

# **The role of Spatial Information Infrastructure in addressing urban deprivations in Indian cities**

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## **INTRODUCTION**

The subject of this paper is part of the 5-year research programme ‘Using spatial information infrastructure in urban governance networks: reducing urban deprivations in Indian cities?’, funded by the Dutch Organization for Scientific Research (NWO) - WOTRO, and conducted by a team of Dutch, European and Indian scholars. The main focus of the programme is how urban governance networks can more effectively tackle urban inequalities, spatial segregation, and household deprivations in large Indian cities, by making use of local spatial information infrastructures (SII). It concentrates on four cities in Western India with varying levels of SII in terms of contents and citizens interfaces to provide contrasting situations. The purpose of this paper is to present an analytical framework that will guide the wider research programme, and to zoom in in more detail on the nature of content development and exchange of content with respect to urban deprivations.

## **Background**

Future population growth will occur mainly in Asian cities, making them a strategic focus for analysis and policy discussions on urban governance issues. Poverty is also becoming urban - by 2007 one out of three city residents will have inadequate housing with few basic services (UN-HABITAT, 2006). Such urbanization also puts a strain on city governments in providing sufficient infrastructure both for economic growth as well as quality of life improvements for their citizens (Douglass, 2001; Hust and Mann, 2005). The rationale to focus on India is its current urbanization, with 35 urban agglomerations with over one million inhabitants while representing 37% of the urban population. Besides, urban poverty on average concerns 24% of the urban population in India (Kundu and Mahadevia, 2002).

In order to analyze poverty, several perspectives are necessary: most importantly those of the households and individuals coping with poverty and deprivations, and secondly, that of the various levels of government involved in programs to mitigate the effects of poverty and multiple deprivations in various areas. The perspective of households is represented well within the ‘livelihoods’ approach, which is commonly used in international research (Moser, 1998; Rakodi and Lloyd-Jones, 2002). In previous research, we have already designed methods to map and analyse the nature of urban deprivations from the household perspective (Baud et al, 2008). Specifically, an index of multiple deprivations (IMD) has been constructed by employing the livelihoods approach and data from the Indian Census 2001, disaggregated to the level of electoral wards. In Indian cities electoral wards are the spatial level that matches political representation and is the lowest level of government administration. The

IMD helped to explore whether 1) hotspots of poverty are clustered within the city, 2) multiple deprivations are concentrated, and 3) whether the types of deprivations differ across cities. What still remains to be done is design methods for mapping and analyzing the perspective of local governance networks, how these governance networks can be supported in developing policies and examine how SII can become a useful tool for this process.

This fits into the debate on the role of (local) governments in the delivery of public goods and services. It concerns the extent to which (local) governments should be direct providers of public goods and services, or provide an enabling context for other providers – private or civil society sector organizations. Part of this discussion concerns the interaction between local governments and civil society organizations. Although several examples are widely known in India (Anand, 1999; Appadurai, 2001; Baud and de Wit, 2008; Burra et al 2003), systematic research on such interaction in other cities is scarce. Particularly the coalitions which form the basis of urban regimes, involving not only local stakeholders, but also those at other levels of government and civil society (multi-level governance), have hardly been discussed in the Indian context, although these are essential in understanding what opportunities and restraints local governments experience in their planning and management of cities.

## **SII and urban governance**

There is a general belief that more and better information can lead to more efficient planning and decision making, and subsequently more effective urban governance in terms of inclusion. In the past decades several SIIs (in the literature frequently referred to as spatial data infrastructure – SDI) have been developed for the purpose of supporting sharing of expensive geospatial data and ready access to spatial information to support multiple purpose decision-making at different scales, at corporate, local state/provincial, national, regional (multi-national), and global levels (Rajabifard et al, 2006). In many cases however, these are top-down approaches, following either a technological or managerial imperative in design and implementation, with an outspoken focus on data, implying a preoccupation with aspects of data standards, interoperability, metadata (Georgiadou et al, 2005) and technology, while neglecting social, political, historical and institutional conditions within which such an SII should be embedded for effective utilization in urban planning and decision making. In particular, substantive issues are framed as technical or managerial problems needing similar solutions; people are considered ‘universally rational agents’, amenable to rational management methodologies, while information technology is assumed to be a value-neutral, globally enabling, a-historical mechanism. The Indian national SII project, launched in 2001, is a prime example of a top-down approach to SII design and implementation, promoted by Indian elites and underpinned by the technological imperative (Georgiadou et al, 2005). According to the evaluation done by Georgiadou et al (2005) the existing installed bases, i.e. agencies of different geospatial data, have not sufficiently been considered in the overall design, metadata standards have been created without an adequate perspective on their relevance and acceptance in local contexts and a rather top-down and data-centric approach has been adopted instead of looking at existing information needs locally. The top-down technology-oriented approach is also evident in the mission statement of the National Informatics Centre (NIC) of the Department of Science and Technology (DST), supporting different government bodies with respect to network and e-governance. Recently two other top-down constructions have been set up: the National Urban Information System (NUIS),

undertaken by the Central Indian government (Urban Development Ministry) as well as the National Urban Renewal Mission (NURM), a policy initiative for urban renewal. NUIS and NURM plan on collecting data from state and local governments for the national SII, without consultations on demands (reflected in contents) or usability at state or local level. Following such imperatives is by definition very likely to fail, especially in such a complex country as India. The nationwide adoption of the outcome of the successful Boomi e-government project of Karnataka to computerize land records and related operations (De and Sen, 2004) by the Government of India shows the importance of integrating the local context in the design.

Unlike the national government, local governments and civil society organizations have little access to existing spatial data about their own areas of jurisdiction (Baud et al, 2006; Joshi et al, 2002) and limited analytical capacity to support policy choices. The limited research done on database contents and 'embedding' in organizational networks in Argentina, Peru and Tanzania for instance shows that this reduces the potential of governance networks to address urban deprivations because of lack of visualization, too complex software, and restricted access to information (Hoyt et al, 2005; Martin-Martinez, 2005; Sliuzas, 2003).

In this paper we propose an analytical framework describing the potential role of SII in making urban governance networks more effective in tackling urban poverty and segregation. What is needed is spatial information both on households as well as on service provision at local – urban – levels, and preferably disaggregated to the lowest administrative level like electoral wards within urban areas, and how they are linked through local networks. This is because local governance networks have limited information from which to work, limited capacity and funds with which to work, and a huge problem of numbers of people and households for whom they have to work effectively. SII as a socio-technical construct could provide basic overall and dis-aggregated information flows on deprivations that urban households face, the unevenness of service provision and access to services, and support strategic choices for prioritizing particular localities, sectors, and groups of households, and hopefully minimizing the extent of political bias in such inherently political processes. The model illustrated in Figure 1 is a first attempt at doing so and at the same time reflects the main elements, but also complexity of the wider research programme. Within this figure three axes can be extracted: SII content, institutional scales and network of actors involved as policy makers, designers, content developers or users, which form the core of the research. In the following section we will elaborate content development aiming at tackling urban deprivations.

## **SII FOR TACKLING URBAN DEPRIVATIONS: CONTENT**

### **Conceptualization of urban deprivations**

Tackling urban deprivations effectively cannot be simply done by means of a traditional, multi-purpose SII since it requires specific knowledge regarding the local context and the spatial patterns of household deprivations. Spatially and thematically disaggregated databases, tailored to analysing urban household's deprivations, allow better situation analysis, area-targeting, and local prioritization of needs, but are currently not normally available to local governments and civil society organisations. Accordingly, content development is guided by the following questions. What kind of spatial information is required to address urban

poverty? What is the role of the installed base with respect to the required information (i.e. what is already in place in terms of content development) and how can specific knowledge be matched to local governance considering the social, political, historical and cultural context?

The inventory of the spatial information demand requires a good understanding of how poverty is conceptualized and how the conceptualization can be transferred to the local context. Unlike most former studies in which spatial patterns of poverty are often mapped in terms of income or consumption (Henninger and Snel, 2002), recent discussions of urban poverty recognize its multi-dimensionality, focusing on the range of deprivations poor households cope with (Baud et al 2008; Moser, 1998; Rakodi and Lloyd-Jones, 2002). This urban 'livelihood strategies' approach generally uses smaller surveys and qualitative research, but can provide deeper understanding of the situation 'on the ground'. Citywide analysis of spatial concentrations of household deprivations has rarely been possible due to lack of spatially dis-aggregated information (Montgomery et al, 2003). As mentioned in the background an earlier study has made a first attempt to deal with this issue by constructing a composite index<sup>1</sup> for mapping household deprivations at electoral ward level using the Census of India 2001 (Baud et al 2006, 2008). Mapping the index within a geographical information system (GIS) made it possible to identify hotspots of poverty and their degree of concentration or scatter. By using the processed database both at the level of the IMD as a composite, as well as in terms of specific deprivations loading onto the index, the IMD generated knowledge of poverty configurations at electoral ward level while the processed database, containing the spatial distribution of the IMD as well as of different capitals and indicators, can subsequently be used to set priorities in deprivations and targeting specific urban areas<sup>2</sup>. The restrictions to this research on the perspective of the households were several: the selection of indicators is to a large extent controlled by what the Census gives, the Census information gradually becomes less up-to-date and less usable over time, the quality and usefulness of the results depends on the size of the geographic divisions used as spatial unit and the access to proper digital boundary files including metadata information is difficult. So, as concerns the household perspective, sharing and utilizing nationally available data like the Census of India should not be the only source of information for local government, but needs to be backed up by sources which keep updated data at similar levels of dis-aggregation. As a matter of fact, spatial data need to be collected in such a way that the multi-dimensional character of poverty from the household perspective can be addressed in a disaggregated and sound way.

The actual living conditions of the households in Indian Cities is central in the conceptual framework shown in Figure 1a. The knowledge generated about household deprivations and the resulting spatial patterns of urban inequalities and segregation are usually circumscribed to a top down and technically centred approach (generalized knowledge). However, to conceptualize deprivations and to explain urban inequalities it is necessary to analyze both the provision of services (supply side), as well as households perspectives (demand and access

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<sup>1</sup> The index of multiple deprivations (IMD) consists of four capitals (social, human, financial and physical) derived from the asset/vulnerability framework developed by Moser (1998) and Rakodi (Rakodi and Lloyd-Jones, 2002).

<sup>2</sup> The comparison of three Indian cities showed that deprivations are concentrated to a certain degree in poverty hotspots, which would make it possible to prioritize certain localities when designing intervention programs. Secondly, deprivations also show diversity in their composition across wards as well as across cities which gives an indications which sectors to prioritize first and it shows that local knowledge is needed to fine-tune provision of services to localized situations (not only depending on deprivations, but also on gaps in provision). Thirdly, it showed that poverty/deprivations are not necessarily concentrated in slum areas, so that targeting those areas may not be effective.

side). Depending on the target of the interventions policies aiming at reducing deprivations are classified as area-based or people-based. The demand and access to services is the result of the perceived, explicit and expressed need of a particular social group and their ability to negotiate their demands on a priority basis.

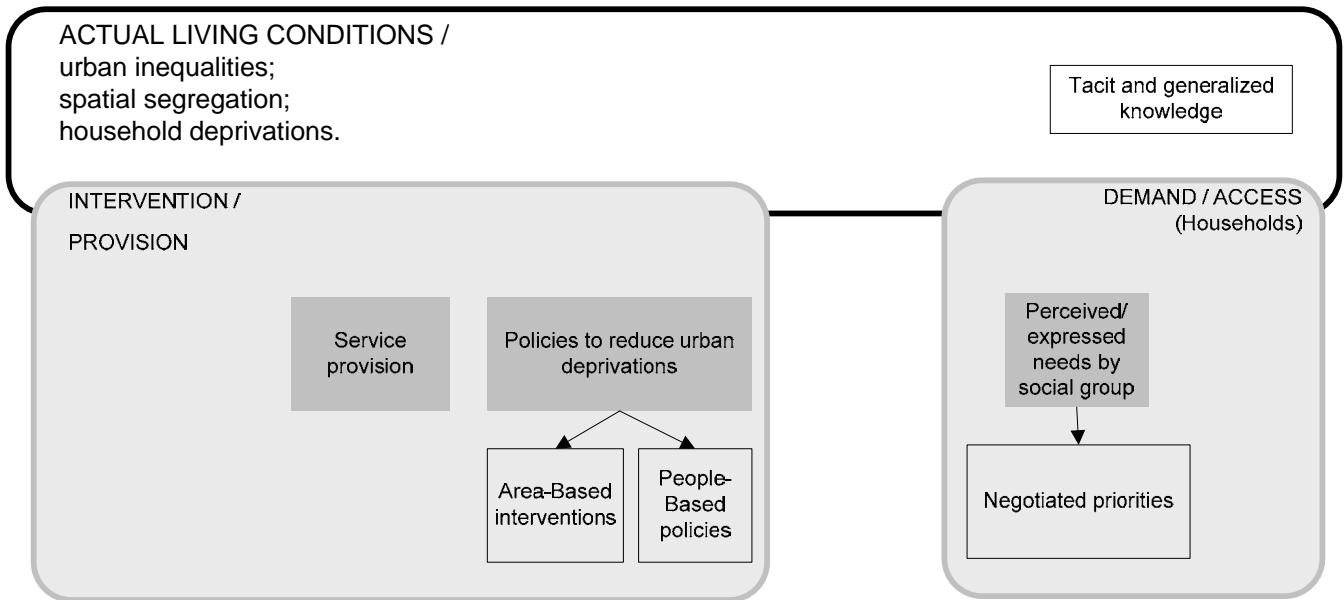


Figure 1a: Theoretical model of the socio-technical SII to effectively support urban governance in tackling urban deprivations. Households deprivations from an intervention and households perspective.

At the top of Figure 1b it is shown that both the provision and demand of services are the result of the perceptions, mandates and resources of the different actors in the local governance networks. The framings that these actors will have about the degree of deprivation -and ultimate the decisions and choices they will make- will be very much influenced by the SII and the information that it generates about the deprivations that urban households face. This information together with local knowledge is in turn negotiated and constructed. As a socio-technical construct, the SII mediate the development, access and exchange of information and reflect the relationships between the different actors. Therefore, the arrows in the conceptual framework plot the flows of information through the SII. In turn, the practices and relations between the different actors in the role of designers, content developers, and users will re-shape and re-construct the contents of the SII.

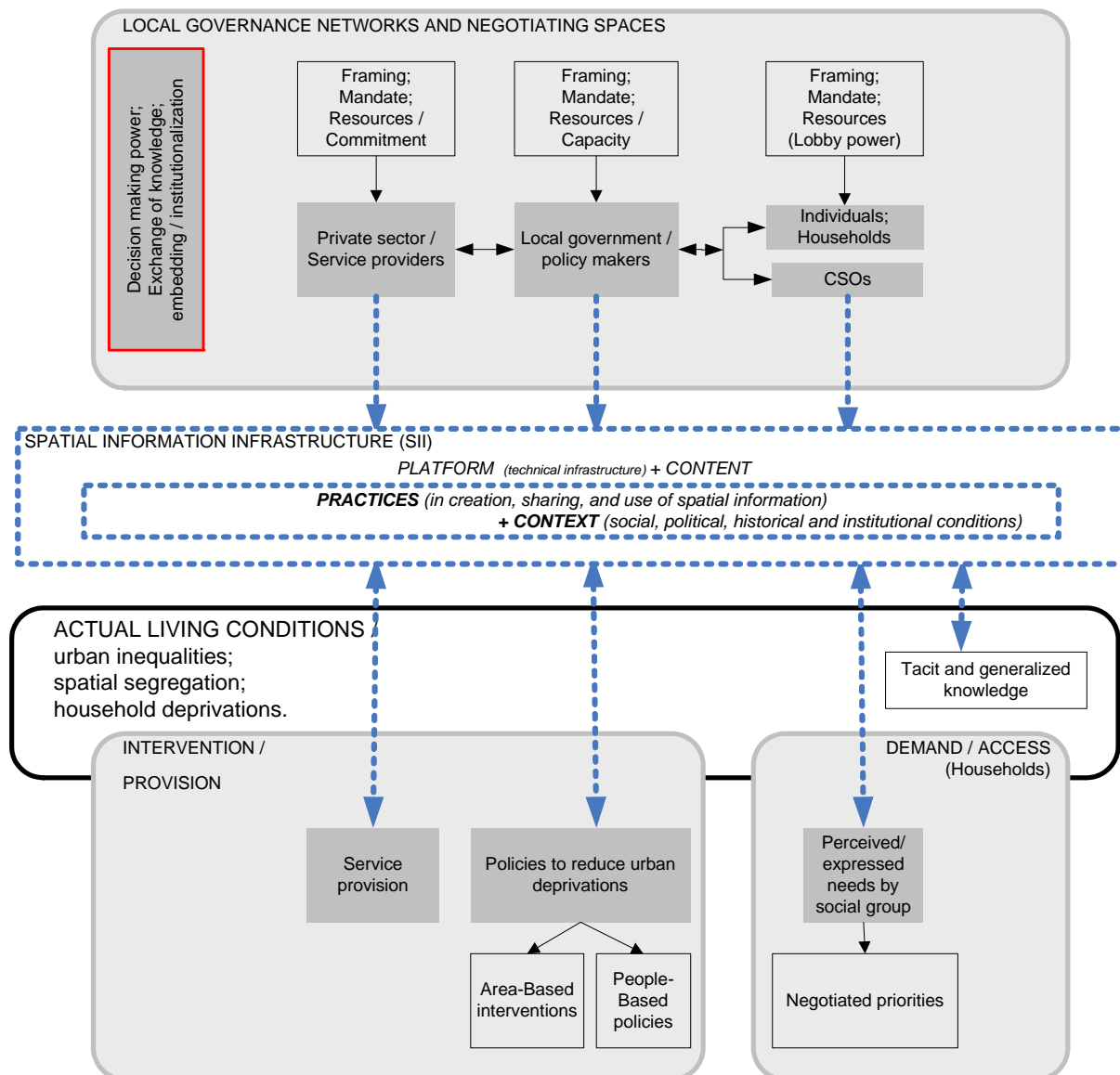


Figure 1b: Theoretical model of the socio-technical SII to effectively support urban governance in tackling urban deprivations.

The framework of Figure 1a,b takes the analysis further by linking household perspectives to structural constraints in Indian cities. Provision of services varies between high-income households, and households in slums in quality and access (Harriss, 2005; Kundu 1993). Local governments provide basic services such as drinking water, SWM, and basic education in India. State and national governments provide (or have jurisdiction over) other services, such as transportation (trains) and health. The fragmentation of services within each sector across levels of government makes locally available knowledge even more strategic for urban management and planning. This is compounded by privatisation initiatives in various areas, such as energy (electricity) and SWM. It is also compounded by the classification of urban areas into planning zones, and legal, recognized (slums) and non-recognized areas which have no access to public services.

A workshop with Indian local representatives and Indian experts has shown that fragmented information is collected and in principle readily available through different government departments and private providers. However, in fragmented state it is not available or usable for urban management and planning. It needs to be collated and brought together in a more holistic and integrated approach to governance in which 'contents' are standardized to be comparable (e.g. in use of spatial units), collected systematically over time, and brought together in one socio-technical infrastructure which builds upon existing bases, which is accessible to both government and civil society groups, and which can be used readily by non-technical experts.

### **Methodological approach**

In order to do research on content development, we propose to analyze the pattern of urban deprivations and how governance networks are attempting to deal with them. In the first stage the index for mapping multiple household deprivations will be revised according to the shortcomings experienced in the previous research project. The outcome of the mapping will give more insight concerning household strategies which allow households to climb out of poverty or which make them fall into poverty (Krishna, 2003).

The second issue concerns an inventory of the provision of and access to services. The dynamics of implementing service delivery policy will be mapped within a GIS, and compared to patterns of deprivation. This allows an analysis of relative efficacy of area-based or people-based approaches. In the light of SII, both will identify what content (and content generation) is needed to tackle urban deprivations, from the household (civil society) as well as the service provider (local government) perspective<sup>3</sup>.

So to understand the different levels of information exchange, provision and utilization of information the local governance networks will be mapped. This includes an analysis of current information use to address urban deprivations. Content development and mapping local governance networks will be done in three cities with different levels of SII, in particular Surat, Kalyani, Hubli-Dharward and Mysore. This will give us a better understanding of the extent to which current SIIs support a participatory approach and use of contents for urban management and planning against poverty and what collection, sharing and exchanging mechanisms are required to make an SII effective in participatory urban management and planning. In order to consider the local institutional, social, historical and political context, content development will be done in close cooperation with local government representatives and civil society organisations using participatory workshops, focus groups discussion, in-depth interviews, and training capacity building.

### **CONCLUSION**

This paper has raised the question of the contributions SIIs can make to tackling urban poverty issues. A first conclusion is that the conceptualisation of urban deprivations has to be done in such a way that it includes both households perspectives (demand side), as well as

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<sup>3</sup> Within the programme this particular project will be carried out by Tara van Dijk (PhD student at the UvA).

provision of and access to services (supply side) in the analysis. A second conclusion is that spatial data required to support this analysis needs to be systematically collected and analysed and deduced knowledge matched to local governance. Thirdly, local governance network analysis will give insights in the collection, sharing and exchanging mechanisms, providing insights into how SIIs should be built to provide access, usability and transparency in the process of local governance. Integrating knowledge deduced from this research will contribute to an SII that can help tackling urban deprivations effectively.

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