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# CONCEPTUAL SPATIO-TEMPORAL DATA MODELLING AND LAND USE CHANGE

*BESER DE DEUS L.A.(1), SILVA L.F.C.F.(2), FREITAS M.A.V.(3)*
*(1) FEDERAL UNIVERSITY OF RIO DE JANEIRO / FEDERAL UNIVERSITY OF ACRE (AMAZON), RIO DE JANEIRO / RIO BRANCO, BRAZIL ; (2) MILITARY INSTITUTE OF ENGINEERING, RIO DE JANEIRO, BRAZIL ; (3) FEDERAL UNIVERSITY OF RIO DE JANEIRO, RIO DE JANEIRO, BRAZIL*

Space and time are fundamental elements that enable us to understand the phenomena evolution. There are several applications and studies demands that require both concepts: the development and the evolution of areas, the occupation and land use, the search and research for elements and the geographic features modified by the landscape, landscape alterations caused by earthworks, rectification of the hydrography, hills dismount, etc. In Geography, for instance, space and time are responsible for the comprehension of the social-spatial dynamics. Thus, space-time studies are essential to establish the understanding of such evident integration of these two terms, frequently analyzed in a disconnected and isolated way. Nowadays, most of the GIS - Geographic Information Systems - available considers the entities representation in only one instant of time, usually the present. Although analysis, planning and decision, on the geographic space, are very frequent and current activities in GIS, there are still several difficulties on working with temporary phenomenons, specifically concerning the modeling, storage, space-temporal analysis and representation of geographical data. The main subject on the association of geographical data with time, is not due to its modification or update, but for the possibility to register past states. This can subsidize the study of spatial phenomenon transformations in an integrated way, leading to production of dynamic sceneries. Moreover, specifically about GIS, to use it as a technological instrument for accomplishment of space-time analysis, and not only "space" as it is being used thoroughly. This kind of analysis is only possible within the implementation of spatiotemporal models that consider not only apparent entities and its geometrical shapes, but its processes and transformations. In this context, a bibliographic review in the scientific literature was made to establish the state of art on the temporal characteristics that ought to be considered in the construction of a Temporal Geographic Information System (TGIS), that is also known as Historical Geographic Information System (HGIS) according to its application. Theoretical studies and discussions were accomplished on time epistemology associated to each discipline that, directly or indirectly is related to GIS. These disciplines include geography, cartography, computer science and statistics among others. Finally, this set of knowledge had allowed the structuring of a conceptual space-time model using geographical and historical data for structuring of TGIS or HGIS will support studies aimed at understanding the changes of land use, transformations and / or development of public spaces in urban areas. Thus, this can be applied to a project which has been developed at the Military Institute of Engineering in a park called Campo de Santana, located on Republic Square, downtown Rio de Janeiro (Brazil), showing its appreciation and depreciation processes throughout its history. The conceptual model was built in Perceptory 2003 (conceptual modeling tool for geospatial databases that uses of the UML formalism - Unified Modelling Language) running on Microsoft Visio Standard 2002.