

References

1. Aalders HJGL (2005). An introduction to spatial metadata standards in the world, in *World Spatial Metadata standards*, edited by Moellering H, Aalders HJGL and Crane A, Elsevier, Oxford, United Kingdom.
2. Acton D (2007). *Methods of charging for data in the NAD*, Hons project report, University of Pretoria, Pretoria, South Africa.
3. Arefin MA, Sadik MS, Coetzee S, Bishop JM (2006). Alchemi vs Globus: a performance comparison, *4th International Conference on Electrical and Computer Engineering*, December 19-21 2006, Dhaka, Bangladesh, pp602-605.
4. Aloisio G, Cafaro M, Conte D, Tiore S, Epicoco I, Marra GP, Quarta G (2005a). A Grid-Enabled Web Map Server, *International Conference on Information Technology: Coding and Computing (ITCC'05) - Volume I*, 2005, pp.298-303.
5. Aloisio G, Cafaro M, Fiore S, Wuarta G (2005b). A grid-based architecture for earth observation data access, *2005 ACM Symposium on Applied Computing*, March 13-17 2005, Santa Fe, New Mexico, USA.
6. Antonioletti M, Atkinson M, Baxter R, Borley A, *et al.* (2005). The design and implementation of Grid database services in OGSA-DAI, *Concurrency and Computation: Practice and Experience*, Vol. 17, Issue 2-4, pp.357-376.
7. Aydin G, Sayar A, Gadgil H, Aktas M, Fox GC, Ko S, Bulut H and Pierce ME (2008). Buliding and applying geographical information system Grids, *Concurrency and Computation: Practice and Experience*, **20**(14), pp 1653-1695.
8. Baker M, Apon A, Ferner C, Brown J (2005). Emerging grid standards, *IEEE Computer* April 2005, Vol. 38 No.4 pp.43-50.
9. Baranski B (2008). Grid Computing enabled WPS, paper accompanying the slides presented at the *GI Days* in Muenster, Germany, 16-18 June, 2008.
10. Belussi A, Brovelli MA, Negri M, Pelagatti G and Sanso F (2006). Dealing with multiple accuracy levels in spatial databases with continuous update, *Proceedings of Accuracy 2006 - 7th International Symposium on Spatial Accuracy Assesment in Natural Resources and Environmental Sciences*, Instituto Geografico Portugues, Lisboa, Portugal, pp 203-212.

11. Berman F, Fox G C, Hey A J G (ed.) (2003). *Grid Computing. Making the global infrastructure a reality*, John Wiley & Sons Ltd, Chichester, West Sussex PO19 8SQ, England.
12. Bernholdt D, Bharathi S, Brown D, *et al.* (2005). The Earth System Grid: Supporting the next generation climate modeling research, *Proceedings of the IEEE*, March 2005, **93**:5, pp485-495.
13. Bejar R, Latre A, Nogueras-Iso J, Muro-Medrano PR and Zaragoza-Soria FJ, (2008). An architectural style for spatial data infrastructures, *International Journal of Geographical Information Science*, 20 September 2008, available online ahead of print edition at <http://www.tandf.co.uk/journals/tf/13658816.html>, accessed 26 October 2008.
14. Buyya R and Nadiminti K (2006). Enterprise grid computing: State-of-the-art, *Enterprise Open Source Journal*, March/April 2006, pp19-22.
15. Brauner J and Schaeffer B (2008). Integration of GRASS functionality in web based SDI service chains, *Proceedings of the academic track of the 2008 Free and Open Source Software for Geospatial (FOSS4G) Conference, incorporating the GISSA 2008 Conference*, 29 September - 3 October 2008, Cape Town, South Africa.
16. Brovelli MA, Magni D, Brioschi M, Legnani M and Corcoglioniti (2008). NAMGIS – A context-aware mobile Web GIS, *Proceedings of the academic Track of the 2008 Free and Open Source Software for Geospatial (FOSS4G) Conference, incorporating the GISSA 2008 Conference*, 29 September - 3 October 2008, Cape Town, South Africa.
17. Bruin RP, White TOH, Walker AM, Austen KF, Dove MT, Tyer RP, Couch PA, Todorov IT and Blanchard MO (2008). Job submission to grid computing environments, *Concurrency and Computation: Practice and Experience*, **20**:1329-1340.
18. Carrera F and Ferreira J (2007). The Future of Spatial Data Infrastructures: Capacity-building for the Emergence of Municipal SDIs, *International Journal of Spatial Data Infrastructures Research (IJS DIR)*, 2007, Vol. 2, pp54-73.
19. Chervenak A, Foster I, Kesselman C, Salisbury C and Tuecke S (2000). The data grid: Towards an architecture for the distributed management and analysis of large scientific datasets, *Journal of Network and Computer Applications*, July 2000, **23**(3), pp187–200.
20. Chervenak A, Schuler R, Kesselman C, Koranda S, Moe B (2005). Wide Area Data Replication for Scientific Collaborations, *Grid Computing*, 2005, *6th IEEE/ACM International Workshop on Grid Computing*, 13-14 Nov. 2005, pp1-8.
21. Chu X, Lonie A, Harris P, Thomas SR, Buyya R (2008). A service-oriented Grid environment for integration of distributed kidney models and resources, *Concurrency and Computation: Practice and Experience*, **20**:1095-1111.

22. Coetzee S (2008). Address data exchange in South Africa, *Proceedings of the ISO Workshop on address standards: Considering the issues related to an international address standard*, 25 May 2008, Copenhagen, Denmark.
23. Coetzee S and Bishop J (1998). A new way to query GIS on the web, *IEEE Software*, May/June 1998, **15**(3), pp31-40.
24. Coetzee S and Bishop J (2008). Address databases for national SDI: Comparing the novel data grid approach to data harvesting and federated databases, *International Journal of Geographic Information Science*, 26 September 2008, available online ahead of print edition at <http://www.tandf.co.uk/journals/tf/13658816.html>, accessed 26 October 2008.
25. Coetzee S and Cooper AK (2007a). The value of addresses to the economy, society and governance – a South African perspective, *45th Annual URISA Conference*, 20-23 August 2007, Washington DC, USA.
26. Coetzee S and Cooper AK (2007b). What is an address in South Africa? *South African Journal of Science*, Nov/Dec 2007, **103**(11/12), pp449-458.
27. Coetzee S and Cooper AK (2008). Can the South African address standard (SANS 1883) work for small local municipalities? *Proceedings of the academic Track of the 2008 Free and Open Source Software for Geospatial (FOSS4G) Conference, incorporating the GISSA 2008 Conference*, 29 September - 3 October 2008, Cape Town, South Africa.
28. Coetzee S, Cooper AK, Lind M (ed.) (2008a). *Proceedings of the ISO Workshop on address standards – Considering the issues related to an international address standard*, 25 May 2008 Copenhagen, Denmark available online at http://www.isotc211.org/Address/Copenhagen_Address_Workshop/workshop.htm, accessed 19 June 2008.
29. Coetzee S, Cooper AK, Lind M, McCart Wells M, Yurman SW, Wells E, Griffiths N and Nicholson MJL (2008b). Towards an international address standard, *GSDI-10 Conference*, Trinidad and Tobago, 25 – 29 February 2008.
30. Colouris G, Dollimore J and Kindberg T (2005). *Distributed Systems – Concepts and Design*, Pearson Education, Essex, England, UK.
31. Cooper AK (1993). *Standards for exchanging digital geo-reference information*, MSc thesis, University of Pretoria, South Africa.
32. Cooper AK (2008). Overview of an address and purpose of the workshop, *Proceedings of the ISO Workshop on address standards: Considering the issues related to an international address standard*, 25 May 2008, Copenhagen, Denmark.

33. Cooper AK and Coetzee S (2008). The South African address standard and initiatives towards an international address standard, *Proceedings of the academic track of the 2008 Free and Open Source Software for Geospatial (FOSS4G) Conference, incorporating the GISSA 2008 Conference*, 29 September - 3 October 2008, Cape Town, South Africa.
34. Cohen J, Darlington J and Lee W (2008), Payment and negotiation for the next generation Grid and Web, *Concurrency and Computation: Practice and Experience*, 2008, **20**:239-251.
35. Coppola M, Jégou Y, Morin C, Prieto LP, Sánchez OD, Yang EY and Yu H (2008). Virtual organization support within a grid-wide operating system, *IEEE Internet Computing*, March/April 2008, vo.12, no. 2, pp20-28.
36. Craglia M, Goodchild MF, Annoni A, Camara G, Gould M, Kuhn W, Mark D, Masser I, Maguire D, Liang S and Parsons E (2008), Next-Generation Digital Earth, a position paper from the Vespucci Initiative for the advancement of Geographic Information Science, *International Journal of Spatial Data Infrastructures Research*, 2008, Volume 3, pp146-167.
37. Crompvoets J, Bregt A, Rajabifard A, Williamson I. (2004). Assessing the worldwide developments of national spatial data clearinghouses, *International Journal of Geographical Information Science*, October-November 2004, vol. 18, no. 7, pp665-689.
38. Davis CA Jr and Fonseca T (2007). Assessing the certainty of locations produced by an address geocoding system, *Geoinformatica*, **11**:103-129.
39. De Bree F, Eertink D, Laarakker P (2008). Assessing Quality of Collaboration in Netherlands SDI, *GSDI-10 Conference*, 25-29 February 2008, St Augustine, Trinidad.
40. Delic KA and Walker MA (2008), Emergence of the academic computing clouds, *ACM Ubiquity*, **9**(31), 5-11 August 2008, no page numbers available.
41. De Man WHE (2006). Understanding SDI; complexity and institutionalization, *International Journal of Geographical Information Science*, March 2006, vol. 20, no. 3, pp329-343.
42. De Man WHE (2007). Beyond Spatial Data Infrastructures there are no SDIs – so what, *International Journal of Spatial Data Infrastructures Research (IJSDIR)*, 2007, vol. 2, pp1-23.
43. De Rose CAF, Ferreto T, Calheiros RN, Cirne W, Costa LB and Fireman D (2008). Allocation strategies for utilization of space-shared resources in Bag of Tasks grids, *Future Generation Computer Systems*, May 2008, vol. 24, no. 5, pp331-341.
44. Di L, Chen A, Yang W, Zhao P (2003). The integration of Grid technology with OGC Web services (OWS) in NWGISS for NASA EOS Data, *GGF8 & HPDC12*, 24 – 27 June 2003, at Seattle, SE , USA .
45. Di L, Chen A, Yang W, Liu Y, Wei Y, Mehrotra P, Hu C, Williams D (2008). The development

- of a geospatial data Grid by integrating OGC web services with Globus-based Grid technology, *Concurrency and Computation: Practice and Experience*, September 2008, **20**(14), pp1617-1635.
46. Farvacque-Vitkovic C, Godin L, Leroux H, Chavez R and Verdet F (2005). *Street Addressing and the Management of Cities*, Washington DC, US: The World Bank.
 47. Finnigan JV and Blanchette J (2008). A Forward-Looking Software Reuse Strategy, *2008 IEEE Aerospace Conference*, 1-8 March 2008, pp1 – 9.
 48. Foster I (2002). What is the Grid? A three point checklist, *GRIDToday*, Vol. 1 No. 6, July 22 2002.
 49. Foster I (2003). The Grid: A new infrastructure for the 21st century science in *Grid Computing. Making the global infrastructure a reality*, by Berman F, Fox G C, Hey A J G (ed.), 2003, John Wiley & Sons Ltd, Chichester, West Sussex PO19 8SQ, England.
 50. Foster I and Kesselman C (1999). Preface in *The GRID: Blueprint for a New Computing Infrastructure*, edited by Ian Foster and Carl Kesselman, Morgan Kaufmann Publishers Inc., San Francisco, California, USA.
 51. Foster I and Kesselman C (2004). Concepts and Architecture, in *The GRID 2: Blueprint for a New Computing Infrastructure*, edited by Ian Foster and Carl Kesselman, Morgan Kaufmann Publishers Inc, San Francisco, California, USA.
 52. Foster I, Kesselman D, Nick JM and Tuecke S (2002). *The Physiology of the Grid: An Open Grid Services Architecture for Distributed Systems Integration*, available online at <http://forge.gridforum.org/sf/go/doc13483?nav=1>, accessed 8 November 2008.
 53. Foster I, Kesselman C and Tuecke S (2001). The Anatomy of the Grid – enabling scalable virtual organizations, *International Journal of High Performance Computing Applications*, 15(3), pp200-222.
 54. Foster I, Williams DN, Middleton D (2006). *Earth System Grid II - Turning Climate Datasets into Community Resources*, Final report for the period June 1, 2001 – July 31, 2006, available online at http://datagrid.ucar.edu/esg/about/docs/ESG_II_Final_Report.doc, accessed 8 November 2008.
 55. Georgiadou SK, Puri SK and Sahay S (2005). Towards a potential research agenda to guide the implementation of spatial data infrastructures – A case study from India, *International Journal of Geographical Information Science*, November 2005, Vol. 19, No. 10, pp.1113-1130.
 56. Ghimire D, Simonis I and Wytszisk A (2005). Integration of grid approaches into the geographic Web services domain, *FIG Working Week 2005 and GSDI-8*, Cairo, Egypt, April

16-21 2005.

57. Gomez-Iglesias A, Vega-Rodriguez MA, Castejon-Magana F, del Solar MR and Montes MC (2008). Grid Computing in Order to Implement a Three-Dimensional Magnetohydrodynamic Equilibrium Solver for Plasma Confinement, *16th Euromicro Conference on Parallel, Distributed and Network-Based Processing (PDP 2008)*, 13-15 February 2008, pp435 – 439.
58. Goodchild MF (2008). Spatial accuracy 2.0, in J.-X. Zhang and M.F. Goodchild, editors, *Spatial Uncertainty*, Proceedings of the Eighth International Symposium on Spatial Accuracy Assessment in Natural Resources and Environmental Sciences, Volume 1. Liverpool: World Academic Union, pp1–7
59. Goodchild MF and Hill L (2008). Introduction to digital gazetteer research, *International Journal of Geographic Information Science*, **22**(10), pp 1039-1044.
60. Goodchild MF, Johnston DM, Maguire DJ, Noronha VT (2005). Distributed and mobile computing, in *A research agenda for geographic information science*, edited by RB McMaster and EL Usery, CRC Press, Boca Raton, Florida, USA.
61. Granell C, Díaz L, Gould M (2007), Managing earth observation data with distributed geoprocessing services, *IEEE International Geoscience and Remote Sensing Symposium (IGARSS 2007)*, 23-28 July 2007, pp4777 – 4780.
62. Grimshaw D and Natrajan A (2005). Legion: Lessons Learned Building a Grid Operating System, *Proceedings of the IEEE*, March 2005, vol. 93, no. 3, pp589-603.
63. Harvey F. and Tulloch D (2006). Local-government data sharing: Evaluating the foundations of spatial data infrastructures, *International Journal of Geographical Information Science*, August 2006, **20**(7), pp743-768.
64. Hayes B (2008). Cloud computing, *Communications of the ACM*, July 2008, **51**(7), pp9-11
65. Hong S-K (2008). Ubiquitous geographic information (UBGI) and address standards, *Proceedings of the ISO Workshop on address standards – Considering the issues related to an international address standard*, 25 May 2008, Copenhagen, Denmark.
66. Hua L, De-ren L, Xin-yan Z (2005). Large volume spatial data management based on grid computing, *Proceedings of the 2005 IEEE International Geoscience and Remote Sensing Symposium (IGARSS '05)*, 25-29 July 2005.
67. Iglesias CA (2008). SDI in Chile – National System of Coordination of Territorial Information (SNIT) – State of the art and projections, *GSDI-10 Conference*, Trinidad and Tobago, 25 – 29 February 2008.
68. Jacoby S, Smith J, Ting L, and Williamson I (2002). Developing a common spatial data

- infrastructure between state and local government—an Australian case study, *International Journal of Geographical Information Science*, June 2002, Vol. 6 No 4, pp. 305-322.
69. Jang S-G and Kim TJ (2006). Modeling an interoperable multimodal travel guide system using the ISO 19110 series of international standards, *Proceedings of the ACM GIS 2006 Conference*, 10-11 November 2006, Arlington, Virginia, USA.
 70. Jin-Hsiang S and Chung-Chi C (2008). The Development of Taiwan Geospatial One-Stop Portal, *GSDI-10 Conference*, Trinidad and Tobago, 25 – 29 February 2008.
 71. Lanig A and Zipf A (2008). Requirements for efficient mining and processing of massive terrain data in Grid infrastructures, *Geophysical Research Abstracts*, EGU General Assembly 2008, Vol. 10.
 72. Lawton G (2008). Moving the OS to the Web, *IEEE Computer*, March 2008, vol. 41, no. 3, pp. 16-19.
 73. Liang Z, Tang X and Lan W (2007). ‘Digital China’ Geo-spatial framework construction: situation, problems and suggestions, *International Conference on Wireless Communications, Networking and Mobile Computing*, 21-25 September 2007, pp4995 – 4998.
 74. Li H and Buyya R (2007). Model-Driven Simulation of Grid Scheduling Strategies. *Proceedings of the IEEE International Conference on e-Science and Grid Computing*, Bangalore India, 10-13 Dec. 2007, pp287-294.
 75. Masser I, Rajabifard A, Williamson I (2007). Spatially enabling governments through SDI implementation, *International Journal of Geographic Information Science*, January 2008, vol. 22, no.1, pp 5-20.
 76. Matheri M. (2005). Challenges facing the creation of a standard South African address system, *FIG Working Week and 8th Global Spatial Data Infrastructure Conference (GSDI-8)*, 16-21 April 2005, Cairo, Egypt.
 77. McDougall K, Rajabifard A and Williamson I (2005). What will motivate local governments to share spatial information?, *SSC 2005 Spatial Intelligence, Innovation and Praxis: The national biennial Conference of the Spatial Sciences Institute*, September 2005, Melbourne, Australia.
 78. Molina M and Bayarri S (2008). The Andean Information System for Disaster Prevention and Relief: a case study of multi-national open-source SDI, *Proceedings of the academic track of the 2008 Free and Open Source Software for Geospatial (FOSS4G) Conference, incorporating the GISSA 2008 Conference*, 29 September - 3 October 2008, Cape Town, South Africa.
 79. Morad M (2002). British standard 7666 as a framework for geocoding land and property information the UK, *Computers, Environment and Urban Systems*, September 2002, vol. 26

no.5, pp483-492.

80. Morad S and Kuflik T (2005). Conventional and open source software reuse at Orbotech - an industrial experience, *Proceedings of the IEEE International Conference on Software - Science, Technology and Engineering*, 22-23 February 2005, pp110 – 117.
81. Olivier MS (1999). *Information Technology Research. A Practical Guide*, MS Olivier, 1999.
82. Onsrud H, Poore B, Rugg R, Taupier R, Wiggins L (2005). The future of the spatial information infrastructure, in *A research agenda for geographic information science*, edited by RB McMaster and EL Userly, CRC Press, Boca Raton, Florida, USA.
83. Peng Z-R and Tsou M-H (2003). *Internet GIS – Distributed geographic information services for the Internet and wireless networks*, John Wiley & Sons, Hoboken, New Jersey, USA.
84. Plaszczyk P and Wellner R Jr (2006). *Grid Computing – The Savvy Manager’s Guide*, Morgan Kaufmann Publishers Inc, San Francisco, California, USA.
85. Rabl T, Pfeffer M and Kosch H (2008). Dynamic allocation in a self-scaling cluster database, *Concurrency and Computation - Practice and Experience*, **20**(17), pp2025-2038.
86. Rahed AA, Coetzee S and Rademeyer M (2008). A data model for efficient address data representation - Lessons learnt from the Intiempo address matching tool, *Proceedings of the academic track of the 2008 Free and Open Source Software for Geospatial (FOSS4G) Conference, incorporating the GISSA 2008 Conference*, 29 September - 3 October 2008, Cape Town, South Africa.
87. Rajabifard A, Feeney MF, Williamson I and Masser I (2003), *National spatial data infrastructures*. In *Developing Spatial Data Infrastructures: from Concept to Reality*, I Williamson, A Rajabifard and M-E.F. Feeney (Eds), pp. 95–109, Taylor & Francis, London, UK.
88. Rajabifard A (2008). Re-engineering SDI design to support spatially enabled society, *INSPIRE Conference*, 23 June 2008, Maribor, Slovenia.
89. Rajabifard A, Binns A and Williamson I (2005). Creating an enabling platform for the delivery of spatial information. *Proceedings of SSC 2005 Spatial Intelligence, Innovation and Praxis: The national biennial Conference of the Spatial Sciences Institute*, Melbourne, Australia, September 2005, Melbourne: Spatial Sciences Institute, ISBN 0-9581366-2-9.
90. Rajabifard A, Binns A, Masser I and Williamson I (2006). The role of sub-national government and the private sector in future spatial data infrastructures, *International Journal of Geographical Information Science*, August 2006, Vol.20, No.7, pp.727-741.
91. Ripeanu M, Singh MP, Vazhkudai SS (2008), Virtual Organizations, *IEEE Internet Computing*,

March/April 2008, **12**(2), pp10-12.

92. Schaeffer B and Baranski B (2008). Orchestrating grid computing enabled web processing services, *2008 Geoinformatics Conference*, Potsdam, Germany, 11-13 June 2008, abstract available online at http://gsa.confex.com/gsa/2008GE/finalprogram/abstract_142272.htm, accessed 8 September 2008.
93. Sheth AP and Larson JA (1990). Federated database systems for managing distributed, heterogeneous, and autonomous databases, *ACM Computing Surveys*, September 1990, **22**(3), pp183-236.
94. Shu Y, Zhang JF, Zhou X (2006). A Grid-Enabled Architecture for Geospatial Data Sharing, *IEEE Asia-Pacific Conference on Services Computing (APSCC '06)*, December 2006, pp369 – 375.
95. Singh G, Bharathi, Chervenak A, Deelman E, Kesselman C, Manohar M, Patil S and Pearlman L (2003). A Metadata Catalog Service for Data Intensive Applications, *Proceedings of the 2003 ACM/IEEE conference on Supercomputing (SC '03)*, November 2003.
96. Talia D (2002). The Open Grid Services Architecture: Where the Grid Meets the Web, *IEEE Internet Computing*, November/December 2002, **6**(6), pp 67-71.
97. Tracz W (1994). Software reuse myths revisited, *Software Engineering*, 1994. *Proceedings of the 16th International Conference on Software Engineering (ICSE-16)*, 16-21 May 1994, pp271 – 272.
98. Tuladhar A, Radwan M, Kader F and El-Ruby S (2005). Federated data model to improve accessibility of distributed cadastral databases in land administration, *Proceedings of 8th Global Spatial Data Infrastructure Conference (GSDI-8)*, 16-21 April 2005, Cairo, Egypt.
99. Valentin A and Cabello M (2008). SDI's and Knowledge, *GSDI-10 Conference*, Trinidad and Tobago, 25 – 29 February 2008.
100. Venugopal S, Buyya R and Ramamohanarao K (2006). A taxonomy of data grids for distributed data sharing, management and processing, *ACM Computing Surveys*, March 2006, Vol. 38, Article 3, pp.1-53.
101. Volckaert B, Wauters T, De Leenheer M, Thysebaert P, De Turck F, Dhoedt B and Demeester P (2008), Gridification of collaborative audiovisual organizations through the MediaGrid framework, *Future Generation Computer Systems*, vol. 24, no. 5, pp371-389.
102. Wang Y, GE L, Rizos C, & Babu R (2004). Spatial data sharing on grid, *Geomatics Research Australasia*, 81, 3-18.
103. Wei X, Yue P, Dadi U, Min M, Hu C, Di L (2006). Effective Acquisition of Geospatial Data

- Products in a Collaborative Grid Environment, *IEEE International Conference on Services Computing*, SCC '06, Sept. 2006, pp455-462.
104. Weiss A (2007). Computing in the clouds, *netWorker*, December 2007, **11**(4), pp16-25.
105. Wells M, Anderson C, Perkins H, Wells E & Yurman S (2008). Developing a Comprehensive Standard for US Address Data, *Proceedings of the ISO Workshop on address standards: Considering the issues related to an international address standard*, 25 May 2008, Copenhagen, Denmark.
106. Williamson I, Grant D and Rajabifard A (2005). Land administration and spatial data infrastructures, *Proceedings of 8th Global Spatial Data Infrastructure Conference (GSDI-8)*, 16-21 April 2005, Cairo, Egypt.
107. Williamson I, Rajabifard A and Binns A (2006). Challenges and issues for SDI development, *International Journal of Spatial Data Infrastructures Research (IJSDIR)*, 2006, vol. 1, pp24-35.
108. Wladawsky-Berger I (1998). "The Industrial Imperative" in *The GRID Blueprint for a new computing infrastructure*, pp25-34, Morgan Kaufmann Publishers Inc., San Francisco, California, USA.
109. Wytzisk A, Von Dömming A, Voges U (2008). Technical Architecture and Implementation Plan for GDI-DE, *GSDI-10 Conference*, Trinidad and Tobago, 25 – 29 February 2008.
110. Xue Y, Wan W, Li Y, Guang J, Bai L, Wang Y, and Ai J (2008). Quantitative retrieval of geophysical parameters using satellite data, *IEEE Computer*, April 2008, **41**(4), pp33-39.
111. Yildirim V AND Yomralioglu T (2004). An address-based geospatial application. *FIG Working Week*, 22-27 May 2004, Athens, Greece.
112. Zaslavsky I, He H, Tran J, Martone M E, Gupta A (2004). Integrating brain data spatially: spatial data infrastructure and atlas environment for online federation and analysis of brain images, *Proceedings on the 15th International Workshop on Database and Expert Systems Applications*, 30 August – 3 September 2004, pp389-393.
113. Zhao P, Chen A, Liu Y, Di L, Yang Q, Li P (2004). Grid Metadata Catalog Service-Based OGC Web Registry Service, *GIS'04*, November 12–13, 2004, Washington D. C., USA.
114. Zhao P, Yu G and Di L (2007). Geospatial Web services, in *Emerging spatial information systems and applications*, edited by Brian H. Hilton, Idea Group Publishing, Hershey, PA, USA.

Referenced Standards

1. *Draft Street Address Standard* (2005), US Address Standard Working Group, United States Federal Geographic Data Committee, US.
2. AS/NZS:4819:2003 (2003). *Geographic information – rural and urban addressing*, jointly published by Standards Australia, Sydney, Australia, and Standards New Zealand, Wellington, New Zealand.
3. BS 7666-0:2006 (2006). *Spatial datasets for geographical referencing - Part 0: General model for gazetteers and spatial referencing*, British Standards Institute (BSI), London, UK.
4. ISO 11180:1993 (1993). *Postal addressing* (withdrawn), International Organization for Standardization (ISO), Geneva, Switzerland.
5. ISO 15836:2003 (2003). *Information and documentation - The Dublin Core metadata element set*, International Organization for Standardization (ISO), Geneva, Switzerland.
6. ISO 19101:2002 (2002). *Geographic information – Reference model*, International Organization for Standardization (ISO), Geneva, Switzerland.
7. ISO 19111:2007 (2007). *Geographic information – Spatial referencing by coordinates*, International Organization for Standardization (ISO), Geneva, Switzerland.
8. ISO 19112:2003 (2003). *Geographic information – Spatial referencing by geographic identifiers*, International Organization for Standardization (ISO), Geneva, Switzerland.
9. ISO 19115:2003 (2003). *Geographic information - Metadata*, International Organization for Standardization (ISO), Geneva, Switzerland.
10. ISO 19116:2004 (2004). *Geographic information - Positioning services*, International Organization for Standardization (ISO), Geneva, Switzerland.
11. ISO 19117:2005 (2005). *Geographic information - Portrayal*, International Organization for Standardization (ISO), Geneva, Switzerland.
12. ISO 19119: 2005 (2005). *Geographic information –Services*, International Organization for Standardization (ISO), Geneva, Switzerland.
13. ISO 19136:2007 (2007). *Geographic information – Geography Markup Language (GML)*, International Organization for Standardization (ISO), Geneva, Switzerland.
14. ISO 19142 (draft) (2008). *Geographic information – Web Feature Service*, International

Organization for Standardization (ISO), Geneva, Switzerland.

15. ISO 21127:2006 (2006). *Information and documentation - A reference ontology for the interchange of cultural heritage information*, International Organization for Standardization (ISO), Geneva, Switzerland.
16. ISO 3166-1:2006 (2006). *Codes for the representation of names of countries and their subdivisions – Part 1: Country codes*, International Organization for Standardization (ISO), Geneva, Switzerland.
17. ISO/IEC 10746:1998 (1998), *Information technology - Open Distributed Processing - Reference Model*, International Organization for Standardization (ISO), Geneva, Switzerland.
18. ISO/IEC 18026:2006 (2006), *Information technology – Spatial Reference Model (SRM)*, International Organization for Standardization (ISO), Geneva, Switzerland.
19. ISO/IEC 7498 (1994), *Information technology - Open Systems Interconnection – Basic Reference Model*, International Organization for Standardization (ISO), Geneva, Switzerland.
20. OASIS Customer Information Quality (CIQ) TC (2007). *OASIS CIQ V3.0 Committee DRAFT Specifications*, available online at http://www.oasis-open.org/committees/tc_home.php?wg_abbrev=ciq#download, accessed 8 November 2008.
21. Open Geospatial Consortium (2005). *Abstract Specifications*, available online at <http://www.opengeospatial.org/standards/as>, accessed 28 March 2008.
22. Open Geospatial Consortium (2007). *OpenGIS Catalogue Service Implementation Specification 2.0.2*, available online at <http://www.opengeospatial.org/standards/cat>, accessed 10 November 2008.
23. Open Geospatial Consortium (2003). *OGC Reference Model*, available online at <http://www.opengeospatial.org/standards>, accessed 17 April 2008.
24. Open Geospatial Consortium (2005). *OpenGIS Web Feature Service Implementation Specification 1.1.0*, available online at <http://www.opengeospatial.org/standards/wfs>, accessed 28 March 2008.
25. Open Geospatial Consortium (2003). *OpenGIS Web Map Service Implementation Specification 1.3.0*, available online at <http://www.opengeospatial.org/standards/wms>, accessed 28 March 2008.
26. Open Geospatial Consortium (2007). *OpenGIS Web Processing Service Implementation Specification 1.0.0*, available online at <http://www.opengeospatial.org/standards/wps>, accessed 28 March 2008.

27. SANS/WD 1883-1 (2008). *Geographic information – Address Standard, Part 1: Data format of addresses (committee draft)*, Standards South Africa, Pretoria.
28. SANS/WD 1883-2 (2008). *Geographic information – Address Standard, Part 2: Guidelines for addresses in databases, data transfer, exchange and interoperability (committee draft)*, Standards South Africa, Pretoria.
29. SANS/WD 1883-3 (2008). *Geographic information – Address Standard, Part 3: Guidelines for address allocation and updates (committee draft)*, Standards South Africa, Pretoria.
30. UPU S42 (2006). *S42: International postal address components and templates*, Universal Postal Union (UPU), Berne, Switzerland.

Other references

Below is a list of other documents, including but not limited to reports, acts, directives, projects and websites, that are referenced in this dissertation.

1. *52°North web site*, available online at <http://52north.org/>, accessed 9 September 2008.
2. AfriGIS (2008). *Data Release Notes*, AfriGIS, 30 August 2008.
3. AfriGIS Website, available online at www.afrigis.co.za, accessed 4 November 2008.
4. Amazon (2008). *Announcing Elastic IP Addresses and Availability Zones for Amazon EC2, Amazon Web Services - What's new?*, available online at <http://aws.amazon.com/about-aws/whats-new/>, accessed 4 November 2008.
5. Brady M, Gavaghan D, Harris S, Jirotko M, Knox A, Lloyd S (2005). *E-DiaMoND: The Blueprint Document*, available online on the eDiaMoND grid computing project website at <http://www.ediamond.ox.ac.uk/publications/blueprint-Final.pdf>, accessed 8 November 2008.
6. Cambridge University Press (2007). *Online edition of the Cambridge Advanced Learner's Dictionary*, available online at <http://dictionary.cambridge.org/define.asp?key=982&dict=CALD>, accessed 8 November 2008.
7. Chief Directorate: Surveys and Mapping website (2004), *WGS84* page, available online at <http://w3sli.wcape.gov.za/SURVEYS/MAPPING/wgs84.htm>, accessed 3 November 2008.
8. *Constitution of the Republic of South Africa* (1996). Available online at <http://www.polity.org.za/polity/govdocs/constitution/index.html>, accessed 19 March 2008.
9. *Dictionary.com* (2008). Published by Lexico Publishing Group, LLC, available online at <http://dictionary.reference.com/>, accessed 5 November 2008.
10. *Directive 2007/2/EC of the European Parliament and of the Council of 14 March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE)* [2007] OJ L 108/1, available online at http://inspire.jrc.it/directive/l_10820070425en00010014.pdf, accessed 28 March 2008.
11. *Dublin Core Metadata Initiative Website*, The Dublin Core Metadata Initiative, available online at www.dublincore.org, accessed 10 November 2008.
12. Fahey D and Finch F (2006). *GeoDirectory Technical Guide*. An Post GeoDirectory Limited, available online at <http://www.geodirectory.ie/Downloads.aspx>, accessed 19 March 2008.

13. *Financial Intelligence Centre Act of South Africa* (2001). Available online at <http://www.acts.co.za/fica/index.htm>, accessed 19 March 2008.
14. *Geodateninfrastruktur-Grid (GDI-Grid) project*, available online at <http://www.d-grid.de/index.php?id=398&L=1>, accessed 28 March 2008.
15. *GeoDirectory Website*. An Post GeoDirectory Limited, available online at <http://www.geodirectory.ie>, accessed 19 March 2008.
16. *Geosciences Network (GEON) portal*, available online at www.geongrid.org, accessed 30 January 2008.
17. Geosciences Network (GEON) project (2005). *GEON – Cyberinfrastructure for the Geosciences: 2005 Annual Report*, available online at http://www.geongrid.org/communications/annual_reports/Annual_Report_2005_Final_NSF.pdf, accessed 30 January 2008.
18. Google (2008). *Google Site Search Taps Power of the Cloud to Improve Search for Business Websites*, Press Release available online at http://www.google.com/intl/en/press/pressrel/20080603_site_search.html, accessed 4 November 2008.
19. Haas H and Brown A (Ed.) (2004), *Web Services Glossary*. W3C Working Group Note 11 February 2004, available online at <http://www.w3.org/TR/ws-gloss/>, accessed 21 October 2008.
20. *Knowledge Factory Website*, available online at <http://www.knowledgefactory.co.za>, accessed 3 November 2008.
21. IBM 2008, *IBM Launches Cloud Services Initiative*, Press Release available online at <http://www-03.ibm.com/press/us/en/pressrelease/25341.wss>, accessed 4 November 2008.
22. *International Organization for Standardization (ISO) Press Release* (2008), available online at <http://www.iso.org/iso/pressrelease.htm?refid=Ref1110>, accessed 28 March 2008.
23. *International Organization for Standardization Technical Committee 211 (ISO/TC 211) Website*, available online at www.isotc211.org, accessed on 28 March 2008.
24. International Organization for Standardization Technical Committee 211 (ISO/TC 211) (2003). *Terms of Reference Joint Advisory Group between ISO/TC 211 and OGC*, Document no. 1513, available online at <http://www.isotc211.org/protdoc/211n1531/>, accessed 8 November 2008.
25. *Laser Interferometer Gravitational Wave Observatory (LIGO) website*, available online at <http://www.ligo.caltech.edu/>, accessed 8 November 2008.
26. Levoleger K and Corbin C (Ed.) (2005). *Survey of European National Addressing as of May*

- 2005, European Umbrella Organisation for Geographic Information (EUROGI), available online at http://euorg.vbnprep.com/POOLED/DOCUMENTS/a101730/EUROGI_Address_Survey_Resp_V3Final.pdf, accessed 28 March 2008.
27. Lind M (2004). Reliable address data: Developing a common address reference system, in Section 6: Reference Data of *A Compendium of SDI Best Practice* edited by C Corbin, available online at <http://www.ec-gis.org/ginie/documents.html>, accessed 8 November 2008.
 28. Lind M and Nicholson MJL (2004). A database of reference for national addressing. Denmark and England and Wales compares, in Section 6: Reference Data of *A Compendium of SDI Best Practice* edited by C Corbin, available online at <http://www.ec-gis.org/ginie/documents.html>, accessed 8 November 2009.
 29. Mathur A (2008). Email, 27 October 2008.
 30. Microsoft (2008). *Microsoft Unveils Windows Azure at Professional Developers Conference*, Press Release available online at <http://www.microsoft.com/presspass/press/2008/oct08/10-27PDCDay1PR.mspx>, accessed 4 November 2008.
 31. National Survey and Cadastre and Danish Agency for Enterprise and Construction (2005). *Offentlige adresse-webservices* (en: Joint Address Web Services), available online at http://www.adresse-info.dk/Portals/2/Dok/Adresse-webservices_Business_case_undersoegelse.pdf, accessed 8 November 2008.
 32. OASIS (2008). *OASIS SOA Reference Model (SOA-RM) FAQ*, available online at <http://www.oasis-open.org/committees/soa-rm/faq.php>, accessed 5 November 2008.
 33. OGF Transaction Management Research Group, (2005). *Proposed Grid Transactions RG – Charter*, Open Grid Forum, available online at <http://www.ogf.org/tm-rg-charter.html>, accessed September 2006.
 34. *OGSA-DAI Website*. University of Edinburgh, available online at <http://www.ogsadai.org.uk/>, accessed 19 March 2008.
 35. Open Geospatial Consortium (OGC) (2008a). *OGC® and OASIS Announce Progress on Standards Cooperation*, Press Release available online at <http://www.opengeospatial.org/pressroom/pressreleases/849>, accessed 28 March 2008.
 36. Open Geospatial Consortium (OGC) (2008b). *Summary of the OGC Web Services, Phase 5 (OWS-5) Interoperability Testbed*, Editors: J Cook and R Singh, document reference number: OGC-08-073r2 Version 0.9.0, OGC, 22 July 2008, available online at http://portal.opengeospatial.org/files/?artifact_id=27995, accessed 3 November 2008.
 37. Open Geospatial Consortium (OGC) (2008), *OGC Newsletter*, July 2008, available online at

- <http://www.opengeospatial.org/pressroom/newsletters/200807>, accessed 4 November 2008.
38. *Open Geospatial Consortium (OGC) Website*, available online at www.opengeospatial.org, accessed 28 March 2008.
 39. *Open Grid Forum (OGF) Website*, available online at www.opengridforum.org, accessed 10 September 2008.
 40. Open Grid Forum (OGF) (2008a). *Defining the Grid: A Roadmap for OGSA Standards, Version 1.1*, Editors: C. Jordan and H. Kishimoto, available online at <http://www.ogf.org/gf/docs/?final>, accessed 2 April 2008.
 41. Open Grid Forum (OGF) (2008b). *OGC-OGF Collaboration Workshop Report*, OGF-22, 26 February 2008, available online at www.ogf.org/OGF22/materials/1075/OGC-OGF-Workshop-Report_OGF-22.doc, accessed 4 November 2008.
 42. Open Grid Forum (OGF) (2007a). *OGSA Data Architecture*, Editors: D Berry, A Luniewski, M Antonioletti, available online at <http://www.ogf.org/gf/docs/?final>, accessed 2 April 2008.
 43. Open Grid Forum (OGF) (2007b). *OGSA Data Architecture Scenarios, Version 0.16*, Editors: S Davey, A Anjomshoaa, M Antonioletti, M Atkinson, D Berry, A Chervenak *et al.* available online at <http://www.ogf.org/gf/docs/?final>, accessed 2 April 2008.
 44. Open Grid Forum (OGF) (2007c). *Open Grid Services Architecture Glossary of Terms Version 1.6*, Editor: J. Treadwell, available online at <http://www.ogf.org/gf/docs/?final>, accessed 2 April 2008.
 45. Open Grid Forum (OGF) (2006). *The Open Grid Services Architecture, Version 1.5*, Editors: I. Foster, H. Kishimoto and A. Savva, available online at <http://www.ogf.org/gf/docs/?final>, accessed 2 April 2008.
 46. Oxford University Press (2007a). *Online edition of the Compact Oxford English Dictionary*, available online at http://www.askoxford.com/concise_oed/address?view=uk, accessed 18 November 2007.
 47. Oxford University Press (2007b). *Online edition of the Oxford English Dictionary*, available online at http://dictionary.oed.com/cgi/entry/50002492?query_type=word&queryword=address&first=1&max_to_show=10&sort_type=alpha&search_id=qwq2-eYh0se-10712&result_place=1, accessed 8 November 2008.
 48. Paull D (2003). *A Geocoded National Address File for Australia: The G-NAF What, Why, Who and When*. PSMA Australia Limited, available online at <http://www.pasma.com.au/resources/the-g-naf-what-why-who-and-when>, accessed 19 March 2008.

49. *Public Sector Mapping Agencies (PSMA) Australia Website*, available online at www.pdma.com.au, accessed 19 March 2008.
50. Rase D, Björnsson A, Probert M, Haupt M (Ed.) (2002). *INSPIRE Reference Data and Metadata Position Paper*. INSPIRE Reference Data and Metadata working group, available online at http://www.ec-gis.org/inspire/reports/position_papers/inspire_rdm_pp_v4_3_en.pdf, accessed 19 March 2008.
51. *RM-ODP: The Reference Model for Open Distributed Processing*, The RM-ODP Resources Site of ISO, IEC and ITU, available online at <http://www.rm-odp.net/>, last accessed 4 April 2008.
52. *Spatial Data Infrastructure Act of South Africa* (2003). Available online at http://lnw.creamermedia.co.za/articles/attachments/01109_spatdatinfraa54.pdf, accessed 19 March 2008.
53. *US Executive Order 12906* (1994). Published 13 April, 1994, edition of the Federal Register, Volume 59, Number 71, pp. 17671-17674.

Appendix A. Acronyms and abbreviations

Table 39. List of abbreviations used in this dissertation

ANZLIC	Spatial Information Council of Australia and New Zealand
ArcIMS	Arc Internet Map Server, a web map server product by the ESRI company
ArcView	Entry level GIS desktop software by the ESRI company
BIRN	Biomedical information research network
BCU	eDiaMoND breast care centers
CAD	Computer aided design
CEN	European Committee for Standardization
DBMS	Database management system
DOE	US Department of Energy
EBF	Extended Backus Naur Form
ERC	Emergency Response Center
ESG	Earth System Grid
ESRI	Environmental Systems Research Institute
FGDC	Federal geographic data committee
GEON	Geoscience network
GIS	Geographic information system
GISc	Geographic Information Science
GML	Geography markup language
G-NAF	Geocoded national address file of Australia
GPS	Global positioning system
GridFTP	An extension of the standard file transfer protocol (FTP) for use with grid

	computing
GUI	Graphical user interface
HTTP	Hypertext transfer protocol
IEC	International Electro-technical Commission
IEEE	Institute of Electrical and Electronics Engineers
IETF	Internet Engineering Task Force
INSPIRE	IN frastructure for SP atial InfoR mation in the EU ropean Community
ISO	International Organization for Standardization
ISO/TC 211	ISO Technical Committee 211, Geographic information/Geomatics
ISP	Internet Service Provider
ITU-T	International Telecommunication Union's Telecommunication Standardization
JDBC	Java database connectivity
LIGO	Laser Interferometer Gravitational Wave Observatory
LIDAR	Light Detection and Ranging
MoU	Memorandum of Understanding
NASA	National Aeronautics and Space Administration
NLPG	National Land and Property Gazetteer
PSMA	Public Sector Mapping Agencies
RM-ODP	ISO Reference Model for Open Distributed Processing
SABS	South African Bureau of Standards
SAPO	South Africa Post Office
SDI	Spatial data infrastructure
SHP	ESRI Shapefile, or simply a shapefile, a popular geospatial vector data format for geographic information systems software
OASIS	Organization for the Advancement of Structured Information Standards
ODBC	Open database connectivity
OGC	Open Geospatial Consortium

OGF	Open Grid Forum
OGSA	Open Grid Services Architecture
OGSA-DAI	OGSA Data access and integration
OGSA-DQP	OGSA-DAI distributed query processing
OGSA-GDS	OGSA-DAI grid data services
PKI	Public key infrastructure
PoP	Point of presence
RAID	Redundant array of indexed drives, or Redundant array of independent disks
SAPO	South African Post Office
SOA	Service-oriented architecture
SOAP	A protocol for exchanging XML-based messages over computer networks which once stood for simple object access protocol but this acronym was dropped with Version 1.2 of the standard, as it was considered to be misleading
TCP/IP	Transmission Control Protocol and Internet Protocol, the set of communications protocols that implement the protocol stack on which the Internet and most commercial networks run
THRIP	Technology and human resources for industry project
UDDI	Universal description discovery and integration
UK	United Kingdom
UML	Unified modeling language
UPU	Universal Postal Union
USA	United States of America
VO	Virtual organization
W3C	World Wide Web Consortium
WS	Web services
WCS	Web Catalogue Service
WFS	Web Feature Service
WGS84	World Geodetic System ellipsoid for 1984



WMS	Web Map Service
WPS	Web Processing Service
WSDL	Web services description language
WSRF	Web services resource framework
XML	Extensible Markup Language

Appendix B. Compartimos data

B.1 Data model: Address data

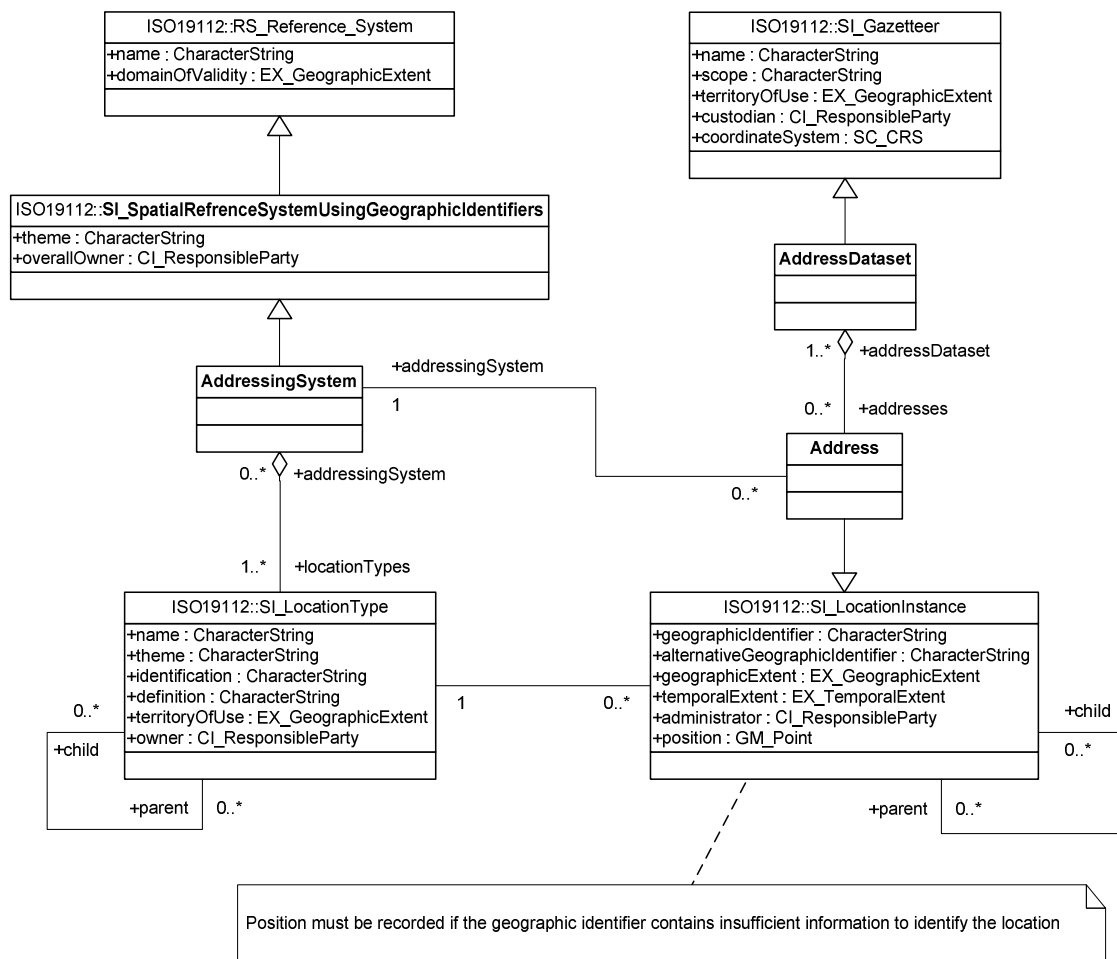


Figure 54. Data model for address data in Compartimos (adapted from ISO 19112:2003)

B.2 Data model: Address data catalogue

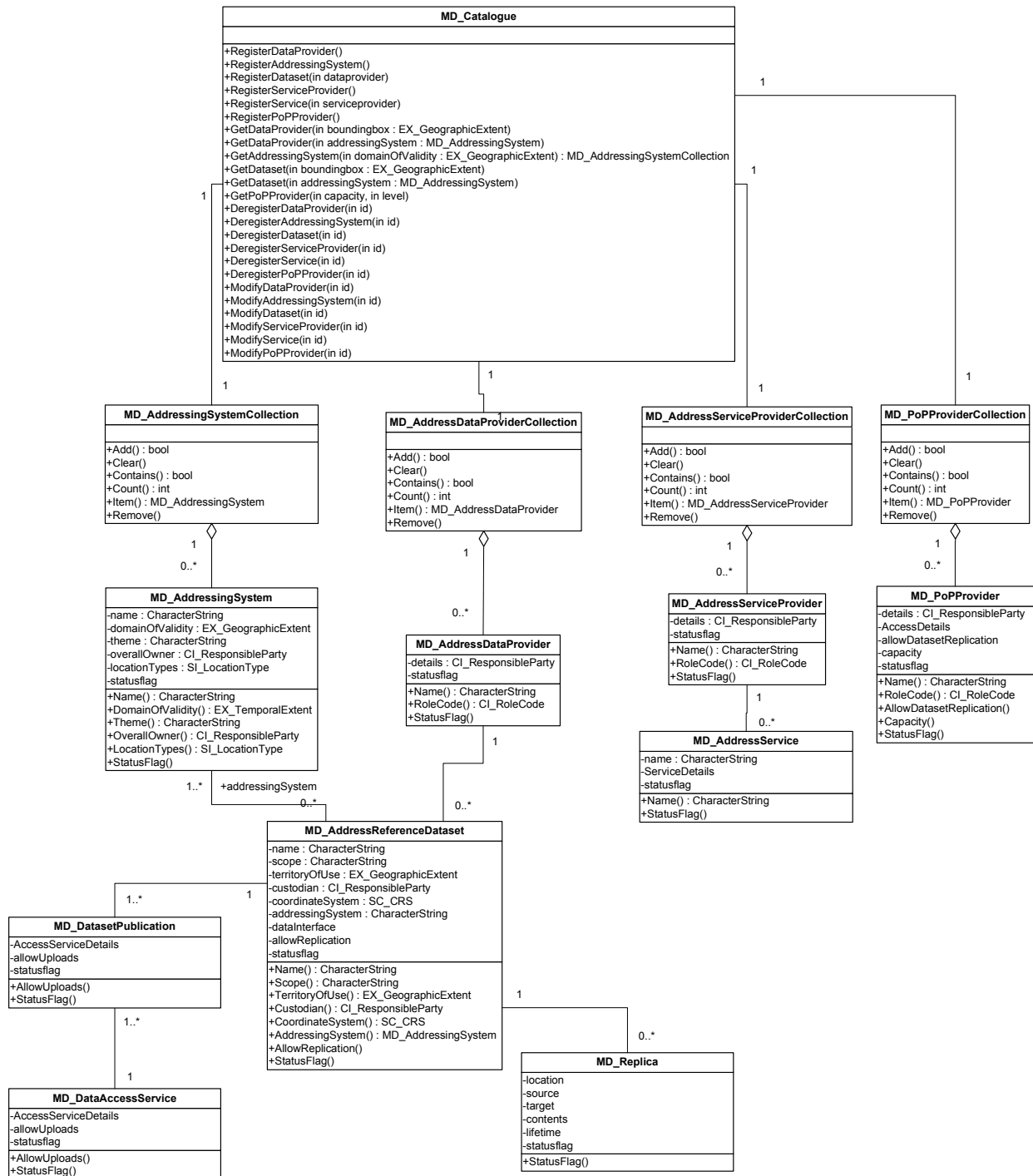
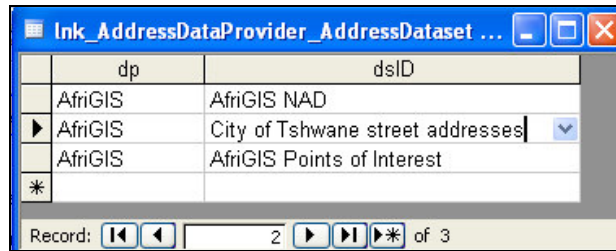


Figure 55. Data model: Address data catalogue

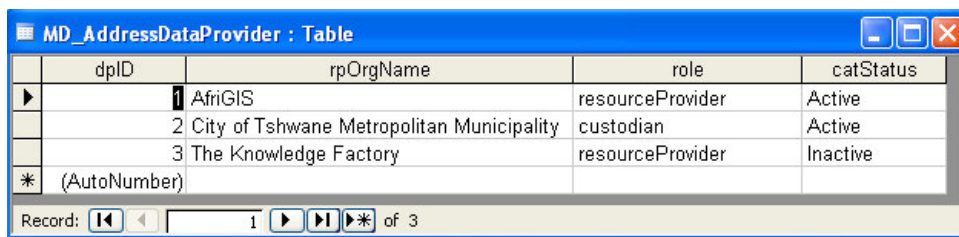
B.3 Sample data: Address data catalogue



dp	dsID
AfriGIS	AfriGIS NAD
AfriGIS	City of Tshwane street addresses
AfriGIS	AfriGIS Points of Interest

Record: 2 of 3

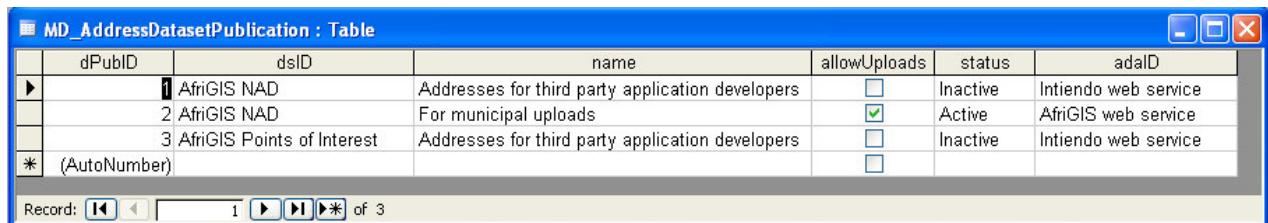
Figure 56. MD_AddressReferenceDataset



dpID	rpOrgName	role	catStatus
1	AfriGIS	resourceProvider	Active
2	City of Tshwane Metropolitan Municipality	custodian	Active
3	The Knowledge Factory	resourceProvider	Inactive

Record: 1 of 3

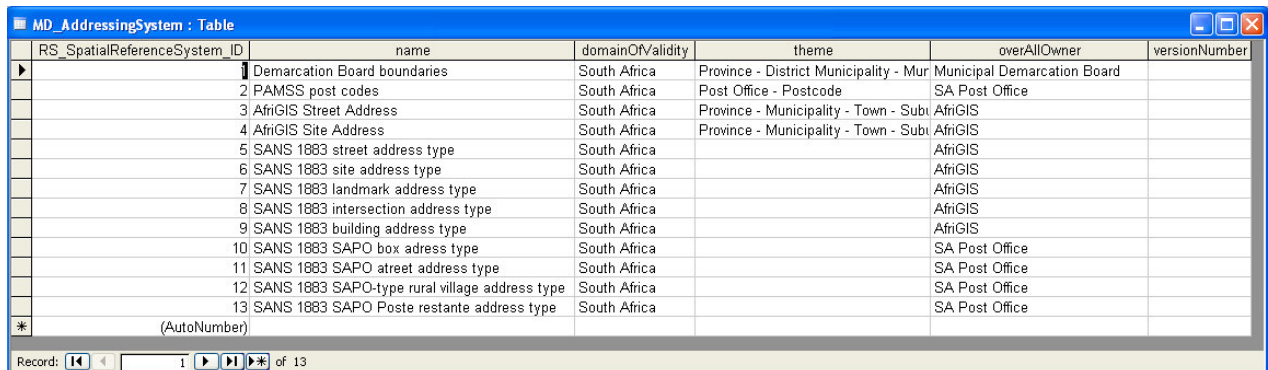
Figure 57. MD_AddressDataProvider



dPubID	dsID	name	allowUploads	status	adalID
1	AfriGIS NAD	Addresses for third party application developers	<input type="checkbox"/>	Inactive	Intiendo web service
2	AfriGIS NAD	For municipal uploads	<input checked="" type="checkbox"/>	Active	AfriGIS web service
3	AfriGIS Points of Interest	Addresses for third party application developers	<input type="checkbox"/>	Inactive	Intiendo web service

Record: 1 of 3

Figure 58. MD_DatasetPublication



RS_SpatialReferenceSystem_ID	name	domainOfValidity	theme	overAllOwner	versionNumber
1	Demarcation Board boundaries	South Africa	Province - District Municipality - Municipal	Municipal Demarcation Board	
2	PAMSS post codes	South Africa	Post Office - Postcode	SA Post Office	
3	AfriGIS Street Address	South Africa	Province - Municipality - Town - Sub	AfriGIS	
4	AfriGIS Site Address	South Africa	Province - Municipality - Town - Sub	AfriGIS	
5	SANS 1883 street address type	South Africa		AfriGIS	
6	SANS 1883 site address type	South Africa		AfriGIS	
7	SANS 1883 landmark address type	South Africa		AfriGIS	
8	SANS 1883 intersection address type	South Africa		AfriGIS	
9	SANS 1883 building address type	South Africa		AfriGIS	
10	SANS 1883 SAPO box address type	South Africa		SA Post Office	
11	SANS 1883 SAPO atreet address type	South Africa		SA Post Office	
12	SANS 1883 SAPO-type rural village address type	South Africa		SA Post Office	
13	SANS 1883 SAPO Poste restante address type	South Africa		SA Post Office	

Record: 1 of 13

Figure 59. MD_AddressSystem

RS_SpatialReferenceSystemLocationTypes : Table

RS_SpatialReferenceSystem_ID	locationType	parent	child
Demarcation Board boundaries	Municipality	Province	Ward
Demarcation Board boundaries	District Municipality	Province	Municipality
Demarcation Board boundaries	Municipality	District Municipality	Ward
Demarcation Board boundaries	Ward	Municipality	None
Demarcation Board boundaries	Province	None	District Municipality
SANS 1883 SAPO box address type	Province	None	Post Office
SANS 1883 SAPO box address type	Post Office	Province	Postcode
SANS 1883 SAPO box address type	Postcode	Post Office	None
SANS 1883 site address type	Municipality	Province	Town
SANS 1883 site address type	Town	Municipality	UsedName
SANS 1883 site address type	UsedName	Town	Site Number
SANS 1883 site address type	RegisteredName	Town	Site Number
SANS 1883 site address type	Site Number	RegisteredName	None
SANS 1883 site address type	RegisteredName	Municipality	Site Number
SANS 1883 site address type	UsedName	Municipality	Site Number
SANS 1883 site address type	Site Number	UsedName	None
SANS 1883 site address type	Province	None	Municipality
SANS 1883 street address type	CompleteAddressN	CompleteStreetName	None
SANS 1883 street address type	CompleteStreetNar	RegisteredName	CompleteAddressN
SANS 1883 street address type	Province	None	Municipality
SANS 1883 street address type	Municipality	Province	Town
SANS 1883 street address type	Town	Municipality	UsedName
SANS 1883 street address type	CompleteStreetNar	UsedName	CompleteAddressN
SANS 1883 street address type	UsedName	Municipality	CompleteStreetNar
SANS 1883 street address type	RegisteredName	Municipality	CompleteStreetNar
SANS 1883 street address type	RegisteredName	Town	CompleteStreetNar
SANS 1883 street address type	CompleteStreetNar	None	None
SANS 1883 street address type	UsedName	Town	CompleteStreetNar
*		None	None

Record: 1 of 28

Figure 60. MD_AddressSystem.LocationTypes

SI_LocationType : Table

SI_LocationType	name	theme	identification	definition	territoryOfUse	owner
-1	None	n/a	n/a	n/a		
1	Province	administrative	name	area	South Africa	Municipal Demarcation B
2	District Municipality	administrative	name code	area	South Africa	Municipal Demarcation B
3	Municipality	administrative	name code	area	South Africa	Municipal Demarcation B
4	Ward	administrative	number	area	South Africa	Municipal Demarcation B
5	Town	commonly known	name	area	South Africa	AfriGIS
6	UsedName	commonly known	name	area	South Africa	AfriGIS
7	RegisteredName	legal	name code	area	South Africa	Chief Surveyor General
8	CompleteStreetName	as built	name	line	South Africa	AfriGIS
9	CompleteAddressNumber		number (text)	point	South Africa	AfriGIS
10	Site Number		number (text)	point	South Africa	AfriGIS
11	Post Office	postal	name	name only	South Africa	SA Post Office
12	Postcode	postal	code	code only	South Africa	SA Post Office
13	StreetNumberRange		numbers (text)	point	South Africa	AfriGIS
*	0					

Record: 2 of 14

Figure 61. SI_LocationType

Appendix C. Operations of the Compartimos service objects

C.1 CatalogueService

Table 40. Operations provided by the CatalogueService

Service name	Description
Start	Starts the catalogue service
Restart	Restarts the catalogue service
Stop	Stops the catalogue service
Synchronize	Synchronizes the local catalogue with the master catalogue
IsRunning	Returns true if the catalogue service has been started
DataPublications	Returns the collection of publications from the catalogue
Publish	Takes a dataset and data access service as input, and creates a dataset publication in the catalogue.
Update	Updates a dataset publication's information in the catalogue
Find	Finds a dataset publication(s) based on the specified input filter
Delete	Removes the dataset publication (i.e. the link between dataset and data access service) from the catalogue.
UsageInformation	Returns information about the usage of various datasets.
UpdateUsageInformation	Updates dataset usage information in the catalogue. This information is used by the ReplicaService to decide when to replicate a dataset.
About an addressing system	
AddressingSystems	Returns the collection of addressing systems from in the catalogue
RegisterAddressingSystem	Adds information about an addressing system to the catalogue.
UpdateAddressingSystem	Updates addressing system information in the catalogue. Fails if the addressing system is associated with a dataset in the catalogue.
FindAddressingSystem	Finds an addressing system(s) based on the specified input filter
DeleteAddressingSystem	Removes the addressing system information from the catalogue. Fails if the addressing system is still associated with a dataset in the catalogue.
About an address-related service	
Services	Returns the services provided by a specific service provider
RegisterService	Adds information about an address-related service to the catalogue.
UpdateService	Updates the information about an address-related service's in the catalogue.
FindService	Finds a service(s) based on the specified input filter
DeleteService	Removes the information about the address-related service from the catalogue.



Service name	Description
About a data provider	
DataProviders	Returns the collection of data providers from the catalogue
RegisterDataProvider	Adds a data provider's information to the catalogue.
UpdateDataProvider	Updates a data provider's information in the catalogue.
FindDataProvider	Finds a data provider(s) based on the specified input filter
DeleteDataProvider	Deletes a data provider from the catalogue
About a data access service	
AddressDataAccessServices	Returns the collection of address data access service from the catalogue
RegisterDataAccessService	Adds information about an address data access service to the catalogue.
UpdateDataAccessService	Updates information about the data access service in the catalogue.
FindDataAccessService	Finds a data access service(s) based on the specified input filter
DeleteDataAccessService	Removes the information about the access service from the catalogue Fails if a dataset is associated with the service through a publication.
About a dataset	
Datasets	Returns the collection of datasets from the catalogue
RegisterDataset	Adds information about an address dataset to the catalogue.
UpdateDataset	Updates a dataset's information in the catalogue.
FindDataset	Finds a dataset(s) based on the specified input filter
DeleteDataset	Removes the dataset's information from the catalogue Fails if a data access service is associated with the dataset through a publication.
About a node host	
NodeHosts	Returns the collection of node hosts from the catalogue
RegisterNodeHost	Adds information about a node host to the catalogue.
UpdateNodeHost	Updates a node host's information in the catalogue.
FindNodeHost	Finds a node host(s) based on the specified input filter
DeleteNodeHost	Removes information about the node host from the catalogue.
About a replica	
Replicas	Returns the collection of replicas from the catalogue
RegisterReplica	Adds replica information to the catalogue
UpdateReplica	Updates a replica's information in the catalogue
FindReplica	Finds a replica(s) based on the specified input filter
DeleteReplica	Delete a replica's information from the catalogue
About a service provider	
ServiceProviders	Returns the collection of service providers from the catalogue
RegisterServiceProvider	Adds a service provider's information to the catalogue.
UpdateServiceProvider	Updates a service provider's information in the catalogue.
FindServiceProvider	Finds a service provider(s) based on the specified input filter
DeleteServiceProvider	Removes the information about the service provider from the catalogue. Fails if the service provider is still associated to an address-related service in the catalogue.

C.2 ReplicaService

Table 41. Services provided by the ReplicaService

Service name	Description
CreateReplica	Creates a replica either of the complete dataset, or of the higher-level location type values only, depending on the parameters. The relevant replica information is updated in the catalogue.
ValidateReplica	Determines whether the replica is identical to the primary source from where it has been replicated
ModifyReplicaContents	Change the set of data that is being replicated, e.g. by specifying specific higher-level location types of an addressing system
DeleteReplica	Removes the replica from the node, and also deletes the associated information from the catalogue.
SynchronizeReplica	Makes use of the transfer service to update a replica with the changes that occurred at its dataset.

C.3 TransferService

Table 42. Operations provided by the TransferService

Service name	Description
SetupTransfer	Initializes a transfer between two locations.
GetTransferState	Returns information about the state of a transfer
StartTransfer	Starts transferring the data as specified in the SetupTransfer service
PauseTransfer	Pauses the transfer, i.e. data that has been transferred does not have to be transferred again when the transfer is resumed.
ResumeTransfer	Resumes the paused transfer.
StopTransfer	Stops the transfer, i.e. any data that has been transferred until that time, is lost. The transfer has to be started again with the StartTransfer service.

C.4 AddressDataAccessService

Table 43. Services by the AddressDataAccessService

Service name	Description
CreateAddressDataset	Takes addressing systems as input parameters and physically creates a database that can store addresses of those addressing systems.
GetAddress	Returns the specified addresses
UploadAddressData	Uploads a whole dataset, or large amount of data, into the address dataset (used for replication)
AddAddress	Adds a single address to the address dataset (used for replication)

C.5 VirtualAddressDataService

Table 44. Services by the VirtualAddressDataService

Service name	Description
GetAddress	Returns the specified addresses. Depending on the input parameters the results are either returned as output parameters, or the TransferService is employed to transfer a file containing the resulting data.
UploadAddressData	Uploads address data in bulk into the address data grid. The uploaded data is stored as a single dataset at any data provider with a data access service for which the AllowUploads property is true.

Appendix D. Additional Compartimos use cases

D.1 Upload an address dataset

This use case illustrates the interaction of objects in the address data grid when a data provider uploads data into the address data grid that will be hosted by a third party data host. This happens, for example, when a data provider such as a small local authority that does not have the resources to host a dataset, makes use of a third party to host its dataset. Such a data provider will update its dataset once, and subsequently upload either re-upload the dataset or upload additions and modifications to the dataset. The TransferService is employed to upload the dataset as a single file.

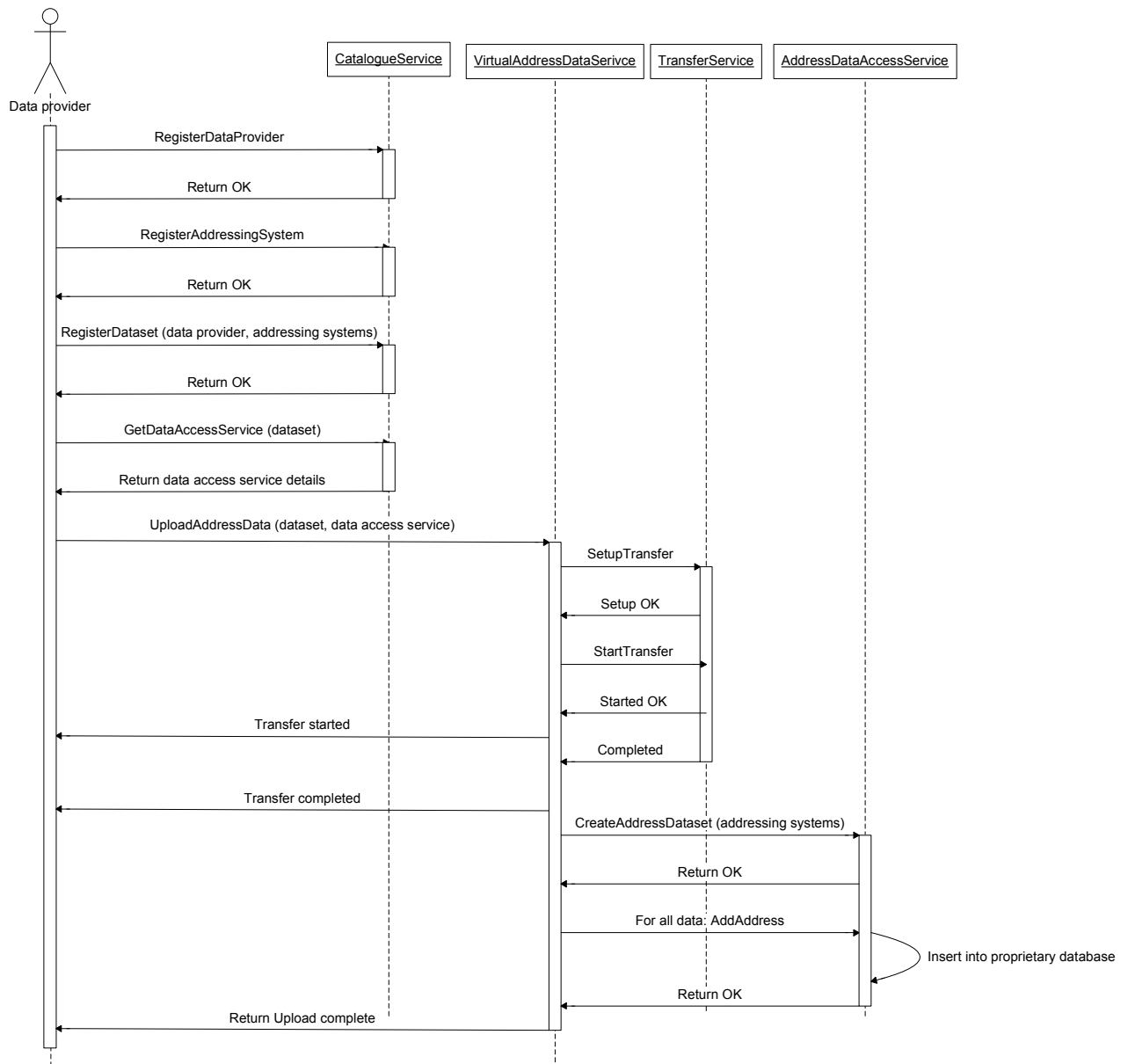


Figure 62. Sequence diagram for uploading an address dataset

D.2 Address dataset publication on the grid

In order to make a dataset available in the address data grid, the following has to happen:

1. Register a data provider in the metadata catalogue through the CatalogueService.
2. Ensure that the addressing systems required for the dataset are in the catalogue; otherwise register the required addressing systems through the CatalogueService.
3. Register the data access service that will provide uniform access to the dataset using the CatalogueService.
4. Register the dataset in the catalogue using the CatalogueService.
5. Register a data publication in the catalogue by associating the dataset and data access service in the catalogue.

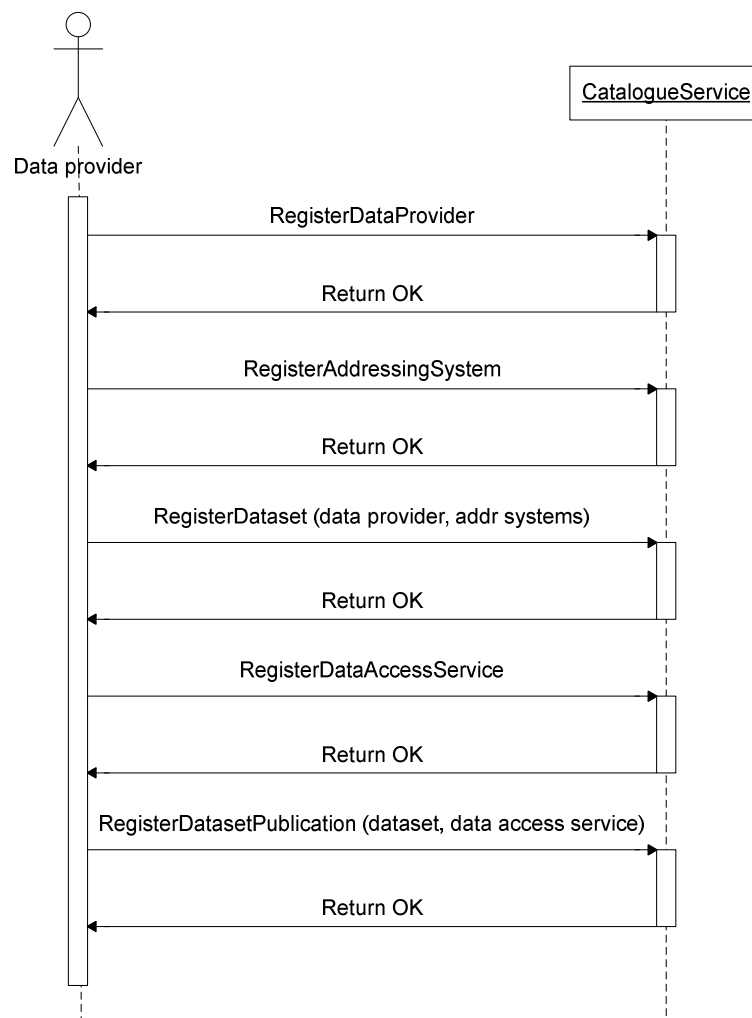


Figure 63. Sequence diagram for address dataset publication on the grid

D.3 Publication of an address-related service on the grid

To publish an address-related service on the address data grid requires two steps only:

1. Register a service provider in the catalogue using the CatalogueService.
2. Register the address-related service in the catalogue using the CatalogueService.

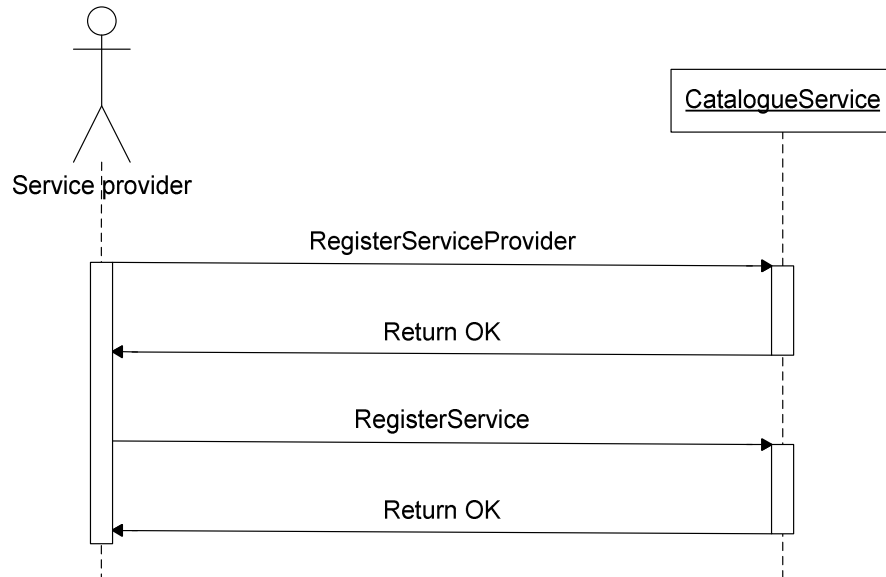


Figure 64. Sequence diagram for publication of an address-related service on the grid

D.4 Dataset replication

The following sequence diagram provides a simplified view of dataset replication. The dataset usage information is kept up to date by the VirtualAddressDataService whenever it gets a request for data. The ReplicaService polls this information at regular intervals and based on the thresholds set in the catalogue decides when it is necessary to replicate a dataset. Note that a dataset can only be replicated if it has been registered in the catalogue as a dataset that allows replication. As part of the ReplicaService's *CreateReplica*, the required information is set up in the catalogue, and upon completion the replica is synchronized, i.e. it is copied from source to target making use of the TransferService.

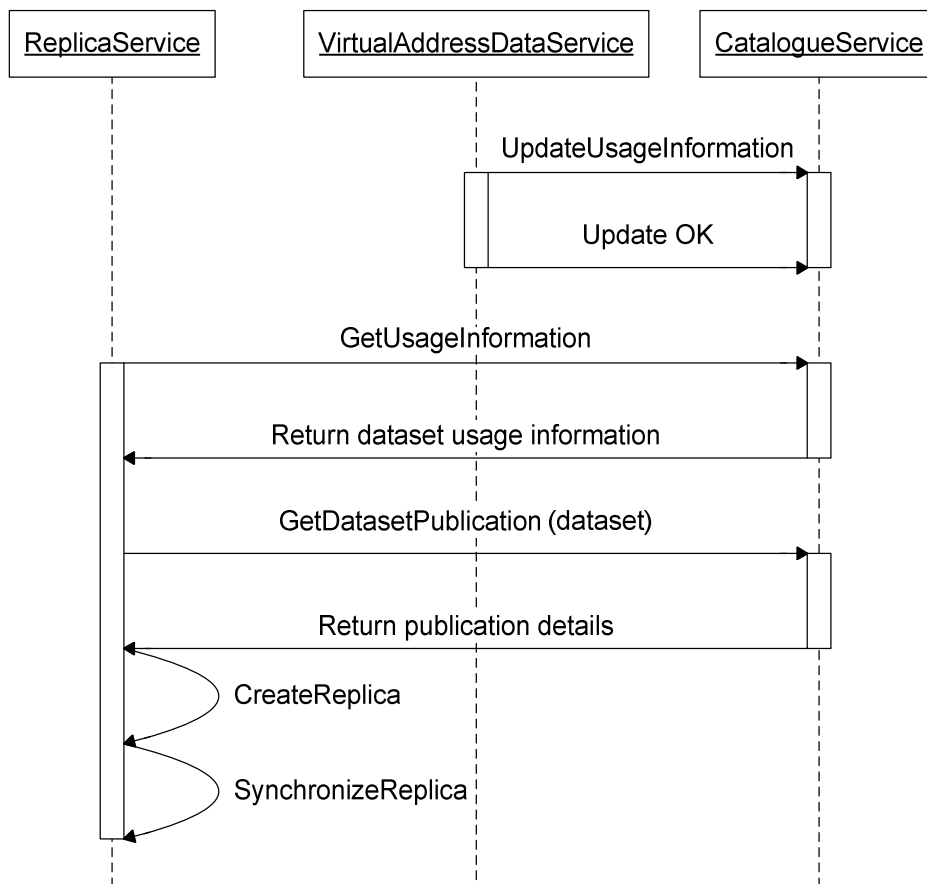


Figure 65. Sequence diagram for dataset replication

Appendix E. Journal publications

E.1 Address databases for national SDI: Comparing the novel data grid approach to data harvesting and federated databases

Coetzee S and Bishop J (2008). Address databases for national SDI: Comparing the novel data grid approach to data harvesting and federated databases, *International Journal of Geographic Information Science*, 26 September 2008, available online ahead of print edition at <http://www.tandf.co.uk/journals/tf/13658816.html>, accessed 13 November 2008.

The complete paper is included as Chapter 6 of the dissertation. This appendix includes only the cover pages.

E.2 What is an address in South Africa?

Coetzee S and Cooper AK (2007b). What is an address in South Africa? *South African Journal of Science*, Nov/Dec 2007, **103**(11/12), pp449-458.