

the street. Some kinds of change may be evident only on maps and in building records. Visualization of elements that are only found in written records tends to be difficult, but again GIS can play a role. In a field like urban morphology, in which many different disciplines are involved, each discipline tends to treat the data differently. Whitehand (2006, p. 87) has pointed out that 'greater attention is needed to the building up of conceptual frameworks and the connecting of individual studies to those frameworks'. In order to establish such frameworks researchers from the different disciplines need to be able to use each other's data, but in order to do so these data need to be in a standardized format accessible to others. XML technology is likely to play a major role in this.

The future use of information technology in the field of urban morphology will be threefold. First, the role of GIS will continue to grow. Existing techniques, especially of rectifying historical maps, will improve. Provided that maps are well annotated, comparative studies will become easier with the increased digitization of data. Secondly, there will be increased use of three-dimensional virtual townscapes: improved automated techniques will allow these models to be created faster. Combinations of GIS and three-dimensional townscape models are still rare but a growing interest can be seen in several disciplines. Thirdly, there will be greater standardization of data.

The Paper and Virtual Cities project provides a number of tools to help these developments in urban morphology. It does so by creating a meta-data format that can be used to describe the variety of the townscape and by providing researchers with a number of tools that can be used to annotate the

townscape as a whole. The same meta-data format can be employed in analysis and the visualization of data in both two and three dimensions by the use of GIS and virtual reconstructions. Urban morphologists should think about the data structure necessary to store the different datasets and to create the necessary framework. The internet and web technology will help in facilitating the exchange of data in order to undertake more comparative studies.

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## Fringe-belt theory and polarities-landmarks theory

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During the keynote address on fringe belts by M. P. Conzen (2008) at the ISUF conference in Artimino, I was suddenly struck by the great assonance that the fringe-belt theory developed by M. R. G. Conzen (1960) has with Muratorian polarities-landmarks theory (Muratori, 1959). The Conzenian

and Muratorian schools have been interrogating each other for some time, and finding affinities (see, for example, Kropf, 2004; Marzot, 2005). But I had never noticed before that these two theories, both fundamental to the study of urban form, shared so many aspects as to be considered almost

complementary.

The interpretative tools obviously differ, because of the different objectives of the disciplines involved – geography and architecture. Yet points of contact and exchange are numerous. This may relate to the considerable degree of independence that the Conzenian and Muratorian schools seem to have from their specific disciplinary backgrounds. What they share with one another are major common values and a common interest in ‘reading’ the development of urban form in a temporal-relational perspective.

Muratorian theory recognizes basically two kinds of polarities-landmarks: ‘inner’ ones, with civil characteristics, and ‘external’ ones, with specialist characteristics. In the inner ones there is recognition of the *civitas* in the *urbs*, that is to say the town as the embodiment of its citizens and made up of its public structures. To both of them we owe the co-ordination of urban fabrics. In the case of the external ones, however, the role of functional exchange between the town and its territory is also important. In such a category would be a monastic complex, but it would also include, for example, a hospital, lazaretto or another structure requiring a large inexpensive land parcel. Such features occupied and fixed the urban ‘boundary’ at a particular time as a fundamental place of contact between town and country. In general it is the polarities that set in order and hierarchize urban fabrics, while the landmarks define their ‘architectonic presence’ in the town. The latent basis of urban form evolution lies in the dialectic between inner and external (civil and specialist) polarities. And it is exactly on this subject that the comparison with fringe-belt theory has force.

The specialist (external) polarities-landmarks are generally situated inside a fringe belt. The monasteries of the inner fringe belt of Koblenz are an example, as are the Mendicant Orders located at the edge of thirteenth-century towns and contributing to the urban fabric of these towns in a vital way (see, for example, Guidoni, 1985). The principal churches were located in the inner fringe belt as major external, specialist landmarks. As the towns grew and reorganized they became inner civil landmarks and a new ‘boundary’ and a new fringe belt were created farther out. Most striking are the traces of the fourteenth-century San Giacomo Hospital and the sixteenth-century

College of St Atanasio dei Greci left behind in the expansion of the Trident of Campo Marzio in Rome (Maretto, 2008, pp. 146-53). Another example is the town of Chioggia. Here the first urban limit is marked by the presence of a series of convents at the edges (inner fringe belt?) of the two main islands. The second one consists of two external ‘specialist islands’ – L’Isola dei Cantieri (Shipyard Island) and the Isola dei Magazzini (Salt Warehouse Island) (see, for example, Maretto, 2005).

Generally speaking, if we confine our analysis to pre-twentieth-century cities, the limit marked by the external polarities-landmarks represents a kind of ‘architectural translation’ of the Conzenian fringe belt. These are preliminary thoughts, but there are attractive possibilities for extending them further.

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