



Developing the national capability to create spatial evidence and simulate spatial implications of city, town and settlement growth

DST's vision to support the much identified need for high impact investment and intergovernmental co-ordination through enhancing spatial evidence and simulating spatial implications of city, town and settlement growth in a highly dynamic developing country context, gave rise to the original Toolkit for Integrated Planning (TIP) and Integrated Planning, Development and Modelling (IPDM) projects.

The DST commissioned the Council for Scientific and Industrial Research (CSIR) and the Human Sciences Research Council (HSRC), to develop an integrated information and modelling platform (IPDM) to support integrated planning, development and service delivery for South Africa. This multi-year, multi-phase initiative focused on developing, collating and disseminating the knowledge and evidence generated by series of advanced spatial analysis and modelling platforms via the stepSA web-based portal.

As founding Partner, DST's vision to support the much identified need for high impact investment and intergovernmental co-ordination through enhancing spatial evidence and simulating spatial implications of city, town and settlement growth in a highly dynamic developing country context, gave rise to the original TIP and IPDM projects and in the last 4 years to the stepSA initiative.

The outputs of stepSA have largely been focused on informing public investment decisions to address growth, transformation and sustainability of SA's cities and towns.

1 RELEVANCE

The South African space economy is marked by the realities of complex, fast changing and fluid socio-economic spatial dynamics. Whilst the emphasis of intergovernmental and spatial planning policies and systems introduced in the last couple of years has largely been on reframing the South African spatial planning system, approaches and establishing institutional capacity, the continued uneven spatial economic prosperity and increased spatial fluidity of population, settlement growth and investment within and between urban and rural regions and settlements continues to highlight major multi-stakeholder research and development needs, i.e.:

- to understand and assess implications of fast changing population and settlement dynamics, networks of interactions and rural/urban linkages;

- to add value to and support existing official data sets;
- to conduct and disseminate research and analyses on changing population, settlement and regional growth dynamics and implications for government investment, interventions, targets and outcomes; and
- to develop dynamic and responsive instruments to support planning, investment and monitoring in space.

2 CONTRIBUTION

Since its inception the StepSA initiative made a huge contribution in bridging these gaps through multi-stakeholder collaboration within a range of inter-related basic and applied research and development processes to:

- Conduct innovative evidence based research;
- Utilise in-depth understanding of spatial dynamics and innovative technologies to generate indicative, integrated and comparable spatial relational data sets, with temporal dimensions; and
- Disseminate and share findings, indicative data sets, integrated indicators, typologies, tools and models with a specific focus to support:
 - Municipal level IDPs and SDFs as planning instruments enabling enhanced government impact through coordinated investment and shared jurisdiction – as fore runner before introduction of SPLUMA, SASDI and notion of spatial data repositories
 - Identification and consideration of settlement and regional spatial dynamics in development of provincial and national sector plans and policies, as well as research to determine spatial implications of such plans and policies – utilise enhanced indicative spatial relational data sets to explore policy implications and investment
 - Assessment of spatial implications and outcomes of large scale infrastructure investment in infrastructure development frameworks, including i.e. household level settlement indicators and resultant economic access, as well as city wide spatial outcomes - building on initial successes: enhancing indicative, integrated and spatial and temporal comparable data sets, and modelling tools to explore spatial implications of investment alternatives
 - Development and evaluation of indicators to assess and track spatial outcomes of policies and interventions – utilising tools and indicative data sets developed in stepSA to enable tracking of socio-economic outcomes of i.e. spatial policies, and large scale infrastructure investment from household level upward, to broader settlement and city-wide measurements to reflect implications of intervention for communities and households. This kind of approach can be described as outcomes-based planning (see *Breaking New Ground*, 2004), and in the upcoming phase this – taking the next steps: utilise in-depth understanding of spatial linkages and scalable,

integrated and comparable indicative data sets, and modelling tools to assess and track spatial outcomes.

BACKGROUND TO THE STEPSA INITIATIVE

Before the establishment of the National Planning Commission (NPC) and the commencement of the process to draft the National Development Plan (NDP), the Social Impact Branch of DST acknowledged the need to ensure that required scientific knowledge and technologies are available to ensure robust planning, policy and decision-making processes across the state.

In response to the work of the former Policy Co-ordination and Advisory Services Unit (PCAS) in the Presidency (which highlighted the need for developing a shared and co-operative understanding of South Africa's rural and urban spaces) DST identified the need to harness information and communication technologies (ICTs) to analyse the key forces that shape the development of places and spaces in the South African landscape and to make available spatial and temporal evidence of past, current and possible future development patterns and trends to support the developmental state to strengthen spatial policy and planning in South Africa, in which spheres and sectors cooperate to shape South Africa's development trajectory.

At the time, there was reasonable agreement on the nature of the problem of spatial fragmentation and disconnection and the extent to which it was impeding South Africa's chances to build an equitable and prosperous nation, but less agreement on the scale and dimensions of the problem and the key levers to address it. The DST commissioned the CSIR and the HSRC to develop an IPDM to support integrated planning, development and service delivery for South Africa.

This multi-year, multi-phase initiative focused on developing, collating and disseminating the knowledge and evidence generated by series of advanced spatial analysis and modelling platforms via the stepSA web-based portal (<http://stepsa.org/>) to ensure that users (planners, policy analysts, decision-makers and researchers) can easily find and download relevant information to spatial planning and policy making processes across the spheres and sectors of the state.

Feedback from portal users, short course participants, seminar attendees and policy dialogue participants and line departments indicated that the new knowledge and evidence based generated by these platforms and the dissemination thereof through the stepSA web-based portal and related policy discourses contributed to tangible and useful input in support of the planning and spatial policy development across a range of scales.

On 8 August 2011 the DST Executive Committee resolved to elevate the IPDM project to a National Initiative. The Spatial & Temporal Evidence for Planning in South Africa (stepSA) National Initiative had as its core, the generation, application and dissemination of spatial evidence to support:

- integrated planning, policy and decision-making for the public good; and
- research and co-innovation in development planning and geo-spatial sciences.

The stepSA initiative has since brought innovation in understanding territorial growth and development dynamics (i.e. trends and forecasts of migration, town growth, land development demand) within city regions, cities, towns and settlements, as well as across networks of settlements and regions (urban and rural). This has largely been achieved through advanced spatial analyses, research findings, decision support tools, and new information platforms and utilised to identify key implications for governance, service delivery, infrastructure investment, spatial and sector policy and plans, monitoring and evaluation at various scales.

In terms of institutional model, it was agreed that the stepSA National Initiative would be implemented in two stages.

- **Incubation Stage:** Transitional incubation programme, which entails the refinement of the innovative user-driven institutional model.
- **National Initiative:** The full implementation of a co-owner institutional model that will evolve from and be driven by user requirements.

The DST, supported by the CSIR and the HSRC interrogated a number of institutional models, including the intergovernmental Group on Earth Observations (GEO), the Global Earth Observation System of Systems (GEOSS), and the Global Biodiversity Information Facility (GBIF) with a view to develop a new institutional model to ensure the sustainability of the initiative going forward.

The review resulted in the decision to drive the development of a user-driven institutional model which is co-owned by the government departments and public entities which will utilise the evidence-based platforms. Contrary to the team's expectations, early engagements with line departments revealed that even though the outputs and findings, as well as capabilities developed by stepSA is highly relevant to (and used by) most departments including to the National Planning Commission (NPC), most institutions have the development of internal portals and systems as part of their own priorities. This includes the Presidential Infrastructure Co-ordinating Committee (PICC) and the departments of Performance Monitoring and Evaluation (DPME), Transport (DoT), Human Settlements (DHS), Treasury (NT), Department of Rural Development and Land Reform (DRDLR), Co-operative Governance (DCOG), etc. At that time there was also still a lot of uncertainty regarding the implications of the new Spatial Planning and Land Use Management Act, 2013 (SPLUMA).

It was also clear that several departments have assumed responsibility for the co-ordination of spatial data and information in support or a range of purposes from planning to decision-making around infrastructure investment across a range of scales. StatsSA has created a Geography Branch to publish its data in spatial formats in future whilst several provinces have also established provincial planning commissions and identified the need for spatial initiatives to collate and disseminate data at provincial and municipal scales including the Gauteng City Region Observatory and the Cape Town Urban Observatory. At national level, the National Planning Commission (NPC) in 2012, proposed the creation of a National Observatory for Spatial Data Assembly and Analysis (NOSDAA) in Chapter 8 of the National Development Plan (NDP).

Whilst the gap in providing access to basic planning data was increasingly being addressed by a range of role players i.e. with the release of StatsSA's latest data sets, various initiatives by the DRDLR in providing access to basic spatial data, and SANSA in providing access to earth observation data, stepSA fulfils a key function in spearheading, developing technology to support, as well as providing access to, a range of research and integrated and advanced spatial analyses and modelling findings. In such a way it not only contributes to raise awareness about the implication of findings i.e. for current national urban, rural and settlement related policy process and underlying assumptions, and planning decisions of various spheres; but also to identifying key research and data gaps and opportunities for collaborative research and innovation (bridging the science, policy and practice gap).

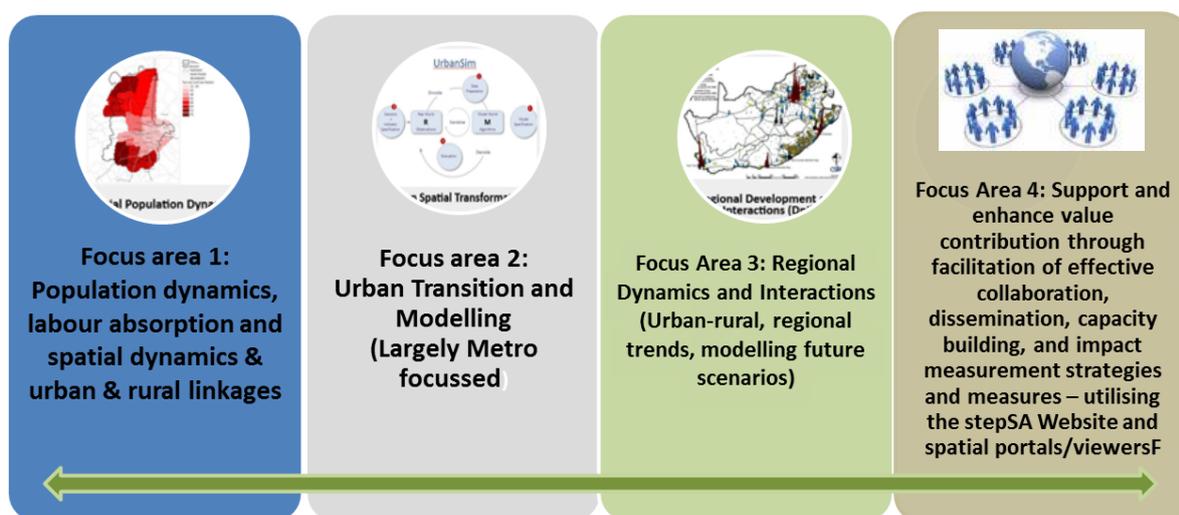
With the enactment of the Spatial Planning and Land Use Management Act (SPLUMA, 2013), several initiatives by the DRDLR Spatial Planning and Land Use Management Branch such as the Spatial Data Repository, and setting in place processes to support the National Spatial Development Framework (NSDF) have also in the meantime been initiated.

Given (i) the above context, (ii) the value being added by the current stepSA initiative as a collaborative initiative between the science councils, several sector departments and municipalities, in addressing key questions about spatial dynamics and growth, as well as (iii) higher levels of clarity regarding roles of national departments within government's new term of office, various bi-lateral engagements between representatives from DST, other government role players and the stepSA project team have given rise to model where:

- CSIR with support of HSRC Host stepSA as Collaborative Research Initiative - Maintaining and enhancing the stepSA initiative in order to build on existing momentum, extend collaboration and provide critical support to a range of national, municipal and other institutions and enable the critical inputs and dissemination of findings:
 - to be taken up in relevant policy discussions and unfolding processes by key national departments (i.e. SHS, DRDLR NSDF processes etc.),
 - be applied within broader contexts; and
 - be shared to enhance capacity and support human capital development.
- Ongoing investment through project collaborators are used to support and extend the above capability and body of knowledge supporting public investment decision making;
- Where DST & the relevant research institutions invest only in the critical research and capability development needs that have been identified through the stepSA initiative and various government collaborators to support ongoing high end technology and capability development to enable innovative profiling, analyses and modelling of spatial implications of growth, investment and development within the complex dynamics of SA cities, towns and settlements.

3 CORE FOCUS AREAS, CONTRIBUTION AND VALUE ADD OF THE STEPSA NATIONAL INITIATIVE

The stepSA initiative was from the outset designed to enhance understandings of spatial and temporal urban and regional growth dynamics and transitions within and between cities, urban and rural settlements and across regions. stepSA particular is aimed at identifying and exploring such dynamics in quantitative and qualitative ways to identify the implications thereof for planning, service delivery, infrastructure investment, policy direction and spatial outcomes. A diagrammatic overview and summary of the respective focus areas is provided in the diagram below.



An overview of the type and nature of *Research and Development* contributions within stepSA, geared towards enhancing the value and the use of spatial and temporal evidence across the three focus areas is provided in the attached Diagram.

Diagram 1: Research and Development contributions within stepSA

ONE: Contribute towards the generation of temporal and spatial evidence by identifying key knowledge and data gaps increasing the quality of evidence, and increasing the understanding, appropriateness and value of evidence created

Enhance evidence base through:

- Qualitative and quantitative research and increased understanding of spatial dynamics and phenomena within specific contexts, case studies or application areas;
- Development of geo-spatial frames, tools, indicators and capabilities to add value to existing data sets

and/or create new comparable spatially refined, integrated and temporal value added/ indicative data sets;

- Produce, test and analyse spatially refined, integrated and temporal value added indicators, profiles, typologies and indicative data sets to contribute to research and analyses aimed at an enhanced understanding of the spatial and temporal dimensions of people and place dynamics;
- Development of ‘models’, profiles and typologies to better describe and enhance understanding, research and analyses of spatial dynamics and related challenges and implications

TWO: Increase the use and value of spatial and temporal evidence in support of municipal, provincial and national planning processes, through collaboration with government role players (i.e. via context specific case studies, “living lab” development and application contexts, joint working groups, or commissioned research) to:

- prioritise and develop value adding profiles and indicative data sets; and
- develop innovative tools and indicators to support decision-making and territorial cohesion of government investment.

Ensure appropriateness, relevance (proxy for impact) of evidence created through:

- Identifying and prioritisation of needs of multiple stakeholders in relation to national priorities, planning requirements and key research questions;
- Collaborative development, application and refinement of indicative data sets, profiles and indicators;

Enable effective use of evidence by decision-makers in evaluating and planning targeted and coordinated investment through:

- Development of relevant indicators, profiles, “tools” and viewers to inform specific investment needs and policy questions; and
- Development of innovative tools to simulate spatial implications of integrated and sector specific policy scenarios, investment plans and alternatives, and differentiated growth scenarios;

THREE: Development and evaluation of spatial outcomes and indicators to monitor impact of investments and interventions.

Support development and evaluation of indicators to evaluate and monitor development outcomes in relation to spatial objectives and requirements for socio-economic and environmental robustness – not only of cities, towns, regions and rural areas; governing and investing institutions and networks; but also households across

diverse segments of SA population (especially the youth and the poor) within the range of inter-linked urban and rural areas.

FOUR: Increase use and impact of spatial and temporal evidence through better access, dissemination and raising awareness on outputs, human capital development.

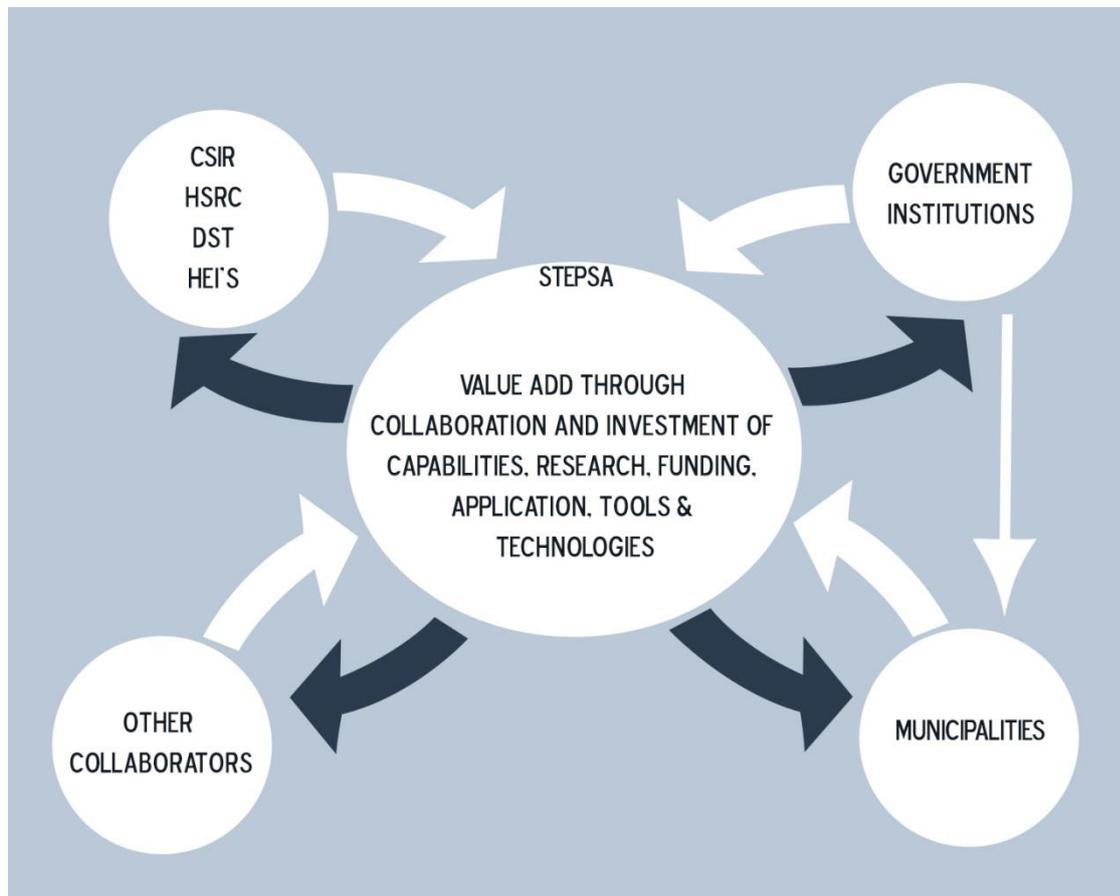
Enable access to and use (impact) of evidence through:

- Appropriate mechanisms to support targeted dissemination of research findings, indicative data sets, profiles and indicators, and application case studies to decision makers and practitioners;
 - Raise awareness on possible investment and policy implications of research findings and evidence created through newsletters, popular articles, participation in and providing inputs in key planning processes and policy discussions; preparation of policy briefs and notes to highlight implications and value of evidence for specific policies and planning instruments; hosting targeted policy and theme specific seminars and developing.
 - Support HCD through seminars, training sessions and guest lectures aimed at knowledge sharing and targeted opportunities to enhance research and development capabilities of students in relevant study areas, practitioners and research community as well as continued professional development;
 - Illustrating scientific relevance and contribute value to knowledge fields and research community via publication of peer reviewed conference papers, scientific articles, book chapters etc.
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The contributions mostly relate to enhanced understanding of spatial and temporal urban and regional growth dynamics, interactions and transitions within cities, towns, settlements and regions, human settlement and informality, economic participation, and the implications thereof for planning, service delivery, infrastructure investment, policy direction and spatial outcomes.

One of the key approaches followed within the stepSA initiative is that of collaborative innovation, not merely in enhancing quality of R&D outputs but more so in enabling targeted and value adding outputs, that address specific needs of clients such as metropolitan municipalities, is enhanced through practical application and is of direct importance to the intended beneficiaries (thus ensuring outcomes are met).

stepSA enabling collaboration and value adding amongst network of role players



Examples of specific achievements and value contribution of the stepSA initiative are:

- **stepSA as collaborative initiative:** Towards the Spatial Planning and Policy Portal of Choice – A grouping of key departments involved on spatial planning and policy including the NPC, SACN, Treasury and EDD requested the stepSA team to host a range of policy papers and relevant resource materials developed by a range of state agencies on the stepSA portal in preparation for the National Spatial Transformation Conference to take place in Johannesburg from 4-6 March 2014. As a result the portal now contains policy content, which hosts all relevant spatial policy initiatives of all relevant departments on the portal.
- **stepSA Policy series** – As part of an initiative to strengthen the link between science and public policy, the stepSA project team produced a series of policy dialogue session and related policy documents. The stepSA Policy Dialogue Series (a joint initiative between the DST, CSIR, HSRC and SALGA) aims to expose policy makers (key stakeholders from government departments and other state agencies) to a diverse set of perspectives on the implications of this evidence for policy and planning processes in South Africa.
- **stepSA e-library of Knowledge Products** – The team produced an interactive e-library of knowledge products for dissemination to key policymakers across the three spheres of

government and includes: A Booklet for Policy Makers and Practitioners, 7 Project Fact Sheets, 6 Policy Briefs and 7 Policy Notes.

- **The South African Planning Institute Seminar Series** – The Institute arranged a series of information sharing events during 2013 with the aim to promote planning as a discipline and the interests of the planning profession. The work related to stepSA was featured in these events which were held in the three provinces of KwaZulu Natal Limpopo and the Eastern Cape.
- **Special Edition of Town and Regional Planning Journal** – Four draft articles from the CSIR and two by the HSRC will appear in a special edition of the SA Town and Planning Journal to be published during 2014. The draft articles have been submitted and the peer review process will commence in April 2014. The theme of the Journal is Spatial Change Phenomena: Impacts and Implications for Planning in South Africa.
- **Other journal and book publications** – Two journal articles from HSRC, two chapters from HSRC’s flagship annual publication State of the Nation, two HSRC diagnostic reports to the NPC, several HSRC conference papers and three research reports have been posted on the portal, and are soon to be followed by the collaborative research report from stepSA/HSRC and the Financial and Fiscal Commission, as well as the collaborative chapter on the informal economy with the World Bank.
- **Utilising stepSA platform to support the dissemination of regional and spatial development studies and initiatives by Government, i.e. Department of Rural Development and Land Reform; Economic Development Department** – During 2013 it was decided to add content from research conducted by the CSIR to the site. The research features on pertinent and relevant findings that can also serve to inform national and regional planners. The first contribution came from the Department of Rural Development and Land Reform. The research reports from a project entitled “23 Priority district Analysis” was added to the site. Additional contributions are expected from the Department of Economic Development – the focus will be on an analysis of functional economic regions.
- **Engagements with government departments** – Further engagements were undertaken with other government departments in view of collaborating and contributing spatial information and analysis to the stepSA platform. The dual aim is to support the contributing department in view of geospatial information while also providing a mechanism to provide/disseminate information from this department. An agreement was reached with the Department of Public Works and their information will be geo-referenced, processed and added to the site in due course. Further engagements are planned with other departments to expand the collaboration.
- **Expanding the indicative migration data set based on IEC voter changes as proxy indicator for migration analysis** – During 2013 the IEC migration information dataset which was developed as part of the IPDM project was updated with the latest election data (2011) and additional analyses were carried out to determine national migration trends including age group analysis. The findings of this work entitled: “Using Election Registration Data as proxy for Measuring Population Migration in South Africa” was presented at an international cartographic conference in Dresden, Germany on 28 August 2013.

- **Effects of travel costs on access to the cities** - Empirical work with the impacts of current spatial planning initiatives, including wide-ranging research in partnership with University of Pretoria Centre for Transport Development into transport-oriented development (TOD) initiatives. The body of transport work under IPDM/stepSA from HSRC/ UP includes research into BRT delivery impacts on urban poverty and exclusion, and the effects of travel costs on access to the cities by excluded populations in South Africa's rural sector.
- **International Key Note Address** – The CSIR project leader was invited to deliver the key note address on the role of evidence based spatial information and modelling platforms in support of urban and regional planning and policy development in South Africa at the 14th international N-AERUS/GISDECO conference on Urban Futures, Multiple visions, paths and constructions, which took place from 12–14 September 2013 in Enschede, The Netherlands.
- **The stepSA web-based portal has emerged as a useful and accessible mechanism for disseminating spatial information (not data), and the results of advanced spatial analysis and modelling to a range of end-users in South Africa** – In the most recent phase of the stepSA National Initiative, huge strides were made in broadening the content of the portal. The portal now includes the results and findings of knowledge generation processes that fell within the ambit of the IPDM Project and stepSA Initiative, and also a wide ranging set of spatial evidence generated by other projects and initiatives by the CSIR as well as national departments such as the Department of Rural Development and Land Reform (DRDLR), the Economic Development Department (EDD) and other development agencies such as the South African Cities Network.
- **Redesign and content update of the stepSA web-based portal** – The stepSA web-based portal has emerged as a useful and accessible mechanism for disseminating spatial information (not data), and the results of advanced spatial analysis and modelling to a range of end-users in South Africa. The stepSA site has been overhauled during the last project quarter from January to March 2014. The new PLONE site structures have been implemented, the replacement of the map viewer with much more interactive functionality have been finalized, final testing and content updates based on the knowledge generated during the project has been done. In the most recent phase of the stepSA National Initiative, huge strides were made in broadening the content of the portal. The portal now includes the results and findings of knowledge generation processes that fell within the ambit of the IPDM Project and stepSA Initiative, and also a wide ranging set of spatial evidence generated by other projects and initiatives by the CSIR as well as national departments such as the Department of Rural Development and Land Reform (DRDLR), the Economic Development Department (EDD) and other development agencies such as the South African Cities Network.
- The stepSA initiative has not only employed an innovative collaboration approach to tool and technology development, but also clearly illustrate the importance of sector and theme specific data custodians, the SASDI process and interrelationships between various role players within the data-analyses/information-planning-monitoring/evaluation-policy review and science-practice continuums. Some indication of stepSA's role in relation to other key

role players and the critical need for collaboration are clearly illustrated in the diagram below.

- **Human capital development** – The initiative included a relative large human capability development component in the form of a structured internship as well as a studentship programme. The aim of the internship programme was to transfer knowledge and skills that will increase the employability of interns, accelerate their career progression and equip them to contribute to more effective integrated development planning process in South Africa by empowering them to contribute to public sector and other planning contexts with a view to strengthening evidence-based planning in South Africa. The purpose of the studentship programme was to support the capacity building of students, as well as the quality of graduate and post-graduate research conducted in the field of integrated development planning. A total of seventeen students were appointed on studentships to complete master degrees in planning.

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