

OFFRE DE POST-DOC

Descriptif

(English part is provided below)

PROJET	
Acronym / Acronyme	ALARIC
Title / Titre	Exploration of structural changes of cities

Référence : 2015 - ALARIC

Financement : UDL – LabEx IMU

Niveau de salaire : 2916,00 brut (environ)

Etablissement d'accueil : Université de Lyon, Labex IMU

Lieu de travail : LIRIS, bâtiment Nautibus, Campus de la Doua, Villeurbanne, France

Spécialité : Informatique

Début de parution : 15 juillet 2015

Date limite de candidature : 24 Août 2015

DESCRIPTIF DU POSTE

L'évolution des villes est le résultat de nombreux facteurs et prévoir la ville de demain peut s'appuyer sur la compréhension des changements passés dans cette ville. L'objectif est ici de contribuer à la conception d'un environnement d'exploration spatio-temporelle 2D/3D de villes intégrant des données multisources/multimédia et reposant sur la définition d'un modèle temporel et d'un modèle de qualité lié à une maquette 3D. Une description du projet et des attentes est disponible en annexe. Ce post-doctorat est lié au projet Alaric. Il est financé par le Labex Intelligence des Mondes Urbains (IMU).

COMPÉTENCES REQUISES

Le candidat aura une thèse en informatique. Il possédera des compétences en informatique graphique et/ ou en systèmes d'informations. Des connaissances dans le domaine de l'information géospatiale seront également préférables. Le post-doctorant devra effectuer un état de l'art et proposer des solutions pour **indexer et représenter des données géo-historique sur une maquette 3D + T**. La qualité des données devra être prise en considération dans ce contexte d'interrogation, d'indexation et de représentation. Les algorithmes proposés par le candidat seront développés en C++ dans un cadre existant mis à disposition par l'un des partenaires permettant ainsi un accès et une visualisation facile des données et une dissémination des résultats de ce projet (voir Vcity : <http://liris.cnrs.fr/vcity/wiki/doku.php>). Le post-doctorant interagira avec les autres membres du projet dans un contexte pluridisciplinaire.

DESCRIPTIF DU LABORATOIRE D'ACCUEIL ET ENCADREMENT SCIENTIFIQUE

Le post-doctorat sera accueilli au laboratoire LIRIS¹, UMR CNRS 5205. Il travaillera sous la direction de Sylvie Servigne² (Equipe Base de Données, LIRIS), Georges Gay³ (Laboratoire EVS) et Gilles Gesquière⁴ (Equipe Geomod, LIRIS). Des interactions auront aussi lieu avec les membres du projet Alaric⁵, en particulier avec Clémentine Périnaud, doctorante sur le projet. Le post-doctorant s'appuiera enfin sur l'expertise des membres du LIRIS travaillant sur le projet V-City⁶ (3 doctorants, 2 ingénieurs, 1 professeur).

LE DOSSIER DE CANDIDATURE COMPREND

- CV
- Lettre de motivation
- Titre, résumé et rapport de thèse
- Liste des publications
- Deux lettres de recommandation

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⁴ <http://liris.cnrs.fr/gilles.gesquiere/wiki/doku.php>

⁵ <http://alaric.liris.cnrs.fr/wiki/doku.php>

⁶ <http://liris.cnrs.fr/vcity/wiki/doku.php>

Annexe Scientifique (en anglais)

Exploration of structural changes of cities

I. Context

The exploration of the changing structure of cities is coupled with fruitful research using GIS-CAD workflows to reconstruct former cities at different stages of their evolution. Although few in number, these scientific projects constitute a solid field of study in geo-historical research, as exemplified in Europe by the Nantes 1900 project and the Virtual Leodium projet [1] [2] or the development of a 4D-GIS (3D + T) to study the medieval town of Cluny [3] [4]. In the United States, temporal 3D-GIS, such as the reconstitution of Washington DC in 1815 [5] or the *Sidney Timelap* [6] has received an increased attention among researchers. Until recently, technical and conceptual challenges were usually coupled with a poor visualization and inquiry into past urban transformation. Thus, one of the predominant choices was to have a narrative approach of urban history thanks to a succession of fixed mockups that prevented other researchers from reusing geo-historical information. Current developments of 4D GIS illustrated above are coupled with increasing attempts to renew historical visualization by the use of a wider variety of historical records and the introduction of temporal devices in order to navigate through the data [7] [8].

In this context, the ALARIC project (*Incremental Urban Change Research Project*) is dedicated to the production of geo-historical information concerning two formerly industrial cities of the Lyon-Saint-Etienne area in France (19th and 20th century). This project is financed by the IMU - Intelligences des Mondes Urbains (“Smartness on Urban Worlds”) - Laboratory of Excellence of Lyon. Its objective is **to contribute to the improvement of the possibilities to inquire urban transformation processes** while considering not only a short period of history but a long-term perspective. Indeed, the exploration of the incremental nature of urban changes involves analysis of an urban production system that evolves over time by superimposing strong continuity and gradual change. Thus, it implies identifying when certain historical processes took place, including when one-off construction became systematic and when urban planning strategies changed. Specifically, the case study investigates the emergence of local urban projects and the terms used by the local actors to justify completed or planned projects. The aim of the reconstitution of two cities is to compare the transformation processes of the urban fabric (for instance the emergence and spread of suburban housing or of industrial railways) and to specify the latency between the emergence of a new type of project and its generalisation. The city model becomes a laboratory for the study of local adaptation to urban change. Hence, a longer-term perspective coupled with **the reconstitution of urban development constitutes a pragmatic basis for investigating the complex and gradual renewal of town planning**. Large cities, for which extensive archival information is available, are priority sites for urban history, yet few studies have examined smaller one - especially former industrial cities.

In this study, we collected a wide range of historical records to inform the existing or planned urbanity of the two sites, in particular the technical plans drawn by the various jurisdictions responsible for urban regulations and the city council's minutes. Based on archival records that provide **an overview of the entire city at a specific point of time, the spatialisation of various sources enables us to inquire urban development.** The spatialisation of archival records refers to the fact to spatially represent the contents of a document collection on *a mapping environment*. **The disparity of the documents makes it necessary to organise them in a workflow to increase the efficiency and the ease of the production of geo-historical information.** Texts, pictures, vectorial information are available with a more and less accurate localization and temporalisation. **Archival records shall be accessed through a virtual mapping environment based on the temporal reconstitution of cities in three dimensions.** The aim of accessing archival records is not only to promote their existence; indeed, **investigating their distribution in time and space must help an understanding of urban transformation processes in a geo-historical context.**

In this project a first method has been proposed to manage different versions of a same city [9]. It is now necessary to go further on the geo-historical information representation in a 3D+T mock-up. Data must be indexed and represented in the mock-up to enhance the possibility to visualize and interrogate urban change. Temporal and Spatial aspect may help in this way. Two other topics must be taken into account during this period. The first one is related to the data quality. A preliminary work has been done in this side to propose data quality information with the identified data. This quality must be considered in the understanding of the incremental urban change and may influence the rendering process. A last part is to propose a method based on standard to facilitate the possibility to reuse data aggregated in this project. For instance, the current work is based on CityGML standard which may be extended to contribute to the definition of a dedicated standard for archeology and urban history.

More information can be found in the web site of the Alaric Project:
<http://alaric.liris.cnrs.fr/wiki/doku.php>

II. Profile for this postdoctoral position

The candidate will have a PhD-thesis in computer science. He must have skills in computer graphics and or data sciences. Knowledge in the field of geospatial information will be also desired. **The postdoc must perform a state of the art and must propose solutions to index and represent geo-historical data in a 3D+T mock-up. Data quality will be taken into account in this context of 3D representation, indexation and information query.**

Algorithms proposed by the postdoctoral candidate will be developed in C++ within an existing framework available by one of the partners thus allowing easy access to the data and an easy visualization of the results (see Vcity: <http://liris.cnrs.fr/vcity/wiki/doku.php>). Post-doctoral student will interact with the other members of the project in a multidisciplinary context.

III. Duration

12 month (October 2015 to October 2016).

IV. Supervision

This work will be supervised by Sylvie Servigne (LIRIS), Gilles Gesquière (LIRIS), Georges Gay (EVS) and the members of the IMU Project ALARIC. In particular, the postdoc will collaborate with a PHD thesis, Clémentine Périnaud (EVS) who is addressing the geo-historical part of the project. This work will be done in the LIRIS laboratory in Lyon (France), campus de la Doua.

Contact: {Sylvie.servigne;[gilles.gesquiere](mailto:gilles.gesquiere@liris.cnrs.fr)}@liris.cnrs.fr

V. How to apply for this position

- The candidate may send by e-mail
 - o Detailed CV with one or several publications in relation with this position.
 - o Motivation letter
 - o Information about the PhdThesis (Title, abstract, reviews,...)
 - o Two letters of recommandation

VI. Bibliography

- [1] B. Hervy, R. Billen, F. Laroche, C. Carré, M. Servières, M. Van Ruymbeke et al., “A generalized approach for historical mock-up acquisition and data modeling: towards historically enriched 3D city models”, in Usage, usability and utility of 3D city models, EDP Sciences, 2012.
 - [2] M. Pfeiffer, C. Carré, V. Delfosse, P. Hallot and R. Billen, “Virtual Leodium: from an historical 3D city scale model to an archaeological information system”, ISPRS Annals of the Photogrammetry, Remote Sensing and spatial information sciences, vol. 2, Strasbourg, XXIV International CIPA Symposium, 2-6 septembre 2013.
 - [3] J.-F. Coulais, S. Faucher, A. Mazuir, Z. Petty, J. Rollier and G. Rollier, “Développement d’un SIG 4D pour la ville médiévale de Cluny », Archeologia e calcolatori, supplément 5, 2014, pp. 164-179.
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- [7] J. Bonnett, “Charting a New Aesthetics for History : 3D, Scenarios and the Future of the Historian’s Craft”, *Social History*, vol. 40, 2007, pp. 170-207.
- [8] I.N. Gregory, “Challenges and opportunities for Digital History”, *Frontiers in Digital Humanities*, 1, 2014, pp. 1-2.
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