The emerging potential for radical e-enabled improvements in rural collaboration and accessibility

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Abstract:

The focus of this paper is the emerging potential for radical e-enabled changes involving two key rural development drivers, namely: 1) *enhanced collaboration* – addressing problems such as small enterprise sizes, low rural demand and supply chain volumes, as well as problems associated with limited local human capacities and uncoordinated or misdirected rural development planning; and 2) *enhanced accessibility* – addressing the typical problems of rural isolation such as inadequate or costly digital and physical access to information, services, peers and markets. The main aim is to present a customised logical framework (CHICA[S]) – developed as a means to assess and prepare plans and value propositions or for realising this potential.

Keywords: Rural Collaboration, e-enabled, accessibility, conceptual framework, ICT.

1. Introduction

In rural contexts characterised by relatively small, spatially isolated communities and high transaction and transportation costs, there is a strong general case for investing in the research, development and implementation of Information and Communication Technologies (ICT) [1] or – stated more generally – e-enabled networks and services. Two motivations are generally offered. First, to harness the potential for replacing and supplementing costly physical interactions with relatively low cost electronic or digital interactions, and in this way, improving the general accessibility of rural households and enterprises (e.g. to information, peers, services and markets). Second, to harness the potential for e-enabled networking and collaboration, and thus overcome typical rural development constraints such as small enterprise sizes, low rural demand and supply chain volumes, limited economies of scale, limited local skills and exclusion from information society or knowledge work occupations.

Both types of potential could increase dramatically in the near future. Besides the virtual explosion in mobile phone ownership, coverage and usage – now also occurring in large parts of the more densely settled rural areas of South Africa – other key technological driving forces include: 1) the steadily increasing range of text messaging, computing, image and data capturing, location intelligence, mobile internet and other functionalities being added to mobile communication devices; 2) the use of wireless mesh networks to increase

rural bandwidths; and 3) increasing availability of, and access to geospatial information, and decision support [2]; and 4) increasing adoption of service-oriented architecture, standard communication protocols and other means to improve the inter-operability of e-enabled devices and services. The combined effect of all this could be a revolutionary change in rural society's *shared spatial or geo-economic intelligence* (i.e. shared knowledge about what is needed, or being offered or supplied where and when).

There are also potentially powerful *non-technological* driving forces. Principal among these could be the refinement and replication of business or organisational models that are akin to the Nobel Prize–winning concept of *social entrepreneurship* developed by Mohammed Yunus (co-winner of the 2006 Nobel Peace Prize) and applied to the well-known Grameen micro-finance and mobile phone rental network in rural Bangladesh [3]. A similar type of social entrepreneurship network – focused particularly on e-entrepreneurs – has been developed in South Africa around the concept of infopreneurs™ *[4]*.

Another non-technological catalyst could be the effective establishment and use of so-called *rural living labs* – or other forms of collaborative, real-life based innovation support systems and services. Following on from the European concept of "living labs", this has the potential of effectively involving end-users in the innovation and validation of e-enabled rural services, products and business models and – presumably – reducing the usual large number of inappropriate or unsustainable rural ICT projects (e.g. 'white elephants' or heavily subsidised operations). This is also the main thrust of Collaboration@Rural (C@R), a recently initiated EU-funded project that also includes a South African rural living lab application.

Figure 1 provides a diagrammatic overview of the introductory argument, namely that expanding rural connectivity and bandwidth, together with a range of technological, inter-operability and organisational innovations, has the potential of creating a positively reinforcing cycle of significant, or even "radical" e-enabled improvements in rural collaboration and accessibility, and that this in turn, could help to overcome many typical rural development problems.

Overcome:
➢scale-related problems: (low rural demand & supply chain volumes),
➢limited local human capacities
➢uncoordinated planning & service delivery

Improving inter-operability of e-enabled devices & services

New social entrepreneurship & related organisational models

Real-life based innovation networks (rural living labs)

Collaboration

Accessibility

Expending rural connectivity & bandwidth

Expanding functionalities of mobile communication devices

Geo-ICT & other new spatial intelligence technologies

Overcome problems of rural isolation and immobility such as inadequate or costly digital and physical access to information, services, peers and markets
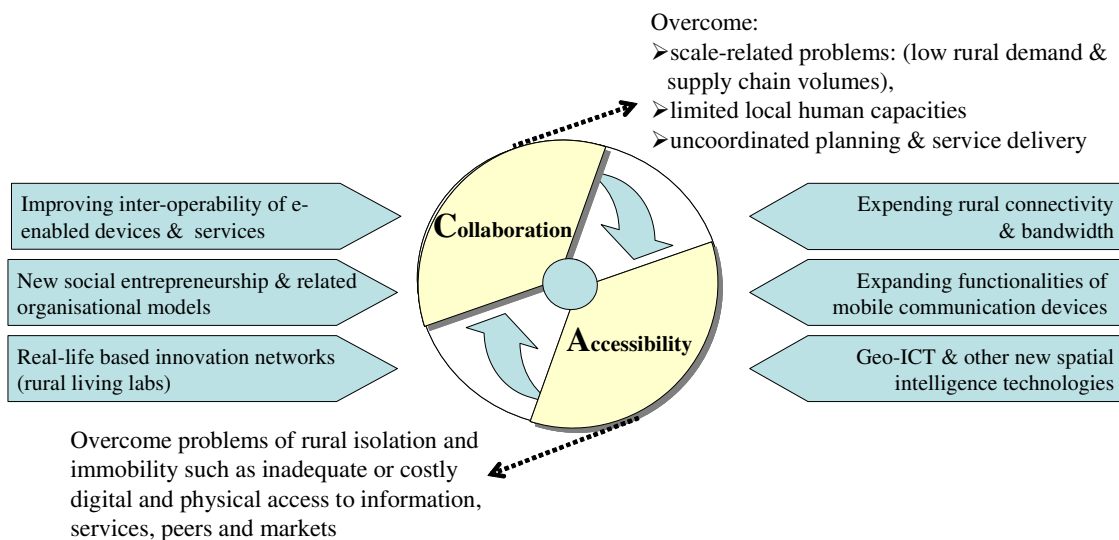
Figure 1: Potential drivers and development outcomes of a radical, mutually reinforcing cycle of e-enabled rural collaboration and accessibility improvements

2. Key issues

Given the extreme variations in degrees of isolation, levels of poverty, and levels of infrastructure and bandwidth that generally exist, not only between the rural areas of Africa, Europe and other "developed" continents, but also within the boundaries of most countries, there are of course a number of context-specific factors that are likely to impede, or even totally prevent the realisation of the vision illustrated by Figure 1. However, it is not the aim of this paper to dwell on these, but rather to raise and develop a preliminary response to a number of key methodological, conceptual and communication issues. Most of these relate to a general concern with the absence of sufficiently well-developed guiding frameworks for the planning of *e-enhanced rural collaboration and accessibility interventions.*

One of the issues is the implicit "*urban catch-up focus*" [5] of many rural e-enablement initiatives (e.g. the general thrust to provide universal broadband access and, through this, to 'also include' rural communities in the information society). In other words, there is a tendency to gloss over uniquely rural realities and development impediments (such as population sparsity, or the high costs of extending roads and other hard infrastructure networks to remote or inhospitable rural areas); the specific challenges that these pose for the delivery of accessible and viable rural transport, health, social administration, and business development services (BDS).

A second, related issue is the relatively unappreciated need for improved rural spatial intelligence and decision support services. Given that rural service delivery responsibilities are usually divided among hub-, satellite- and route-based service providers (see Figure 2), and that this often leads to poor coordination, duplication and associated inefficiencies, such intelligence or decision support could have a potentially huge impact on the ability of these different service providers to collaborate with each other, and – as a result – reduce the time and costs that (spatially dispersed) rural clients usually have to incur to access the appropriate service.
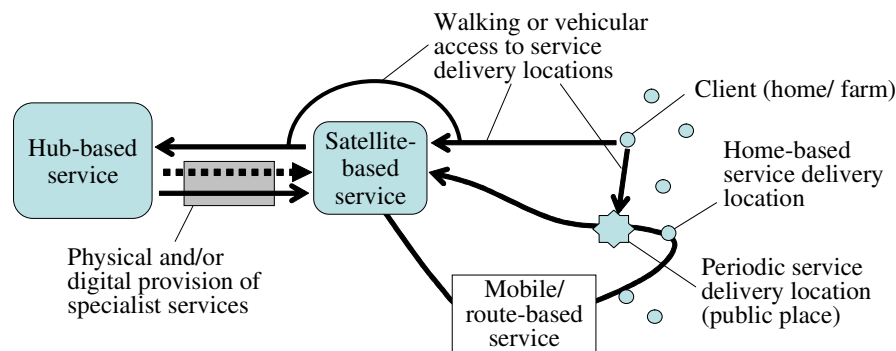

Figure 2: Illustration of a typical rural service delivery context

As explained more fully in the next section, customised guiding frameworks could help to highlight potentially neglected rural e-enablement requirements and make context-appropriate trade-offs between, for example, the need for improved bandwidth and the need for improved spatial decision support. But such frameworks could also help to address the general issue of *vague or overly general value propositions* and – by implication – assist with the task of convincing relevant stakeholders to participate in planned e-enablement projects or programmes.

3. CHICA[S] logical framework

3.1 Background

This section describes initial conceptual and methodological work undertaken by the authors to develop the CHICA[S] logical framework, aimed at providing strategic guidance for the planning of e-enabled rural accessibility and collaboration interventions. The assumed application context is a developing, spatially dispersed rural environment where there is not necessarily high-bandwidth connectivity, nor high levels of computer literacy.

3.2 Outline

As indicated by Figure 3, the CHICA[S] logical framework takes *rural accessibility and collaboration needs* as its general point of departure, and indicates a logical sequence of connectivity and e-enablement actions that would typically be required to meet these needs. Seen from an operational, short-to-medium term perspective, this sequence is broadly typified as:

- Enhanced **C**onnectivity (digital and physical/ transport connectivity, with the latter depending on enhanced road connectivity and/or mobility).
- Enhanced **H**uman interfaces, capacities and e-entrepreneurship.
- Enhanced **I**nteroperability and local **I**ntelligence (including intelligence-enhancing decision support or modelling);
- Enhanced **C**ollaboration (including initiatives such as SMME cluster and network development, or the establishment of local innovation networks);
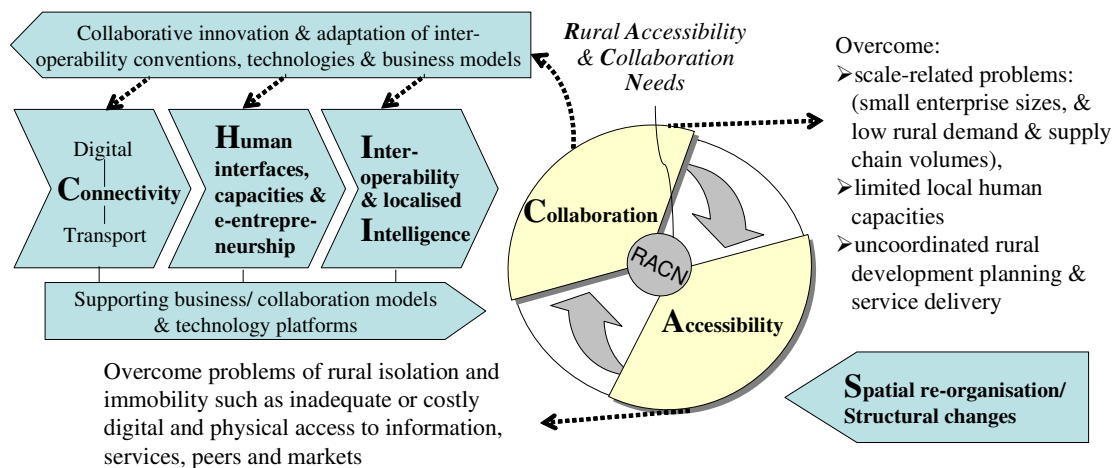- Enhanced **A**ccessibility

Figure 3: Logical framework for the planning of e-enabled rural accessibility and collaboration interventions

Finally, the framework also highlights the logical (medium-to-long-term) possibility of engaging in:

- E-enabled **S**patial re-organisation (such the opening of accessible village agencies or multi-purpose centres) and/or **S**tructural changes (such as the re-allocation of service delivery responsibilities among hub-, satellite-, and mobile/route-based service providers).

3.3 Methodological foundations

The general methodological foundations for this framework is the Logical Framework Approach (LFA), which – despite many criticisms [6] – is an extensively tried and tested methodology for the planning, assessment and monitoring of projects or programmes with significant "'wider'" development outcomes. Logical frameworks are typically used to clarify the underlying means-ends logic and value proposition of a proposed development programme or initiative (i.e. why it can be reasonably expected that particular interventions will lead to particular outcomes) highlight what else might be needed, and clearly document assumptions about interdependencies, constraints, risks and uncertainties.

Other methodological features and the substantive focus on rural accessibility outcomes has been borrowed from the Integrated Rural Access Planning (IRAP) methodology [7,8], developed originally by the ILO in reaction to prevailing roads-focused and supply-oriented rural investment project. The IRAP methodology takes the community and its access needs as the point of departure, and considers transport as well as non-transport accessibility improvement options. The latter could then include improvements of tracks and footpaths, propagation of intermediate means of transport (IMT), measures to improve conventional transport services, spatial re-organisation of service delivery facilities, and improved telecommunications and information systems.

3.4 Other sources

Good practice knowledge and guidelines relating to the secondary intervention focus, i.e. on *collaboration*, has been derived from a variety of leading or new regional, rural, enterprise and social network development approaches, in particular:
- A wide range of cluster-focused approaches to regional, rural and enterprise development, in particular the UNIDO approach to SME cluster and network development [9];
- The REED planning and knowledge management framework [10], which sets out a logical set of key success factors ("cornerstones") for Rural Enterprise and Economic Development.
- Leading approaches to e-enabled network creation and coordination [11].

The collaboration concepts incorporated in the CHICAS framework are also partly based on the conceptual frameworks and methodologies being developed through the EU-funded Collaboration@Rural (C@R) project. The principal feature of the C@R project is the establishment of *rural living labs*, which are collaborative mechanisms for involving rural end-users and other stakeholders in the design of e-enabled services (e.g. a collaborative procurement service).

Finally, the CHICAS framework has also drawn from the learning and good practice knowledge obtained through the following development and implementation projects:
- Work on ICT for (rural) development undertaken by the CSIR's Meraka Institute, focused initially on business models for Multi-Purpose Community Centres, and evolving later into incubation and support of rural e-entrepreneurs referred to as "infopreneurs" (i.e. a type of SMME that specialises in the provision of a multi-purpose range of information, agency, service brokering and other intermediary services in isolated, low-bandwidth rural contexts).
- The development of methodologies for (rural) economic linkage and logistics analysis [12] and GIS-based service access planning [13].
- Work on geospatial interoperability, geo-portals and collaborative spatial analysis platforms [14].

4. Application

4.1 High-level assessments

The CHICA[S] framework has been designed to assist with relatively, quick, high-level assessments of an existing (as-is) situation or plan. The result of such an assessment would typically be that **C**onnectivity improvements are not enough, and that supplementary actions and initiatives – in particular **H**uman interface and capacity development, and enhanced **I**nteroperability and localised **I**ntelligence are needed to achieve significant and sustainable rural **C**ollaboration and **A**ccessibility improvements.

4.2 Planning and design

Figure 4 provides an outline of the range and sequence of planning and design outputs that can be produced, using CHICA[S] as an overall guiding framework. Considering the title and the general theme of the paper, it is important to highlight the formulation of:
- Emerging potentials/ positive developments (that can be harnessed);
- Optimistic scenarios and ideal interventions or service concepts; leading to
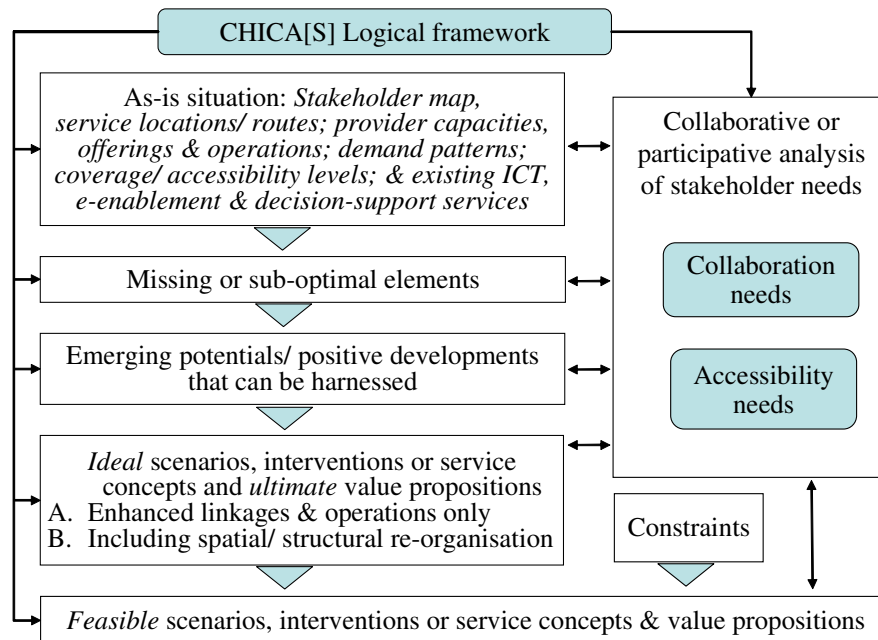- Ultimate value propositions.

Figure 4: CHICA[S] application process

The basic idea with the concept of an "ultimate value proposition" is that it is based on an optimistic, yet concrete and contextualised scenario about the possible harnessing of emerging potentials. As such, it provides a useful basis for, firstly, communicating and "selling" the possible ultimate benefits to stakeholders, and secondly, designing a feasible interim or first-stage implementation.

4.3 Example of an ultimate value proposition

Table 1 gives an example of such an ultimate value proposition, in this case focused on e-enabled accessibility and collaboration improvements in the typical rural service delivery context illustrated by Figure 2. It does not refer to any specific type of service but – to make it more concrete - we can assume that it involves a bundle of rural health and allied logistics and ICT-support services, and that the promised outcome will be a positively reinforcing series of improvements in rural health service collaboration and accessibility.

Table 1. Example of an ultimate value proposition dealing with e-enabled rural collaboration and accessibility improvements

Given the low volume, erratic and/or spatially dispersed demand pattern for service bundle X, the (ultimate) value proposition is that existing hub-, satellite- and mobile/route- based service providers can be cost-effectively enabled to collaborate with each other, and/or with local e-entrepreneurs and web-based service providers to:	
A. Enhance existing service linkages and operations	B. Improve the spatial and institutional organisation of the service delivery network
To achieve this, stakeholders will be e-enabled to collaborate, design and implement systems and service that will enhance their collective capacities to: 1) record, geo-locate, "ID" and share intelligence on all service requests in the region or service area; 2) decide who is best placed to (first) deal with the service requests, and what bundle of associated or downstream services is to be provided; 3) assess possibilities for cost recovery and/or financial assistance (at each stage, and/or for each service element); 4) obtain (e-transacted) financial support (if necessary); 5) provide and monitor the provision of the service.	To achieve this, stakeholders will be e-enabled to collaborate, compose and use a web-linked, spatial decision support system to: 1) segment and assess the effective service coverage and accessibility for different user or client groups; 2) identify poorly served demand locations and volumes; 3) assess the relative service loads of the different service providers in relation to capacities and minimum viability thresholds; 4) prepare plans for spatially re-organising the service locations, routes, inter-service linkages and allocated capacities/ functions; 5) implement and adapt these plans in participative and collaborative manner.
As a result of A and/or B, there will be significant: 1) reductions in user access times and costs, and 2) improvements the overall responsiveness, transparency, efficiency and viability of service delivery operations in the area.	

5. Conclusions

In conclusion, the central argument of this paper can be summarised as follows:

1. The harnessing of ICT – referring specifically here to mobile communications, wireless mesh networks, the mobile internet, emerging Geo-ICT and other

geospatial technologies, e-collaboration technologies and service-oriented architectures – has the potential to radically enhance the accessibility of rural communities and enterprises (to information, peers, services and markets).

2. This potential will however not be realised without improved collaboration, networking and supporting business models, including private-public, local-regional, urban-rural and formal-informal sector collaboration.

3. Such collaboration should occur both at a strategic/ planning and operational level, and be supported by enhanced interoperability and localised intelligence – including the creation and sharing of local spatial or geo-economic intelligence.

4. The collaboration and planning should be guided by clear value propositions and context-relevant logical frameworks.

5. All collaboration and e-enablement should be human-centric and enabling, referring here to the needs and capacities of all human actors or potential collaborators.

6. The combined outcome of all the above could be a positively reinforcing cycle of collaboration and accessibility improvements, capable of addressing many of the typical isolation, immobility, scale, and human capacity related problems in poor or underdeveloped rural areas.

7. The customised logical framework [CHICA(s)] has been developed from several development and implementation projects including recent work undertaken as part of the EU funded collaboration@rural project. It is anticipated that it will continue to evolve and develop along with gaining new insights on collaboration and accessibility needs.

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