and voting on proposed legislative items (Araya & Barria 2009). In practice, questions in the chat sessions were pre-arranged with the senators provided answers and with breaks in the session if an unexpected question arose. In e-participation only non-contentious topics were selected and votes were not binding. These were seen as public relations exercises that replicated rather than challenging existing distributions of power.

***Spread***: diffusion of digital ICTs – mobile phones especially – incorporates millions upon millions of individuals as nodes in the digital network. For many on low incomes, this means a step change in their connectivity, and their relationship with the state. They are much better able to receive (some) government services (Ghyasi & Kushchu 2004, Bhatnagar & Singh 2010) including direct social protection payments (Vincent & Cull 2011), and they also – indirectly – become taxpayers given "mobile phone operators are key, and rapidly growing, contributors of tax revenues to government" and that operators derive their revenues from individual customers (Heeks 2009)[28]. In many cases, digital ICTs are replacing a localised, intermediated, capricious and limited experience of government with an increasingly "standard" model of state-citizen relations.

State control is also moving into another space from which it was originally absent: cyberspace. Often framed around narratives of criminal activity online – particularly child pornography and predation, terrorism and other threats to national security (Kohlmann 2006, Ravindran 2009, Dubois & Dutton 2014) – this has led to a steady increase in state surveillance and regulation of online activity (e.g. CIPESA 2014).

***Curve***: there are examples of the form and practice of politics changing but its substance remaining the same. These could be corralled under the heading "informational politics" (Castells 2010). In a narrow sense there has always been an informational politics – a politics of meaning, symbols, discourse, public relations and persuasion – but this has arguably taken centre stage as digital media becomes the key platform through which politics is consumed and even enacted (Barney 2004)[29]. But Curve also means a mutation of the way in which the dominant force – the nation state – exercises its control, as it shifts from being the apex of a hierarchy of power, to the most powerful node in a broader network.

In some cases, the mutation is relatively small. One can see instances within nations. For example, e-petitions provide a much easier way that paper petitions for citizens to express their political opinions, and online petitioning sites therefore tend to generate hundreds if not thousands of petitions (Lindner & Riehm 2009, Margetts et al 2014). Given the reduced barriers to petitioning, the high level of e-petitions generated, and some evidence of (marginal) alterations in citizen participation (Bohle & Riehm 2013) this can be seen as a new form of political action. It has pushed governments into action, to extend their own form to incorporate e-petitioning with many legislatures now hosting this service. However, this is a mutation at the margins of state politics: being channelled into the existing mechanisms e.g. of parliaments, and potentially strengthening rather than undermining the models such as representative democracy (Hough 2012).

Looking more broadly at ICT-enabled political campaigns – which may involve e-petitions but also a broader range of online communication – the mutation is somewhat larger. Governments have been pushed to change their legislative programmes, and to get rid of unpopular politicians. Examples include the ICT-enabled citizen protests in Brazil to ensure

[28] Mobile operators "average 7% of tax receipts in Africa and, in some countries, are the single largest tax payer" and "around 30% of the cost of mobile phone ownership goes to pay tax" (Heeks 2009). Mobile operators contribute more than US$20bn in taxes in sub-Saharan Africa (GSMA 2013).

[29] Though traditional sources of power – money, military might – remain.

passage of the "Ficha Limpa" law barring those with a criminal record from running for public office (Moncau & Magrani 2011, Welp & Breuer 2014), and the ICT-enabled student protests against education reforms in Chile which also impacted the outcome of the subsequent Presidential elections (Valenzuela et al 2014, Welp & Breuer 2014).

Governments have had to change their processes and relations to take account of the new online politics, of the space it creates for citizen opinions to be manifest, and of the broader political network within a country. Particularly, that network now often includes online political intermediaries: organisations like Avaaz and MoveOn which have proven necessary in order to marshal the "herd of cats" that is citizens acting online. Those intermediaries have thus become important political actors (e.g. Carty 2011). But, in general, these intermediaries and their networks have worked with, rather than directly challenged governance of their nation-state.

Governments have also had to change their processes in response to e-government as this has moved beyond the automation phase described under Copy. This is seen in the integration of processes – often cutting across organisational boundaries within and between departments – so that citizens can be presented with "one-stop government" (Hanna 2010). In a number of cases, and partly due to issues of locus of ICT capabilities, the advent of one-stop government services has involved use of private sector providers to administer or deliver public services (e.g. Naik et al 2014). While government retains ultimate control, its role mutates to one of "steering not rowing" (Osborne & Gaebler 1992).

There are other ICT-enabled challenges that challenge the nation state further but which still mutate rather than transforming the dominant, competitive model of politics. The first mutation is largely within nations and summed up as "accelerated pluralism" (Bimber 1998). This sees a fragmentation of political interests, with individuals adhering to an ever-wider array of special interest political groupings, including those with more polarised political views (Barney 2004, Curran et al 2012). One result is a decline in mainstream political parties within democratic regimes and, more generally, a loss of the common public realm of politics. This – for example the rise of ICT-enabled non-traditional political parties – is most clearly seen in the global North (though even here the extent of fragmentation is questioned and the resilience of traditional institutions is noted (e.g. Ward & Gibson 2009[30])).

The second change is a mutation of politics to the transnational level.

Transnational governance within the public sphere has arisen to address the transnationalisation of political issues. Most of these issues have been enabled or exacerbated by digital technologies and would not exist in their present state without ICTs: transnational crime and terrorism; migration; pandemics; climate change; trade and financial flows; tax and labour activities of transnational firms. This is not Curve in its conventional sense because here ICT is not enabling but requiring the emergence of transnational governance. However, ICTs also do the former: they enable the transnational

[30] With further counter-evidence, albeit from experiments rather than the real world, that polarisation of opinions is not necessarily higher online (Gonzalez-Bailon 2014) and that conformity may be greater online than offline (PRC 2014).

governance networks which, again, would not exist in their present form without ICTs (Fortes 2003, Navarrete et al 2010).

But transnational governance has also arisen within the private sphere as nation states have ceded power to transnational corporations. As already seen, these could not exist in the present form without ICTs, and transnational corporations have often sought advantage through shaping national policies or playing governments off against each other (Miyoshi 1993, Narula & Dunning 2010). Transnational ICT firms – some of which are quasi-monopolies – are no exception, and have undertaken regulatory capture (steering nation state policies to their interests), regulatory arbitrage (working around regulations, for example through transfer pricing, taking advantage of either loopholes or differences between regulations in two locations), and regulatory opportunism (for example to take advantage of regulatory lacunae or delays) (Frieden 2002, Jelen & Markovic 2009).

***Boost***: from pre-digital origins in the census, information and communication technologies have been used by states to augment their power. The advent of digital technologies has significantly increased the opportunities for further enhancement of government power. Examples in use by the democracies of the global North include CCTV, facial recognition software, biometric passports, and surveillance of online activity and communications (Fuchs 2008). More authoritarian regimes have passed through their original phase of seeking to reject the Internet due to its political costs (despite its economic benefits: the so-called "dictator's dilemma"), into a second phase of seeking to control the Internet (e.g. via filtering, blocking and disconnecting services), which overlaps with a third phase of proactive e-repression (Heeks & Seo-Zindy 2013).

It is the third, repressive phase that boosts the power of the incumbent regime:

> "states make use of e-surveillance to gather evidence that is used to repress their opponents. But they also actively use ICTs for repressive purposes: disseminating propaganda inside and outside the country; hacking into the websites of internal social movements and the email/mobile accounts of organisers; planting disinformation into social movements' communications; using viruses and other tools of cyberwarfare to attack political challengers ([*Kalathil & Boas 2001*], Karlekar & Cook 2009). This ... presents evidence that the dictator's dilemma is solved: ICTs can be simultaneously harnessed for economic growth and political restraint." (Heeks & Seo-Zindy 2013:4)

***Shift***: digital technologies are enabling political transformation – strengthening an alternative politics – in two main ways (Fuchs 2008). First, digitally-enabled social movements give voice to an alternative politics. This could be on a small scale; for example, providing Hutu and Tutsi youth in Burundi a safe online space to discuss national reconciliation and development (Kadende-Kaiser 2006). Maximally, these new social movements have been able to enact regime change; the ultimate demonstration of ICTs overthrowing the dominant political order. There are many disagreements here. Views on revolutionary actions like the Arab Spring, for instance, range from those arguing a central, causal role for ICTs to those arguing a merely facilitative, mediating role (Castells 2012, Heeks & Seo-Zindy 2013). But this spectrum of opinion is delimited, with a general acceptance that regime change would not have happened or at least would not have

happened in the same way or timescale, had it not been for ICTs. And there are serious limits set by asking "what happened next?". Fluid, atomised, ICT-enabled social movements are often no match for more traditional hierarchies (*ibid.*). Yet in all cases, they have shifted the terms of political debate and action in their countries.

Second, digitally-enabled social movements themselves provide an example of an alternative politics:

> "The digital social networks based on the Internet and on wireless platforms are decisive tools for mobilizing, for organizing, for deliberating, for coordinating and for deciding. Yet, the role of the Internet goes beyond instrumentality: it creates the conditions for a form of shared practice that allows a leaderless movement to survive, deliberate, coordinate and expand." (Castells 2012: 229)

Certainly there are limits here. Cooperative online politics can be undermined by citizens being self-centred (using e-participation as the means to form one's own opinions and political identity rather than engage in debate or influence political outcomes (Lyu 2008)), performative (more concerned with display and impact than content or engagement (Herring et al 2002)), and transitory (flitting from one issue to another rather than forming the mass, long-term identities necessary to drive systemic transformation (Qiu 2009)). As both mirror and stage, the Internet is thus a medium through which we regard our own performance, and form our own identity, values and attitudes (Cover 2012, Castells 2012). But that formation can be in light of the alternative politics. The majority of the population may not join, and many involved may already adhere to that alternative model, so online social movements' main transformation may be to individuals at the margins.

***Hybrid***: as with the digital economy, real-world digital politics may involve a mix of different outcomes. One example – mixing Curve and Shift – is the disintermediation seen in e-government applications. For many in the global North, this simply means service consumers save a little time e.g. by being able to renew a licence without visiting a government office or posting a letter. For many in the global South, it means more. First, by virtue of three savings: the higher cost of a journey to the nearest government office (which could be a day-trip for many in rural areas); the wage or agricultural earnings that would have been foregone during the journey; and avoidance of a corrupt payment to someone intermediating between them and the government service (e.g. Bhatnagar & Singh 2010[31]). But second, by changing the nature of the relationship to the state to a more objective and equitable one; to some extent reducing the control of the state – at least as exercised by local officials – over their lives.

Castells (2012) argues that power comes directly through physical coercion and control, and indirectly through control of discourse and meaning. One can see states morphing some powers and relinquishing others – again, a mix of Curve and Shift – in the realm of online political discussion. The Chinese state is perhaps the quintessential example. It coerces (by threatening blog writers or discussion board hosts), it controls (via censorship of online

[31] In their before-and-after survey of e-government in rural India, Bhatnagar & Singh (2010) found in roughly half of cases before computerisation, officials would demand a bribe (averaging around US$3; equivalent to a day's income in rural India). After computerisation when government officials were largely disintermediated from the process, less than 1% of users reported paying a bribe.

content[32] and blocking of sites), and it intervenes in discourse (via the "50-cent party" who challenge and seek to refute online content critical of the state) (Jiang 2010, Hassid 2012). Yet it cannot – or chooses not to – stifle all political debate across the diverse spaces that have opened up online. Therefore, a space has been created for alternative voices and this is not simply status quo: "the Internet has contributed to a more critical and politicized citizenry in China's cyberspace and shifted the power relationship between the state and the society" (Lei 2011:311). Yet state controls place limits on this shift and Huang (1999:145) sums it up neatly: politically-active citizens online in such contexts are "flying freely but in the cage".

As well as being found in terms of e-efficiency, e-transparency and e-communication, the same pattern – mixing Curve and Shift; flying freely but in the cage – can be seen in three other areas:

- e-Participation. For example, in e-participatory budgeting, citizens are able to determine among themselves – facilitated by online visualisation, scenario modelling, discussion and voting – how public money should be spent. However, the proportion of public budget allocated is often quite small, and citizen input may be guiding rather than binding (Peixoto 2009, Alfaro et al 2010)[33].
- e-Accountability. Online applications are being used in Asia and Latin America for "sousveillance": to track performance against politicians' promises, to report corruption of public officials, to track budget payments to their intended destinations, and to show which officials were handling a licence application (Bertot et al 2012, Gigler & Bailur 2014). While producing a shift in balance of power from government to citizens, government remains the reference point; the sun around which the planets of civil society orbit.
- e-Collaboration. Government goods and services can be co-produced with citizens via use of ICTs. For example, interactive community mapping has been undertaken in Africa, using community members and others to capture details of roads, buildings, facilities, etc on a digital map (Shkabatur 2014). Similar public participation geographical information systems have been used in Asia to integrate top-down satellite data with bottom-up inputs of community members; for example, to identify priority locations for planting trees to improve resilience to climate change (Ty et al 2012). In both cases, there is a co-production model between community, government, and technical experts. The community can use the final product though final decision-making may be seen as the preserve of government.

**C3c. Digital Society**

Compared to the other two domains in which digital development plays out, digital society is more difficult to analyse. Its content is less clear – here we include social development sectors such as health and education and the "development system" – whereas others

[32] King et al (2014) report results of a mass experiment in posting which showed online postings critical of leaders were often permitted (the authors interpret this as state tacit approval of data on "which officials are not doing their job") while postings relating to collective action outside government were censored.

[33] http://mygov.nic.in/ allows online participation in decision making but an example is that citizens were allowed to suggest the name, logo and tagline for a new financial inclusion scheme. Even then, a government jury selected the winner, and the content of the financial inclusion scheme was not up for discussion.

restrict this third domain to culture or identity (Barney 2004, Fuchs 2008). Whatever the boundary set, it overlaps with economics and politics. And the argument for a dominant mode of organising is harder to make: threads of cooperation and community tend to be more strongly present in this domain than the other two (van Vugt et al 2000, Henrich et al 2004). As a result, the ideas of Copy, Spread, etc make less sense in this domain – for example, since society is everywhere there are no "anti-social" territories into which it could spread.

What we can see, as in the other two domains, is evidence with digital society for the promotion of both competitive and cooperative modes, as Table 4 summarises.

| Sub-Domain | Example of ICT-Enhanced Competitive Mode | Example of ICT-Enhanced Cooperative Mode |
|---|---|---|
| ***Knowledge*** | The spread of knowledge management in developing countries, enabling control, portability and depersonalisation of knowledge (Ferguson et al 2010) | The creation of subject-area wikis by groups of specialists to share knowledge (Ma et al 2008) |
| ***Education*** | The imposition of standard curricula and pedagogies via e-learning (Landzelius 2006a) | The use of group participative e-learning tools (Gitonga et al 2014) |
| ***Health*** | Sales of patient records to health insurance and other firms (Donnelly 2014) | The creation of open source health information systems with global North-South collaboration (Staring & Titlestad 2008) |
| ***Culture*** | The presentation of a deracinated, skewed version of local culture online as a means to develop private sector tourism (Michaelidou et al 2013) | The capture and sharing within communities of traditional stories, language and crafts (Landzelius 2006a) |
| ***Identity*** | The use of social media to promote the self while explicitly or implicitly demoting others: from cyberbullying to displaying symbols of status and wellbeing (Enli & Thumim 2012, Mura & Diamantini 2013) | The use of social media to participate in, and strengthen, identity networks of family and community (Wellman et al 2002, Oiarzabal & Reips 2012) |
| ***Religion*** | Commodification of religious artefacts through mobile services selling religious quotes, prayers and poetry (Barendregt 2009) | The construction of online peer discussion fora and communities based around religious beliefs (Campbell 2005) |

**Table 4: Competition and Cooperation in the Digital Society**

Certainly both of these modes will contest with each other and a key issue for any digital context remains which one dominates, and what the trend is. Landzelius (2006b) cites two examples to extract a possible pattern:

- Colombia's U'wa people who successfully used ICTs to resist drilling on tribal lands by Occidental, only for a local firm – EcoPetrol – to move into the area once media gaze had shifted elsewhere.
- Canada's First Nations whose self-empowered uptake of ICTs is now seen as an opportunity to utilise them as workers for online services firms.

She therefore speaks (*ibid.*: 297) of "moments of empowerment" that are "fragile, ephemeral, subjective, and context-dependent"; islands of cooperation in a competitive sea. Others, though, see greater potential for cooperative models to spread (Acevedo 2009).

Whichever the case – and reflecting trends already discussed above – social structures and processes under a digital development paradigm are increasingly:

- Networked: with a growing importance of relations and positions within networks, and a growing emphasis on multi-node actions (Castells 2010).
- Virtual/Mobile: with an increasing disembodiment from physical/spatial relations where the virtual is distinct but not separate from the physical (Fuchs 2008, Doulet & Dan 2009).
- Flexible: with identities and engagement being more fragmented and transitory than previously, and with social structures more readily able to form, dissolve and re-form (Qiu 2009).
- Complex: it is unclear what the impact will be of the increasing complexity and interconnection that digital development will deliver. There is potential to create the equivalent of Adam's (1980:57) Total Perspective Vortex in which:

  > "you are given just one momentary glimpse of the entire unimaginable infinity of creation, and somewhere in it a tiny little marker, a microscopic dot on a microscopic dot, which says 'You are here'."

  As individuals see their own insignificance and powerlessness, a range of behaviours from withdrawal to reassertions of selfhood to extremism can result.

Overall, it is feasible that "networked individualism" (Castells 2010) will become the dominant form in society: weaker and more transitory and mobile than prior networks but intentionally created and sustained by the individuals who see themselves at the centre (Barney 2004).

**Box 5: A Digital Development System**

As the myriad of actors within the international development system – from the international agencies of the UN system through bilateral donors and international NGOs and community-based organisations to final development recipients – become increasing users of ICTs, it becomes increasingly credible to think of a digital development system. This is a system in which not only the administration of development is digitised but also in which some direct development processes (education, public health, welfare payments, etc) are dematerialised.

As part of digital society it reflects the wider trends described:

- ICTs can be used to reinforce the competitive mode of organising development; increasing management control within organisations, and improving upwards flows of accountability at the expense of downward accountability to development recipients (Heeks 2000, Lewis & Madon 2004, Neu et al 2006).
- ICTs can be used to reinforce the cooperative mode of organising development; for instance via online crowd models. Example of this include use of a global network of volunteers to provide technical and administrative assistance to NGOs in Africa (Acevedo 2009), and crowdmapping information on local situations during disasters, other emergencies, conflict and other crises (Bott et al 2014).

Underpinning both trends is the move towards a more networked, virtual, flexible, mobile, etc model of development structure and process (Acevedo 2009)[34]. Development may thus become more agile and heuristic but will certainly favour those within the network who – through resources, relations, position – are powerful. These are characterised in various ways:
- as "searchers" who adopt a trial-and-error model, introducing quick "pivots" within development projects in response to real-time impact data (Thompson 2008, Khan 2013).
- as intermediaries who sit between the local and the global, managing relations and flows of knowledge (Hayes & Westrup 2014).

The growing complexity of connections thanks to ICTs, and the growing number and severity of shocks to which development actors will be subject, mean growing concerns about the resilience of development actors and systems. They are pushing resilience – and the inter-relation between ICTs and resilience – up the development agenda (Ospina & Heeks 2010b).[35]

[34] An alternative characterisation is FAST: flat, agile, streamlined, technology-enabled (EC 2013).

[35] Growing development complexity is seen by some as requiring a more localised, self-organising vision of development: "an uncertain, open-ended and long-term process driven by a large number of local interactions that generate self-organized stable patterns capable of adaptation" (Rihani 2002: 134). However, understanding of resilience demonstrates that self-organisation runs alongside the need for growing cross-scale interactions (Heeks & Ospina 2014).

## C4. Digital Development Beyond Transformation

As described above, competitive logic is the dominant mode in many economic, political and – to some degree – social contexts. The evidence of the digital development paradigm is mixed but there is little sign yet that it will seriously challenge the domination of competitive logic even though it supports many examples of cooperative logic.

Despite the very differing views that exist about competitive logic, there is reasonable agreement that it has some shortcomings that need to be addressed. These can all be understood via the notion of market failures, externalities and the like: that there are broader requirements for and impacts of competitive behaviour which those engaged in that behaviour have no direct incentives to address. There is plenty of evidence for these arising within digital development, and they will be analysed under the four headings below.

### C4a. Digital Ecosystem

Competitive markets are a highly dynamic force for flexibly directing investment in response to consumer demand since investors can readily see the opportunity for a return. Competitive markets work less well in other forms of investment: long-term investments that have risks and uncertainties; investment in public goods where the investor cannot capture all the returns on the investment; more generally any investment where there are societal benefits not captured in the price of the product.

This means that markets will underinvest – relative to the societal benefits – in many aspects of the "digital ecosystem" (e.g. Garcia & Horowitz 2007, Poel et al 2010, Kim et al 2011). For example, there will be underinvestment in the institutions needed to shape and guide digital development. There will be underinvestment in the skills and knowledge (including direct research and development) needed for digital development. There will even be underinvestment in the technical infrastructure:

> "even if the market were to perform perfectly in terms of allocating resources and satisfying consumer demand, it would nonetheless undersupply society with Internet interconnection infrastructure over the long-run, because market demand for the Internet is but some fraction of social demand" (Frischmann 2001).

To understand this in more detail, we need to understand more about the digital ecosystem[36], which can be defined as:

> "the space formed by the convergence of the media, telecoms and IT industries. It consists of users, companies, governments and civil society, as well as the infrastructure that enables digital interactions" (WEF 2007: 3).

[36] In the discussion here, we will assume but not particularly investigate the system features of the digital ecosystem; i.e. that is consists of structure, processes and properties; that it has a boundary; that it has subsystems which interact; that its core function is to process inputs into outputs (see Figure 10's value chain); that there are feedback loops; that it is holistic with emergent properties (that the whole is greater than the sum of the parts and this produces outcomes hard to predict from the parts) (Skyttner 2005). It is an ecosystem because it includes human beings interacting with technology to make this a socio-technical system.

In a little more detail, the space represents the precursors which provide the inputs necessary to create the technical foundations and socio-technical applications of digital development, as summarised in Figure 10 (adapted from Heeks 2014c).

We can simplify these somewhat to say that digital development therefore requires:

**Technological Infrastructure**: an interoperable digital infrastructure for data handling is required that covers the greatest possible geographical area with the maximum possible processing and communications capacity. It should allow for both mobile and fixed device connection, and enable multiple, parallel and redundant capacity to ensure resilience (Sterbenz et al 2010). Given their inter-reliance, there will be a complementary requirement for electricity infrastructure (Yeager & Stahlkopf 2000).

**Data Infrastructure**: more challengingly, the principle of interoperability will also need to apply to the data infrastructure; enabling data held on any device and application to be used by any other device and application. A second principle will be data quality: ensuring the value of the data that is in circulation. There are many different metrics for data quality, but one guide would require data to be as complete, accurate, relevant, timely and appropriately-presented as possible (Heeks 2006).

One debated area of data infrastructure is network neutrality: the principle that those providing or controlling the network should treat all data equally, "not discriminating or charging differentially by user, content, site, platform, application, type of attached equipment, and modes of communication" (Climpean et al 2014: 2). The debate is largely framed in economic terms with arguments both for and against (e.g. Wu 2003, Yoo 2005, Cheng et al 2011)[37]. Many governments outside the global North, though, view the issue more in political terms and see a need to discriminate against content harmful to the state (Marsden 2013).

**Financial Infrastructure**: the financing of digital development will need to come from multiple channels. Overall, private sector investments in ICTs in the global South (from multinationals through to individual savings) now dwarf those from government and donor agencies (Heeks 2009), though the pattern is uneven. New sources of financing digital development are arising; for example through new aid donors of the global South or from social enterprises (Lee et al 2008). A number of these are collaborative models including public-private partnerships (Fife & Hosman 2007) and crowdfunding (Sow 2012, Owen 2014).

[37] Net neutrality in a number of developing countries is under pressure from the emergence of zero-rated services like Facebook Zero, Google Free Zone or Wikipedia Zero, which involve agreements by mobile operators not to charge for data related to these specific Internet services.

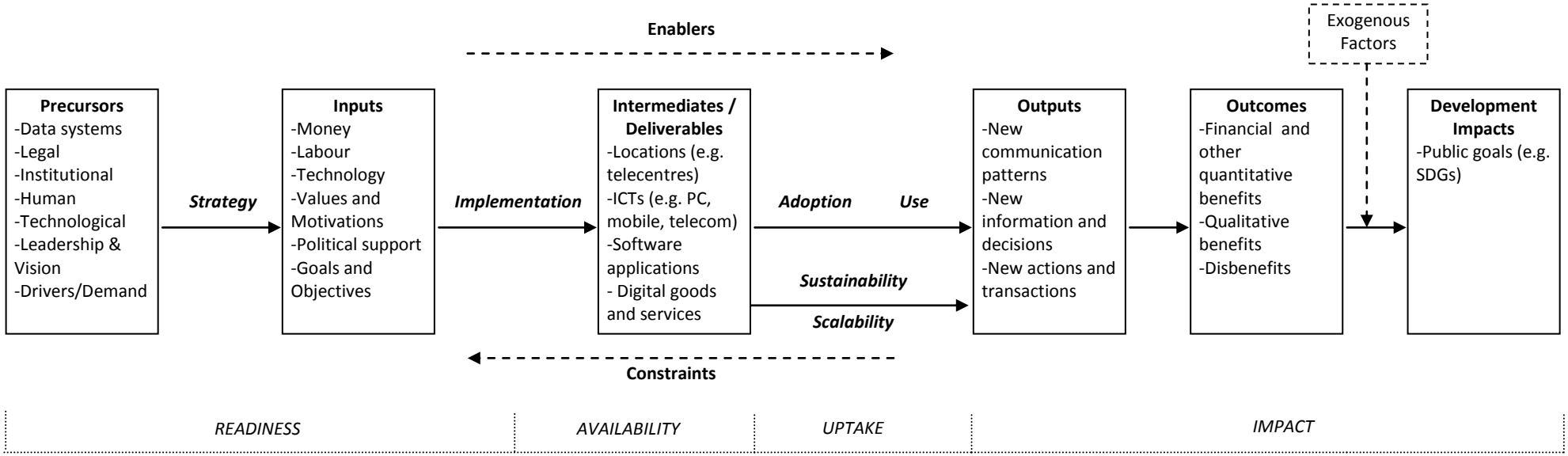


**Figure 10: The Digital Development Value Chain**

**Human Infrastructure**: it is widely understood that ICT usage skills are a requirement for digital development (Garrido et al 2012). However, this basic element of human infrastructure needs to be expanded in three dimensions:

- Competencies: digital development requires more than just skills, it requires competencies: skills, knowledge and attitudes (Heeks 2006). Thus, for example, ICT users need not just the skills to access data online but also the knowledge to evaluate that data and turn it into information, and the attitude of trusting and valuing the information obtained (see discussion below on information value chains).
- Roles: as discussed above, digital development is not simply about using ICTs; it also requires a set of other roles of increasing competency – producer, worker, entrepreneur, innovator. These are the roles that gain greatest value within a digital development paradigm, and the competencies must exist for these roles to be fulfilled. For example, without local digital producers and digital innovators, low-income communities will miss out on some digital development benefits (see examples cited elsewhere from Heeks & Arun 2010, Foster & Heeks 2013b). The same is true of large organisations, which will require access to a range of ICT competencies beyond use: system development, system sourcing, system management, system maintenance (Heeks 2001).
- Complementary Competencies: as discussed below, both ICT producers and consumers require more than just ICT competencies in order to reap development benefits (Lee 2013). ICT producers require interpersonal and employment competencies. ICT consumers require decision and action competencies.

**Institutional Infrastructure**: institutions are understood here in a neo-institutionalist sense of aspects of social structure that shape human behaviour. In particular, digital development will require:

- Policy: a topic covered in Section D.
- Leadership: there is growing recognition that specific digital development initiatives require one or more individuals to champion them and drive them forwards (Hanna 2009, Lips 2014). The particular characteristics of champions are based around the 3Rs: they have a clear vision of the results they seek to achieve through digital development; they obtain the resources necessary to achieve those results; and they build relationships with others in order to obtain the resources and in order guide behaviour towards the envisioned goal (Renken & Heeks 2014).
- Culture: partly covered already by encompassing attitudes within the notion of competencies, this looks at the contextual norms and values, which would need to support or at least be in synch with the norms and values of digital development. As seen above in the notions of Copy, Spread, Curve, Boost and Shift it may be difficult to identify a universal digital culture. However, as noted in Section B it is often associated with support for online privacy and freedom of expression (Bolsover et al 2014).
- Other Incentives: of these, one of the most important will be the expressed demand for digital development and its goods and services from citizens in a particular context.

**Systemic Infrastructure**: the elements of infrastructure need to be organised together into sub-systems performing different functions. These could be within a single organisation but will more likely be on a more open network model. One key example will be the structural

arrangements for digital innovation. Much innovation for digital development is likely to be undertaken via traditional arrangements within large organisations in the private and, to a lesser extent, public sectors. With growth in digital capabilities at all levels in society, there will be an expansion in collaborative models such as the co-innovation approaches adopted by living labs (Coetzee et al 2012), and an expansion in grassroots models like digital incubators, hubs, hackerspaces and maker faires (Hanna & Knight 2011, Pearce-Neudorf 2014, Williams et al 2014).

This mix of structures will echo the eclecticism of processes within digital development, with competitive (commercial and controlling) and cooperative approaches. There is a strong emphasis in academic literature on the value of agile and participative digital development approaches, which in practice often means a co-creative approach: a hybrid of competitive and cooperative modes (Heeks 2009, Walton & Heeks 2011).

**C4b. Digital Inclusion**

If we accept the notion that networks – of various topographies – are the dominant structure under a digital development paradigm, then a simple classification would allow for three different positions vis-a-vis the network (Qiu 2009, Castells 2010).

***Elite***: these are nodes – nations, organisations, communities, individuals, etc – that are particularly well connected in the network with ready access to all of the various types of capital (financial, social, political, etc) required for network activity. For example, there is evidence of a fundamental shift under digital development from an employment pattern of labour security to labour flexibility, at least within formal employment[38] (Barney 2004, Castells 2010). Elements of this pattern include growth in part-time and temporary work and self-employment, temporal and spatial dislocation of work, the eclipse of the career, and a growth in need for continuous reskilling. Elite individuals – what Castells refers to as "self-programmable" labour in view of their ability to reskill and redirect themselves – have the connections and resources to successfully surf this wave of change, experiencing greater empowerment and autonomy through ICTs.

***Exile***: those who are outside digital networks are generally regarded as being in the weakest of all positions. Castells (2000:12) rather melodramatically refers to "legions of discarded, devalued people [*who*] form the growing planet of the irrelevant", since they are excluded from the economic, political and social benefits of digital connectivity[39].

The dimensions of the digital divide that forms this exclusion are well known, with exiles over-represented in groups including those on lowest incomes, those living in rural areas, women, seniors, the disabled, and ethnic/linguistic minorities (Ragnedda & Muschert 2013, Sinha & Hyma 2013). The size of excluded groups varies but examples include: 24% of the those earning less than US$1 per day in a sample of African countries had no access to a mobile phone, and 7.5% of those earning less than roughly US$2 per day in a sample of Asian countries (Cartesian 2014); 71% of Africa's population, 60% of Asia's population, 48%

[38] Informal employment – the condition for many in the global South – has always meant flexibility without security.

[39] Though, of course, they would also be excluded from all of the disbenefits of connectivity.

of the Middle East's population and 44% of South America's population are labelled Internet non-users (IWS 2016). Due to the mirror image of network effects, the larger the digital network becomes, the greater the relative losses to those who are outside that network (Tongia & Wilson 2011).

The sharpness of this "outside" categorisation is challenged by evidence of the "digital provide"; positive spillovers to those without access to digital ICTs. Primary producers who are non-users have experienced price increases as a result of the general increase in market efficiencies brought on by presence of mobile phones (Lokanathan et al 2011), non-user wage employees have seen wage increases (*ibid.*), non-user consumers have benefited from price decreases (Jensen 2007), and non-user decision makers have digital information passed to them in analogue form (Smith 2010).

In all these examples, the individuals are liminal to the digital network: not integrated within it but linked to it via a weak, analogue connection. In practice, then, it may be more appropriate to think of a continuum from centrality to liminality in key networks rather than outright exclusion.

***Drone***: the relative clarity of narrative for those at the core and (beyond the) edge of digital development networks contrasts with the muddier picture for those in between; what in economic terms Castells (2010) refers to as "generic labour". Two contrasting perspectives can be identified:

- Positive incorporation: which emphasises the benefits of ordinary participation in digital networks. Economic examples were listed above in the discussion on micro-level impacts (higher income, accumulation of assets, freedom to adopt higher-level roles), and can be set alongside equivalents of empowerment and accumulation of political and social capital (Heeks & Arun 2010).
- Adverse incorporation: which emphasises the disbenefits of network participation. Barney (2004), for example, associated growth of digital employment with loss of stability, security and solidarity; their replacement with poor working conditions; and a shift of costs and risk from employer to employee.

In reality, most general participants in digital development networks experience both aspects simultaneously. For example, Philippine call centre workers gain reasonable incomes and marketable skills at the same time as suffering high rates of burnout and a dislocation from family and social life (Hechanova 2009). Many in the global South are already relatively adversely incorporated into economic, political and social networks. They therefore do not suffer the transition from security to flexibility noted by Barney; the latter is already their condition. Thus low-end digital work typically brings a decent income alongside a lack of contract, sick leave, overtime, training, etc (Nandi 2014). Despite the pros and cons, the drones do seem in a better position than the exiles outside the network.

Association with ICTs also brings less tangible benefits, which should not be ignored. Those working in ICT-related employment report higher social status; with evidence on this fairly consistent from the global South (e.g. Heeks & Arun 2010, Nandi 2014). More generally, those who use digital technologies typically report themselves feeling empowered (e.g. Anderson & Shrum 2007, Konieczny 2014). If users perceive technologies as empowering, then ICTs will actually be empowering via processes of improved self-efficacy (Chiles & Zorn

1995) and greater hope for the future (Heeks & Krishna 2016). There is also a little evidence that this subjective empowerment impact of ICTs is greater for those with less power (e.g. Pertierra 2009, Khan & Ghadially 2010), though this might relate to this group's lesser depth and length of experience with ICTs.

Alongside the positive and adverse incorporation perspectives, there is a third perspective:

- Constrained incorporation: which emphasises the inability of those incorporated into digital networks in non-elite roles to obtain maximum benefits. For digital producer roles, individuals may have digital skills but they need a set of other resources to create an effective chain linking those skills to a secure, well-paid job. In India, for example, lower-income students with IT skills have less prior social capital and their trainers have less social capital, meaning they have fewer connections to formal IT employment (Nandi 2014). By contrast, richer students already have good connections via their families, and they build these further by graduating from the top, well-connected IT training institutes.

  For digital consumer roles, the same issue applies – to benefit from digital networks, individuals (and organisations) need a set of resources to create an effective chain linking the digital data they receive to beneficial development results. This information value chain has been conceived in different ways (e.g. Warschauer 2002) of which the model shown in Figure 11 (adapted from Heeks 2014d) is one variant.

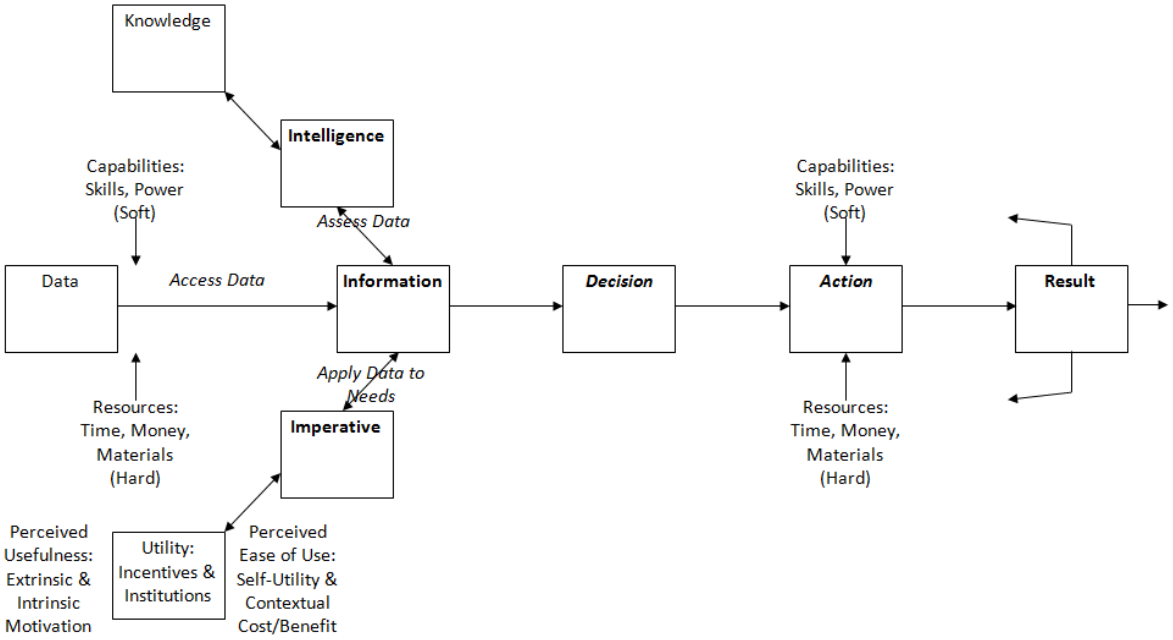


**Figure 11: Extended Information Value Chain**

[Key: bold = key items; italics = processes; non-italic = structural elements]

"Value – and development results – only derive from information used in decisions that are implemented as actions. To make that happen you also need the intelligence to process the data into information; the imperative that motivates you to run the whole chain through; and the soft capabilities and hard resources to access data and take

action" (*ibid.*). In a number of situations, connection to the digital network provides access to data but not the other "praxis" resources and capabilities required to produce development results.

For example:

- the ability of some wage labourers to benefit once given access to an online job database in Sri Lanka was constrained by their lack of trust of local employers, and their lack of access to transportation (Balasuriya & de Silva 2011).
- the involvement in e-participation platforms of some Internet-using South Korean citizens was constrained by their lack of awareness of the platforms, their lack of platform-specific skills, and their lack of motivation to engage with political issues (Lyu 2008).
- deaf and wheelchair-using children in Indonesia who use digital technologies may be unable to access online disaster early warnings, or unable to effectively act on them due to their disability (Robinson & Kani 2014).

A core way in which some of these digital consumer value chain barriers have been overcome is through use of "infomediaries" who have some of the necessary praxis resources and capabilities (Pant & Heeks 2011). Those who work best have a double-hybrid profile (Gould & Gomez 2012, Ospina & Heeks 2012). They are external/internal hybrids in understanding their local community but also having wider contacts and knowledge; and they are socio-technical hybrids who understand the technology but also social interactions and context.

Overall, the digital development paradigm is associated with growing inequality between the elites who strongly gain from digital development, the drones who experience fewer gains and sometimes losses, and the exiles who gain nothing. Qiu (2009) aptly describes these as the "haves", "have-lesses" and "have-nots". This inequality is often conceived in terms of polarisation, with the elite pulling away from the rest through their harnessing of ICTs, and there is direct evidence of this from the labour market (e.g. Boehm 2013, Michaels et al 2014) and from politics (Norris 2001, Lindner & Riehm 2011, Yamamoto & Kushin 2014)[40]. This is sometimes visualised as an hour-glass model of society but a more accurate rendition might be a Cluedo piece-shaped society (see Figure 12). This is firstly a reminder that inclusion—exclusion is in reality a continuum rather than a sharply-distinct set of categories. Notwithstanding this, we can understand the pattern best as one in which there is a small elite of haves, a large base of the drone have-lesses, and a large group of exiled have-nots below them, with a squeezed middle balancing precariously between elite and drone status.

**Figure 12: A Visualisation of Digital Society**

[40] This evidence base draws almost entirely from the global North though there are similar signs emerging in other locations; e.g. that technology empowers the politically active but not the politically apathetic (Lee et al 2014).

We must therefore understand exclusion under a digital development paradigm to consist of two different things:

- Digital exclusion: outright exclusion from the digital network.
- Praxis exclusion: exclusion from the resources that enable digital foundations (skills for producers, data for consumers) to be turned in practice into developmental results.

Inclusion under a digital development paradigm will require both of these exclusions to be addressed: dealing not just with the problems of the exiled have-nots but also the drone have-lesses. Access to the digital network will be the foundation for all activity in a digital development paradigm, and this brings with it strong arguments that digital access should be a human right (UNGA 2011). But the value chains above demonstrate that effective inclusion means much more than simply ensuring a digital connection but also ensuring access to a range of other economic, political and social resources. Thus, for digital producer roles it is not sufficient to merely provide skills but also the employment opportunities to turn those skills into development benefits (e.g. Heeks & Arun 2010); and for digital consumer roles it is not sufficient, for example, to merely provide open government data but also to utilise or strengthen civil society bodies that can turn data into accountability (Gigler & Bailur 2014).

**C4c. Digital Sustainability**

Systems can fail to sustain in any situation but there are challenges of particular relevance to the overall context of digital development:

- Competition: in a competitive mode of organisation, the incentives are to consume resources now to one's own advantage, to the potential detriment of those who come after, thus undermining sustainability (Nash 1996, Jackson 2006).
- Complexity: as systems grow in complexity, the potential for shocks to spread through the system grows; these shocks can destroy capacity and render the system unsustainable (Gai et al 2011, Ramalingam 2013).
- Competition and complexity: competition pressurises complex (economic) systems to reduce additional channels and concentrate resource flows through a few key hubs, to tightly-couple sub-systems, and to reduce surplus inventory and process time (Korowicz 2013). All of these increase the dangers of shock diffusion and of cascading sub-system failure.

With growth in ICT use increasing complexity[41] and – as yet, as described above, and overall – more likely strengthening than weakening competition, then digital development not only faces serious sustainability challenges, but can be seen as enabling and even generating those challenges[42]. There are two main ways in which this will be manifest under digital

[41] As noted above, this is a self-reinforcing spiral as increasing use of ICTs causes increasing complexity and the only way to cope with that increasing complexity is to make greater use of ICTs.

[42] If one looks at some of the global sustainability challenges then ICTs play a role in all of them: climate change would not occur without ICT-enabled growth in global production and consumption; the early 21st century financial crisis originated in complex financial instruments only operable with ICTs, with cascade effects thanks to the ICT-based interconnections between financial systems; health pandemics spread thanks to a mass global transport system that could not function without ICTs; terrorist organisations can only organise and recruit on any scale through use of ICTs; and so on.

development: the sustainability of digital systems, and the impact of digital systems on the sustainability of other systems.

One can seek to understand this via specific evidence and models: for example, analysing the specific factors that impact digital development system sustainability in specific contexts (e.g. Pade et al 2006). Or, for example, modelling / analysing the relationship between ICTs and carbon emissions including the growing carbon footprint of the IT sector and the opportunities for reducing emissions through smart applications (Roeth & Wokeck 2011). Or analysing ICTs' relationship with climate change more generally – other than mitigation as just mentioned, through its role in climate change adaptation, monitoring and strategy (Ospina & Heeks 2010a). Or analysing ICTs' impact on the environment more broadly via its contribution to e-waste (Nnorom & Osibanjo 2008, Heeks et al 2015).

However, a more appropriate analytical lens would be a generic one that could be applied to all situations. For any system – digital or otherwise – to sustain, it must be resilient: defined as the ability of a system to withstand, recover from, adapt to, and potentially transform amid change and uncertainty (Heeks & Ospina 2014). Put another way, any system – an information system, a community, a value chain, etc – will be more likely to sustain the more resilient it is. Resilience has therefore emerged in recent years as both a key concept but also a key goal of development (Brown 2016) and it will form an important plank for both understanding and action within a digital development paradigm.

This and other models can then be used to evaluate the resilience of digital systems (e.g. Wang et al 2010) and/or the impact of ICTs on resilience of development stakeholders and systems (e.g. Ospina et al 2015). On this basis, they can provide guidance for action to improve sustainability.

| Resilience Attribute | Definition | Key Markers/Characteristics |
|---|---|---|
| **FOUNDATIONAL ATTRIBUTES** | | |
| ***Robustness*** | • Ability of the system to maintain its characteristics and performance in the face of contextual shocks and fluctuations. | • Physical Preparedness<br>• Institutional Capacity<br>• Multi-level Governance and Networking |
| ***Self-Organisation*** | • Ability of the system to independently re-arrange its functions and processes in the face of an external disturbance, without being forced by the influence of other external drivers. | • Collaboration/Consensus-building and Participation<br>• Social Networks<br>• Local Leadership and Trust |
| ***Learning*** | • Capacity of the system to generate feedback with which to gain or create knowledge, and strengthen skills and capacities. Learning processes are closely linked to the system's ability to experiment, discover and innovate. | • Capacity Building<br>• New and Traditional Knowledge<br>• Reflective Thinking |
| **ENABLING ATTRIBUTES** | | |
| ***Redundancy*** | • Extent to which components within a system are substitutable; for example, in the event of disruption or degradation. | • Resource Spareness<br>• Functional Overlaps and Interdependency<br>• Resource Substitutability |
| ***Rapidity*** | • Speed at which assets can be accessed or mobilised to achieve goals in an efficient manner. | • Rapid Resource Access<br>• Rapid Resource Assessment/ Coordination<br>• Rapid Resource Mobilisation |
| ***Scale*** | • Breadth of assets and structures a system can access in order to effectively overcome or bounce back from or adapt to the effects of disturbances. | • Multi-level Networks<br>• Resource Access and (intra/inter) Partnerships<br>• Cross-level Interactions |
| ***Diversity & Flexibility*** | • Ability of the system to undertake different courses of actions with the determinants at its disposal, while enabling them to innovate and utilise the opportunities that may arise from change. | • Different Courses of Action/Emerging Opportunities<br>• Adaptable Decision-making<br>• Innovation Backbone |
| ***Equality*** | • Extent to which the system provides equal access to rights, resources and opportunities to its members. | • Distribution of Assets<br>• Inclusiveness/Divides<br>• Openness and Accountability |

**Table 5: RABIT Resilience Attributes – Definition and Markers**

**C4d. Digital Harm**

Mainly associated with the competitive mode of economic organisation are a range of digital development outcomes which vary from jurisdiction to jurisdiction in terms of their legality but which are regarded in many contexts as problematic. They include:

***Cybercrime***: there are concerns that governments exaggerate cybercrime statistics in order to justify introducing cyber-regulations, and that cybersecurity firms do the same in order to win business (Schneier 2013). Indeed, more than simply concerns, there is evidence of overstatement (Ryan & Jefferson 2003, Maass & Rajagopalan 2012). However, beyond the hyperbole there is agreement that the cybercrime threat is both real and growing, particularly in developing countries (Kshetri 2010). Cybercrime can be divided into (ITU 2009: 52-53):

- "Offences against confidentiality, integrity and availability of information and communication infrastructures" such as hacking, cyberterrorist attacks, wiretapping, computer espionage and extortion.
- "Computer-related traditional crimes" such as fraud, money-laundering, online grooming of children, and attacks on public safety.
- "Content-related offences" such as child pornography, racism, libel, cyberbullying, cyberstalking and incitement to other crimes including terrorism.
- "Offences related to infringements of copyright and related rights".

There are direct beneficiaries of cybercrime (the perpetrators) and indirect beneficiaries (those who make a living in the cybersecurity industry). The costs of cybercrime are:

- Economic: reliable figures are very hard to come by but detailed analysis (Anderson et al 2013) suggests global costs of direct cybercrime are at least US$3.5bn; of "transitional" cybercrime (payment card fraud relating to transition from traditional to virtual payment) are at least US$46bn; and of the infrastructure to fight cybercrime are at least US$25bn[43].
- Political: in undermining national security of nation-states and trust in national governments (Kramer et al 2009, O'Neill 2012).
- Social: for example seen in the damage caused to individuals who are the victims of content-related offences (e.g. Sen 2013).

***Pornography***: the circulating statistics about online pornography are often exaggerated but one estimate is that 14% of searches and 4% of websites relate to pornography (Ward 2013), and that it forms a US$20bn global industry (CE 2013). Assumptions about the damaging impact of pornography run well ahead of the evidence: some reviews conclude that both positive and negative impacts have been recorded (Short et al 2012), and others conclude "the aggregate literature has failed to indicate conclusive results" around many types of sexual behaviour (Owens et al 2012:116). However, the same review (*ibid.*:116) notes "consistent findings have emerged linking adolescent use of pornography that depicts violence with increased degrees of sexually aggressive behavior" and that use of pornography led to negative self-image among adolescent girls and boys. The Internet-

[43] Total figures significantly exceeded by US$130bn global losses per year from tax fraud, though with that fraud itself increasingly cyber-mediated.

enabled expansion of child pornography harms all those involved (Wortley & Smallbone 2012).

***Gambling***: just as with pornography, the virtual nature of online gambling can lead to reports that run ahead of actual behaviour; with the great majority of online gamblers shown to be moderate in their betting (Shaffer et al 2010). However, a small proportion are "problem gamblers": those who invest significant money and time in gambling, with detriments to their own wellbeing and that of others around them (McCormack & Griffiths 2011, Yen et al 2014). There is evidence that the extent of problems is exacerbated online, with problem gamblers representing a significantly higher proportion of online than physical gamblers, and with evidence that Internet gambling leads to problem gambling (Wood & Williams 2009, Williams et al 2012).

***Curtailment of Rights***: three rights within the Universal Declaration of Human Rights (UNGA 1948) have been the subject of particular concerns in the emerging digital development paradigm:

- Article 12: "No one shall be subjected to arbitrary interference with his privacy, family, home or correspondence, nor to attacks upon his honour and reputation. Everyone has the right to the protection of the law against such interference or attacks". With human activity increasingly mediated by or recorded on ICTs, the potential for invasion of privacy is growing (UNHCHR 2014). As noted already above, this has enabled governments to have access to personal data (e.g. Singh 2014), has enabled private companies to have access to personal data, such as social media firms[44] (Kelecha et al 2013), and has enabled illegal access to personal data (Pratt 2011).
- Article 19: "Everyone has the right to freedom of opinion and expression; this right includes freedom to hold opinions without interference and to seek, receive and impart information and ideas through any media and regardless of frontiers". All states set limits on freedom of expression based on principles of harm to others; for example banning expression that is racist or blasphemous or relating to child pornography. Governments in some countries go further and set limits on online expression based around perceived threats to the state (Goel 2011). From a liberal rights-based perspective, such actions represent encroachments on the right to freedom of expression (Hintz 2013).
- Article 27 (2): "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". Problems with protection of ICT-related intellectual property are typically dated from the invention of software piracy in the mid-1970s (Pitre & Loguidice 2014)[45]. The extent of harm from sharing/theft of intellectual property remains much-debated; particularly for developing countries where piracy has been economically-redistributive (Asongu 2014) and a key enabler of ICT diffusion including development of the local digital economy (Heeks 1996). However, the value of piracy likely declines as the local digital economy develops and there is thus an economic logic for protection to be introduced at some point (Charoensukmongkol & Elkassabgi 2011) though that point

[44] Though with some signs that some users are rather blasé about this (Debatin et al 2009).

[45] Generally attributed to the California-based Homebrew Computer Club, used to sharing software, copying paper tapes of developers' software, and leading to a famous letter of complaint from Bill Gates.

may occur only once countries have reached the technologically-caught-up rather than technologically-catching-up stage (Dosi & Stiglitz 2013).

***Monopoly***: although in a different category to the other items mentioned here, the emergence of info-monopolies is – as noted above – another outcome of competitive logic within digital development[46]. Great care needs to be taken to avoid negative assumptions about Internet monopolies (Jamison 2012, Haucap & Heimeshoff 2013):

- There are consumer benefits to the network effects of monopoly: the utility of joining Facebook or LinkedIn is generally greater than that of joining much smaller rivals.
- There are producer benefits for the monopoly suppliers themselves (though it is uncertain whether these are any greater than producer benefits in more competitive situations).
- Most Internet monopolies operate in two- or multi-sided markets with clients who benefit from their monopoly (e.g. the advertisers who use Google, or the sellers who use eBay).
- Assumptions about the costs or longevity of dominant players in particular Internet sectors may be exaggerated.

However, there are disbenefits associated with the info-monopolies (Evans 2008, Levine 2008, Jelen & Kolakovic 2009, Luchetta 2012) including:

- damaging competitors by raising costs and other barriers to entry, enforcing exclusivity deals, and predatory pricing;
- damaging consumers by invasions of privacy and lock-in;
- damaging governments by tax avoidance; and
- damaging suppliers by altering charges and conditions of use[47].

[46] These are monopolies that emerge through the competitive logic of commerce. But other monopolies emerge through the competitive logic of control, such as the state information, media and telecommunications monopolies that still exist in some countries.

[47] Though the latter tends to be more anecdotal in nature e.g. http://exposingtheplayers.blogspot.co.uk; Lashinsky (2014).

# D. Policy and Digital Development

Digital development is an emerging not prevailing paradigm. It co-exists with older paradigms. It will take many years to predominate over the ICT4D paradigm – think evolution or, at most, slow-burn revolution – and by the time it does, we will have a new sense of it, and other paradigms may have emerged.

Nevertheless, avoiding the hype and hectoring does not mean we should downplay the importance of digital development. Its vanguard is already with us, warning us that a strategic response is required from government, business and civil society. This section will focus most on the former though the political changes of digital development are – as seen above – vesting policy-making powers in transnational governance and business organisations.

All actors need to reflect on a set of overarching policy questions that can be framed in various ways:

- Opportunity and risk: the appropriate generic policy approach is "a position of techno-realism that assesses the actually existing effects, critically judges risks, and tries to help shape society in ways that advance opportunities and minimize the risks of new technologies" (Fuchs 2008:345). But the question remains: opportunities and risks for whom?
- Acceptable balance: digital development policy will always consist of tensions that need to be surfaced in policy discussions (DeNardis 2014). Examples include the acceptable balance between right to "freedom of expression and privacy versus law enforcement, national security, and civil discourse" (*ibid.*: 353); interoperability vs. profitability in provision of digital services; right to privacy vs. free-to-use platforms; costs vs. benefits of info-monopolies; for children online, protection from harm vs. freedom of expression and information.
- Preferred pattern: what do actors want from digital development? Which of Copy, Spread, Curve, Boost and Shift best serves their interests and duties?

Many forces will determine which pattern is dominant in any given context but principal among these will be the institutional forces that shape behaviour and the distribution of power associated with those forces (Podolny & Page 1998). Policy will always be a powerful component among institutional forces in any environment, and digital development policy needs to do one or more of three things:

a) Support the dominant mode, to the extent that policy-makers value that dominant mode.
b) Support the subordinate mode, to the extent that policy-makers value that subordinate mode.
c) Address the shortcomings of the dominant mode, to the extent that policy-makers are concerned about those shortcomings.

Because it forms the more traditional realm for policy, we will deal with the last item first, and the purpose of this section is to provide policy guidance on how to plan for, and support, the emerging digital development paradigm at national and international levels.

## D1. Policy to Address Digital Market Failures

The conventional view of government policy is that it should intervene where markets are unable to achieve development goals. The market failures described in Section C4 provide rationale for intervention of two types:

- Reducing constraints: underinvestment in the digital ecosystem creates constraints to implementation and operation of digital development, which government should intervene to address.
- Reducing disbenefits: operation of digital development under competitive logic creates societal disbenefits, which government should intervene to address.

### D1a. Digital Ecosystem Policy

The objective of state policy should be to ensure a pervasive infrastructure and effective ecosystem for digital development. In pursuit of that objective, it may develop a number of goals to be achieved via a variety of policy instruments. Preparatory work would include an audit of the current digital ecosystem in order to identify those particular areas in which it was weak.

| **Digital Ecosystem Policy Objective**: to ensure a pervasive infrastructure and effective ecosystem for digital development | |
|---|---|
| **Policy Goals** | **Policy Instruments (Examples)** |
| A pervasive, high-capacity, interoperable technological infrastructure | • Invest directly in telecommunications infrastructure including broadband<br>• Encourage private sector investment in telecommunications infrastructure<br>• Ensure independent regulation of telecommunications infrastructure<br>• Regulate cost-based interconnection between networks<br>• Develop country-level Internet Exchange Points<br>• Set minimum, universal access speed requirements |
| A pervasive, high-quality, interoperable data infrastructure | • Promote or mandate use of interoperable data standards<br>• Invest in capacity for data capture, analytics and visualisation<br>• Introduce regulations on data integrity, retention, consent, usage and administration |
| A high-volume flow of financial investment with long-term perspective | • Steer development financing, including crowd-funding, into ICT investments<br>• Provide direct funding for ICT investments<br>• Encourage private sector funding of ICT including use of public-private partnerships |
| A pervasive, full-spectrum set of ICT consumption and production capabilities | • Introduce ICT skills as a component of primary, secondary and tertiary education curricula including higher-level entrepreneur and innovator competencies<br>• Provide specific support for building higher-level capacities among digital natives<br>• Provide subsidies or tax breaks for in-service ICT-related training |
| A pervasive, full-spectrum set of ICT-complementary consumption and production capabilities | • Develop general health and education policies<br>• Develop general business development services<br>• Develop transferable interpersonal and decisional capabilities |

| | |
|---|---|
| | • Provide specific support for building complementary capabilities<br>• Support interventions to promote ICT application in all development sectors (health, education, agriculture, small enterprise, public administration, etc) |
| The necessary legal framework to enable digital processes | • Promote legal recognition for digital signatures, contracts and transactions |
| A supportive institutional infrastructure for digital development | • Identify and develop digital development champions<br>• Raise understanding and awareness of digital development impacts<br>• Development of effective public-private partnerships across digital development financing, innovation, capacity-building, and service delivery<br>• Support for other bipartite (NGO-private; community-private) digital partnerships |
| The necessary structures and processes to support digital development | • Support development of online IT employment databases<br>• Provide business development services specifically for digital economy enterprises<br>• Support digital economy enterprises through other investments and incentives e.g. around R&D<br>• Support digital innovation through direct funding, subsidy and tax breaks including co-creation<br>• Create best practice guidelines to convert development organisations to agile practice |

### D1b. Digital Inclusion Policy

The objective of state policy should be to ensure the benefits of digital development are shared by all. A core goal would be to ensure that the digital ecosystem, in all its elements, extended to encompass excluded groups. Preparatory work would include an audit of the dimensions of digital exclusion: income, geography, gender, ethnicity, disability, age, etc.

| **Digital Inclusion Policy Objective**: to ensure the benefits of digital development are shared by all | |
|---|---|
| **Policy Goals** | **Policy Instruments (Examples)** |
| The digital ecosystem encompasses marginalised groups | • Universal service funds or obligations for mobile, Internet and other ICT infrastructure<br>• Universal service funds or obligations for complementary power infrastructure<br>• Targeted financing for digital inclusion initiatives<br>• Targeted ICT capability-building for marginalised groups including higher-level entrepreneur and innovator capabilities |
| Development of inclusive local data content and applications | • Support grassroots data content generation by capacity-building of data producer roles within marginalised communities<br>• Facilitate collaborative development of data content between local communities and external actors<br>• Develop and support training for local ICT production capabilities<br>• Run hackathons, competitions, etc for development of apps relevant to local digital development needs |
| Adequate incentives for inclusive digital innovation (IDI)[48] | • Support new partnerships for IDI e.g. international consortia, and public-private collaborations<br>• Funding to procure IDIs and/or for R&D to pilot IDIs including cost-sharing<br>• Promote universal design and usability principles<br>• Support information flows about digital innovation needs of excluded groups e.g. via market research<br>• Competition policy to push firms to expand into marginalised (e.g. low-income) markets<br>• Support grassroots innovator links to formal sector (e.g. network events, fairs, competitions/award, innovation databases, reports to amplify awareness of grassroots IDI, marketing assistance, quality assurance, government procurement)<br>• Support IDI intermediaries (capacity-building, financial interventions) |
| Promote effective uptake of ICTs by marginalised groups | • Embed ICTs into government information and service delivery<br>• Support ICT embedding by others (NGO, private sector) delivering information and services to marginalised groups<br>• Accelerate affordability via financial support (subsidy, tax exemption, etc) for inclusive ICT goods and services<br>• Targeted ICT-complementary capability-building for marginalised groups including digital business development support<br>• Capacity-building and financial support for infomediaries in marginalised (e.g. low-income) communities<br>• Support for ICT incubators / hubs / clusters in marginalised communities |

[48] For further details, see Foster & Heeks (2015).

### D1c. Digital Sustainability Policy

The objective of state policy should be to ensure the sustainability of digital development.

| **Digital Sustainability Policy Objective**: to ensure the sustainability of digital development | |
|---|---|
| **Policy Goals** | **Policy Instruments (Examples)** |
| Reduce the environmental impact of the ICT sector | • Introduce sustainability initiatives such as green IT actions for design and sourcing of IT<br>• Ensure effective recycling of e-waste via recycling capacity-building and/or extended producer responsibility |
| Reduce the environmental impact of non-ICT sectors | • Provide funding and capacity-building for smart applications (power, motors, buildings, transport/logistics) |
| Improve the management of climate change | • Develop ICT-based capacity to model and monitor climate change<br>• Support ICT-enabled strategic tools for climate change e.g. carbon markets and technology transfer<br>• Support ICT application in climate change policy-making<br>• Integrate ICTs into making and content of National Adaptation Programmes of Action<br>• Support ICT application in climate-smart agriculture<br>• Support ICT application for adaptation in other vulnerable sectors (poverty, water, health, habitat, ecosystems, disaster management) |
| Increase the resilience of ICT systems | • Improve robustness and redundancy e.g. by design fault-tolerance into critical ICT systems<br>• Improve self-organisation and learning e.g. by designing intelligent self-management into critical ICT systems |
| Increase the resilience of development systems | • Improve robustness e.g. by providing ICT tools to support system institutions<br>• Improve self-organisation e.g. by enabling e-deliberation<br>• Improve learning e.g. by developing ICT-enabled communities of practice<br>• Improve other resilience attributes e.g. by scale by providing ICT-based links to wider institutions |

### D1d. Digital Harm Policy

The objective of state policy should be to reduce the other emergent disbenefits associated with digital development.

| **Digital Harm Policy Objective**: to reduce the other emergent disbenefits associated with digital development | |
|---|---|
| **Policy Goals** | **Policy Instruments (Examples)** |
| Reduce levels of cybercrime | • Legislate to outlaw hacking<br>• Actions to raise awareness of cybercrime and cybersecurity<br>• Create cybersecurity agencies and capabilities<br>• Create appropriate anti-cyberterrorist and anti-cyberwarfare agencies and capacity at national and international level<br>• Extend conventional crime legislation to cover online activity (e.g. espionage, fraud, grooming, child pornography, hate crime, bullying, stalking) |
| Reduce the harm caused by socially-equivocal applications | • Policies limited access to online pornography<br>• Policies limited access to online gambling |
| Protect digital rights | • Legislate right to online privacy as part of data protection<br>• Require court orders for interception of online communication<br>• Extend freedom of expression legislation to online domain<br>• Develop “loose and limited IPR” legislation<br>• Extend labour legislation to cover the online domain<br>• Commit to abide by UNESCO Code of Ethics for the Information Society (UNESCO 2011) |
| Reduce the disbenefits of info-monopolies | • Ensure anti-trust, anti-monopoly regulation and other competition law covers online activity<br>• Clarify application of taxation rules to online activity<br>• Improve monitoring of digital financial flows |

## D2. Policy to Support Digital Transformation

The generic goal of digital transformation policy will be to enhance the digitally-enabled transformation of societal processes and structures. However, this will be a much more contested area for government policy than for those discussed above since this is particularly where ideology plays a role. Does government wish to support the competitive logic of markets and hierarchy, or does it wish to support cooperative logic? Examples of policies to support the three modes are shown below.

| **Digital Transformation Policy Objective**: to enhance the digitally-enabled transformation of societal processes and structures | |
|---|---|
| **Policy Goals** | **Policy Instruments (Examples)** |
| Enhance the digitally-enabled expansion of competitive markets | • Ensure legal frameworks for free operation of markets in all sectors<br>• Regulate to eliminate anti-competitive behaviour<br>• Reduce levels of government, non-market interventions |
| Enhance the digitally-enabled expansion of (state) hierarchical controls | • Legislate to allow government monitoring and interception of all online communications<br>• Finance government capacity to monitor and intercept online communications<br>• Set up blocking and filtering of websites and online communications |
| Enhance the digitally-enabled expansion of cooperative structures and activity | • Legislate to require freedom of information in public and civil society sectors<br>• Legislate to require freedom of information in the private sector to the extent possible within commercial confidentiality limits<br>• Use incentives and capacity-building to support use of ICTs in cooperatively-owned organisations and in cooperative production processes<br>• Develop co-produced e-government services and deliberative e-participation initiatives<br>• Build capacity and create incentives for open data initiatives in public and other sectors<br>• Mandate use of open standards for IT in the public sector<br>• Mandate use of open source software in the public sector<br>• Support development of open e-learning resources and open access publication of scientific research<br>• Legislate network neutrality principles |

## D3. Digital Development Policy Governance

For digital development to be encouraged, more than new policy content is needed.[49] Policy makers must also consider both the processes and structures through which digital development policy is made, implemented and maintained. But governance must also be driven by a new policy worldview that fits with the digital development paradigm.

### D3a. Policy Worldview

The actors and processes of digital development are different from those for traditional development. Beyond mere awareness of these differences, policy makers must adopt a different worldview if they are to produce policies for digital development. We do not reprise full details of the differences here, but highlight the key tenets that will be part of this modification of worldviews:

- Different focus: moving from seeing ICTs as a tool to understanding them as a development platform, understanding the way in which ICTs mediate development processes, and aligning to the Sustainable Development Goals.
- New opportunities and constraints: around the changing nature of digital economy, politics and society.
- New actors: those from within the digital economy but also digital natives within society at large.
- New relations: particularly the emergence of network forms of organisation.

More generally, policy makers must understand the digital development paradigm and its implications.

Acceptance of a new worldview can be a long-term, incremental process of change. But this can be accelerated by actions from the international development agencies to raise the profile of digital development; through work by universities and consultancies that act as thought leaders; and via training workshops and other capacity building. This will include building a stronger evidence base to support policy making for digital development, building case studies that highlight the nature and value of digital development, and commissioning harder economic and social data to support discussions of the importance of digital development at a political level.

### D3b. Policy Lifecycle Processes

The various components of the policy-making process are discussed below, but one overarching requirement will be for policy leadership. Whether such leadership is emergent or can be created is a matter for debate (e.g. Renken & Heeks 2014). However, policy leadership – which typically comes from within national governments – is consistently recognised as a critical success factor in ICT-related policy (e.g. Heeks et al 2010, Biggs & Polomska 2013):

> "At the heart of e-development are e-leaders and e-leadership institutions—individuals, networks, and institutions that develop a vision of a knowledge society, set policies and priorities, forge national consensus on reforms, and coordinate and create synergies among the elements of e-development" (Hanna 2008: 2)

[49] The approach used within this section is based on Foster & Heeks (2015).

***Analysis*:** Policy objectives and goals must be specific to each individual context, and evidence-based. The foundation for policy must therefore be a specific analysis of current actors and relations, strengths and weaknesses including indicators and causes of failures to achieve digital development. This could be seen as a digital development audit or simply a SWOT analysis. Sectorally, readiness surveys can also provide insight into the steps that policy needs to concentrate on and these might be usefully applied via a Digital Development Readiness appraisal.

***Planning and formulation*:** Given the range of actors within the digital ecosystem and the expectations of many about their relative autonomy in the digital realm (Thompson 2008), planning processes can benefit from incorporating more participatory components in order to better understand policy needs, content and impacts. This might particularly focus on understanding the digital development constraints and disbenefits that have been outlined previously. However, given limited levels of knowledge about many digital development issues, there may need to be concerted awareness-raising, teaching and even capacity-building activities before a more participatory approach to policy is feasible (CIPESA 2014). This will particularly apply to digital inclusion policies (SDC 2007). It would be appropriate for policy-making to make use of new digital politics platforms.

***Implementation*:** Digital development policy is in part aimed at informal, low-income actors. There is evidence that such policies can often be dissipated, avoided or appropriated, rendering policy instruments that seem useful less powerful or even powerless on the ground (Foster & Heeks 2013a). It is therefore important to take a localised, 'front-line' perspective on digital development. This should clearly define the institutions that will be implementing policy, ensure they have sufficient human and technical capacities to implement, and also identify the incentives that will align local behaviour with policy intentions.

***Monitoring and evaluation*:** Tracking and understanding the progress of digital development policies requires metrics for evaluation of success/failure. Development of such metrics can build on existing multistakeholder initiatives such as the Partnership on Measuring ICT for Development (e.g. ITU 2014) and on other work on measuring the digital economy (e.g. OECD 2013a). Both these and any related audit or readiness measurement could focus on the five areas of: Transformation, Ecosystem, Inclusion, Sustainability, Harm. Because policy for digital development may move governments into uncertain territory, it is also important there be mechanisms to enable learning and incremental adjustment to policy.

**D3c. Policy Structure**

The initial structural approach to ICT policy was sidestreaming: locating ICT policy in a single specialist body; typically a Ministry with one or more of "Information", "Communications" and "Technology" in its title. Over time, and given the shifting focus towards uptake and impact of ICTs (see Figure 13), there was increasing mainstreaming: moving or developing responsibilities for ICT-related policy in other Ministries. The essence of the digital development paradigm is that the digital now touches every aspect of development. Hence, that every Ministry is involved in policy for digital development and there must be pervasive mainstreaming of policy.

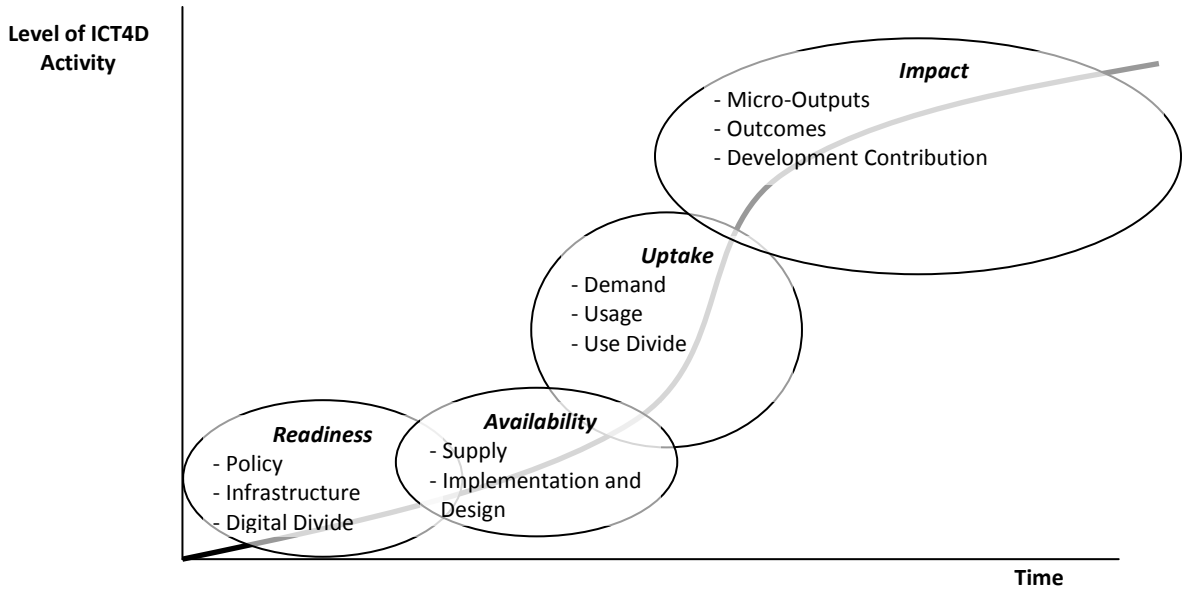


**Figure 13: Changing Focus of ICT4D Priorities Over Time**

What is required, then, is a matrix-based understanding and allocation of responsibilities, filling the type of skeleton shown in Table 6.

| Policy Actors | Policy Responsibilities |
|---|---|
| Core ICT Policy (e.g. Ministry of ICT) | Technical and data elements of Digital Ecosystem, Inclusion, Sustainability, Harm, Transformation policies |
| Contextual Policy (e.g. Ministries of Finance, Enterprise, Trade & Industry, Education, Science & Technology) | Broader aspects of Digital Ecosystem and Digital Inclusion policies: finance, capabilities, digital processes, business development, innovation |
| Specific Policy | Particular aspects of particular policies e.g. Digital Inclusion (Ministry of Community Development); Digital Sustainability (Ministry of Environment); Digital Harm (Ministry of Information and Media; Ministry of Trade & Industry) |
| Sectoral Policy (e.g. Ministries of Agriculture, Health, Education, Finance, Enterprise, Public Administration, National Security, etc) | Sectoral aspects of Digital Transformation policy promoting competitive (commerce, control) and/or cooperative ICT application |
| International Policy (e.g. UN and other supranational bodies) | Cross-national aspects to Digital Ecosystem, Inclusion, Sustainability, Harm, Transformation policies |
| Business Strategy (e.g. leading, transnational digital corporations) | Recognition that business strategies of key digital corporations form part of the policy system |

**Table 6: Digital Development Policy Responsibilities**

However, there are several dangers in mainstreaming (Heeks 2010b). These include a lack of adequate understanding of ICTs within mainstream Ministries, and fragmentation and incoherence of digital policy. Because it is so cross-cutting and potentially transformative, the advent of digital development will be a significant challenge to governments because of their relatively silo-type structures. A cross-cutting structure will need to be created which also reflects the moves towards more networked models of governance described above.

This will be something like a "Digital Development Policy Collaboratory", summarised graphically in Figure 14. This will perform a dual bridging role, drawing in horizontally policy actors from both ICT and development / context; and drawing in vertically those connected with both government and other sectors:

> "Experiences with various types of ICT policy suggest the value of autonomous and capable state agencies, combined with strong representative bodies for both the private sector and civil society and a mechanism for robust interaction between these three groups" (Heeks 2009: 26).

The issue of who participates is particularly sensitive since the responses to questions posed at the start of the section – about opportunity and risk, acceptable balance, and preferred pattern – will differ from actor to actor; but the nature of policy will be determined by who is allowed to participate in policy making.

Digital Development Policy Collaboratories should also adopt an experimental and iterative approach to policy, allowing the incremental learning and policy revision noted above.

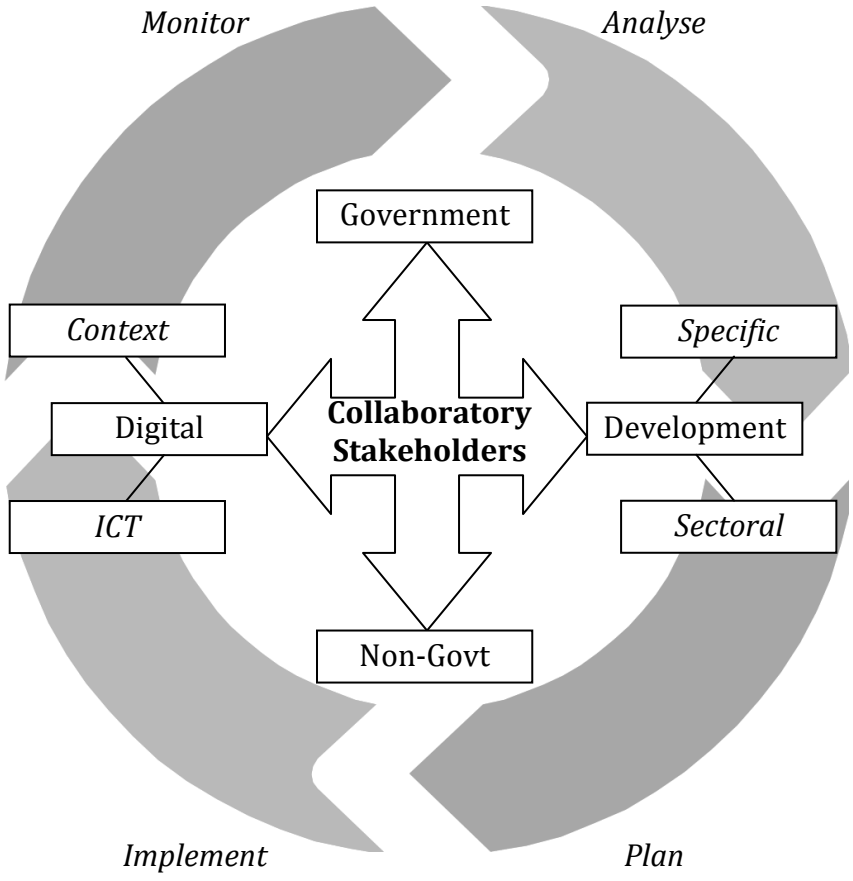


**Figure 14: Digital Development Policy Collaboratory**

A Policy Collaboratory approach is also important because of increasing recognition of the need for policy coherence and, conversely, of the damage of incoherent, inconsistent or conflicting policies (OECD 2013b). Indeed, the principles of policy coherence reflect the guidance offered above (*ibid.*: 2):

- "ensuring that the interactions among various policies in the economic, social, environmental, legal and political domains support countries on their pathway towards inclusive sustainable growth;
- putting in place institutional mechanisms, processes, and tools to produce effective, efficient, sustainable and coherent policies in all sectors;
- developing evidence-based analysis, sound data and reliable indicators to inform decision making and help translate political commitments into practice; and
- fostering multi-stakeholder policy dialogue to identify the barriers to, and the catalysts for, change".

For digital development policy, a number of coherences can be promoted (Hanna 2008, Heeks et al 2010, OECD 2013b):

a) Horizontal value chain coherence (see Figure 10): ensuring that policy not only has the elements required to support readiness and availability of digital infrastructure but also supports its utilisation and development impact.
b) Vertical value chain coherence: ensuring that all elements of ecosystem policy are present and fit together.
c) Make—use coherence: ensuring that policies for ICT production are consistent with policies for ICT consumption.
d) Horizontal policy coherence: ensuring that digital policies developed by individual national Ministries do not conflict with one another. This notion could be extended to coherence between a wider range of national stakeholders. In particular, this seeks coherence between the digital and the development domains of policy.
e) Vertical policy coherence: ensuring there is a fit between policies promoted at local, national and international levels.

There will also need to be more specific policy collaborations to ensure coherence around convergence issues. Ministries of Finance and ICT will need to work together on the implications of m-money and e-money becoming the basis for financial and banking transactions. Ministries of Information/Media and ICT will need to work together on the implications of convergence between ICT and media technologies. Ministries of Education and ICT will need to work together on the increasing digital mediation of learning. And so on.

## D4. Summary

Figure 15 provides an overview summary of policy background and recommendations.

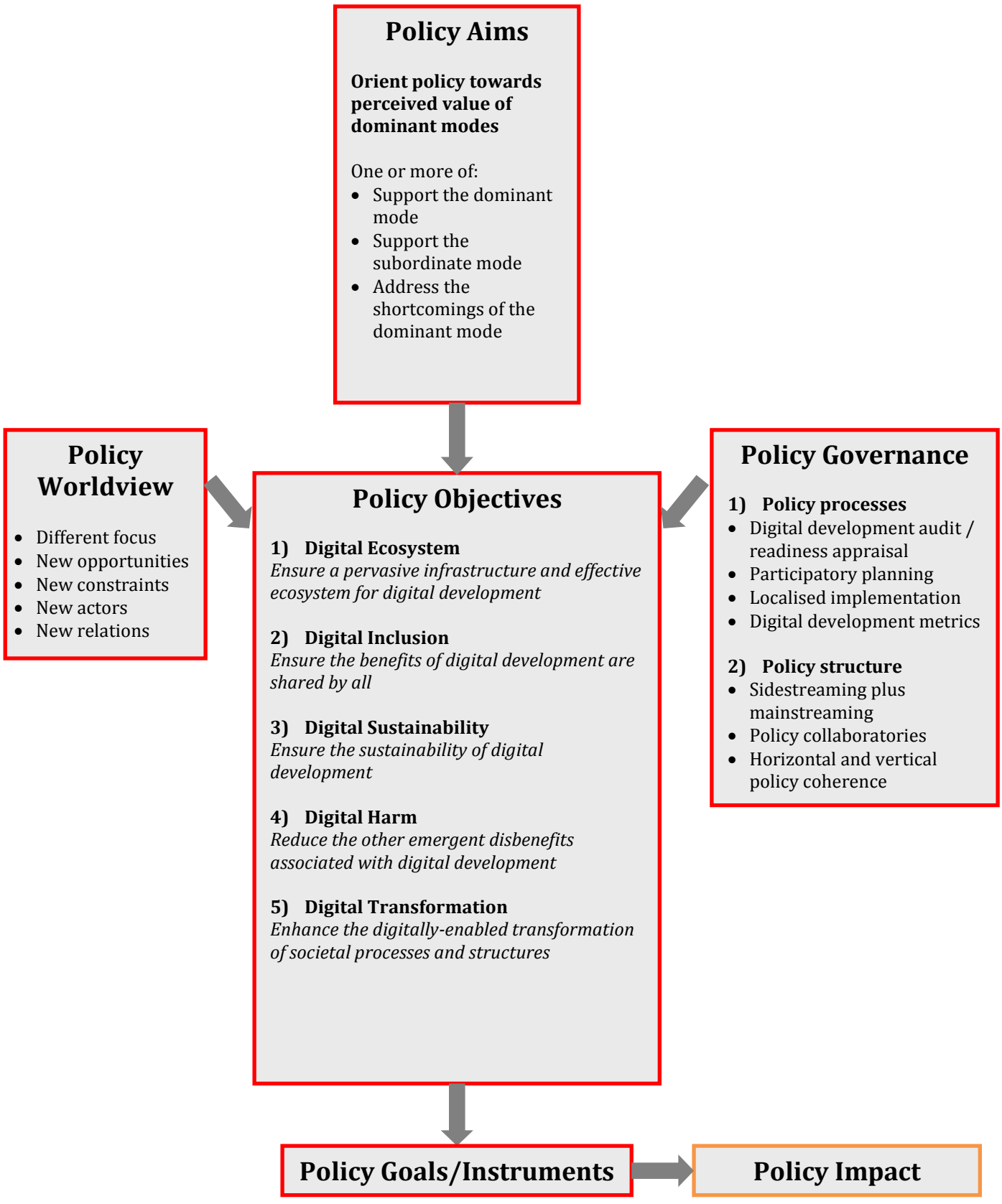


**Figure 15: Overview of Digital Development Policy**

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