In this book, a defence is made of the proposition that remote sensing can be a valuable and efficient instrument for acquiring knowledge of the external morphology of the changing historical landscape. This concerns both the external physical structure of cities and their developmental dynamics. As an integral component of the cultural landscape, the physical morphology of cities is a theme that has, for a long time, been the subject of intensive study both in the disciplines of spatial design as in those of spatial history. This has occurred via various theories, points of view, techniques, and methods. Publications on the history of urban planning also reveal a long-standing and increasing interest in cities as material artefacts. Historical geography, archaeology and urban planning often serve as examples in this matter. By means of the many techniques that are available for registration from the sky and from space, both the total pattern and the details of the cityscape can be determined and analysed. It is remarkable, however, that remote sensing as a method and as a system has scarcely been picked up within historical urban research, and there are hardly specific interpretation methods with respect to urban planning history. There is barely mention of a stable interest in this topic.

Remote sensing, as a collective name for methods and techniques of observing the Earth, has temporal and historical dimensions. First and foremost, by means of recording, the picture of continuously changing spatial reality is 'frozen' for an indeterminate time in a visual or visualisable medium. This recording can be used as a study model for an exogenous, spatial structure and use of space for a single moment. This study model does not only represent, to scale and in two or three dimensions, the factual appearance of the urban space in an objective way, it also enables one to deduce information on invisible aspects at the same time. In addition to this process of deduction, the invisible is also made visible by means of physical applications, namely, by the deployment of instruments that are sensitive to parts of the electromagnetic spectrum which cannot be perceived by the human eye.

Where a single recording displays the static aspects of spatial reality, several recordings in succession divulge elements of spatial processes. Within these processes, the various developments follow their own time scale and rhythm. Research on a specific development should take these factors into account with regard to the frequency of recording and duration of the observation period. Frequent registration over a period of several months to a number of years can present a clear picture of, for example, urban planning processes or adaptations in the layout of cities. On a more small-scale level, the extension of the infrastructure and processes of urbanisation are visible. The data from registration over a number of decades can establish trends regarding spatial structure and usage of ground. These trends are not only historically interesting but can also assist in helping to discover spatial (dis)continuities, which can subsequently provide points of reference for planning and design. Remote sensing is also seen as a method for objectively simulating factual processes, in the context of historical research, design studies, decision-making, and management. Complexity is reduced to compressed time-space presentations which, depending on the recording technique used, can be applied at various spatial aggregation levels.

The first chapter of this thesis deals with the issues and points of departure of this research. It is proposed that systematic methods of interpretation in the history of urban planning have been lacking as a result of a knowledge problem. This problem concerns comprehension of the possible use of remote sensing images, and methodical knowledge regarding analysis and interpretation. Moreover, the diffusion of knowledge with respect to information and communication technology, in as much as this involves
morphology and remote sensing, seems to have occurred more slowly than in, for example, archaeology. Subsequently, information is presented on the concept of morphology from the perspectives of architecture and historical geography. At the same time, a relation is established with spatial planning.

Chapter two discusses the definitions and principles of remote sensing, along with a categorical division of observation instruments and platforms. Advantages and disadvantages are presented, in addition to which the complementary role of cartography and field observation (in situ sensing) is covered. This observation in situ includes photography in particular, and this is placed within a long tradition of documentary urban photography. A whole range of remote sensing functions is also elucidated within the knowledge acquisition process. These functions are: registration, monitoring, exploration, analysis, cartography, simulation, conceptualisation, provision of evidence, and verification. In addition, educational and representative functions can be distinguished. In subsequent chapters, the functions mentioned are illustrated by means of historical examples.

The history of remote sensing as a technology is discussed in the third chapter. The interaction between military operations and scientific research forms the leitmotiv here. Immediately after the initiation of aerial photography, tactical reconnaissance was carried out during armed conflicts. Later, in both World Wars, aerial photography turned out to be an essential aid to planning operations in terms of surveillance of the rapidly changing ground and fighting conditions. Besides the exchange of methods, techniques and instruments, scientists also circulate in both domains of activity. The accomplishments of military aerial reconnaissance are now also redeemed in civil research on geo-observation. An example of this is the recent release of satellite espionage photographs made by the American Federal Government during the Cold War period from the 1960s onwards. This meant that the period over which the civil sciences had satellite pictures of the earth at their disposal was extended by twelve years in comparison to the Landsat programme.

Chapter four deals in greater detail with the historical use of remote sensing. In archaeology especially, remote sensing has been applied as a knowledge instrument with much success. But it has also been used to register and analyse accurately the city's social space, the planological and urban planning space, and the corresponding physical environment, with their often-ephemeral (morphological) processes. In this matter, the issue at stake in the research has always been of decisive importance in the choice of instruments and the planning of the observation.

The advent of electronic data processing and satellite registration has led to revolutionary new opportunities in working with spatial data. Since this time, spatial transformation processes can be followed at extremely short intervals and across great surfaces at the same time. The possibilities of data processing have also increased. Geometric rectification and radiometric correction have become simpler, and automatic object recognition lies almost within reach. Other factors that are at least as important are the theoretical insights into the working and guidance of complex dynamic systems in nature and technology, which were at a premium in the nineteen-fifties and which have pervaded many branches of science. In this way, system-theoretical and cybernetic thought models have exerted an unmistakable influence on the automation and reorganisation of spatial management and public administration. Traces of these can found in literature on post-war American urban planning.

Finally, the significance of remote sensing (and the corresponding technology of data processing) in current spatial-historical research is investigated. Since the nineteen-twenties, aerial photography has functioned as a source and aid to historiography. Traditional aerial photography interpretation is still alive and kicking, as a vital tradition in
Great Britain testifies. However, recent developments in the domain of ICT give reason to believe that new perspectives for morphological research will probably arise. Geographical information systems, computer image processing, Internet, and digital libraries form the building blocks of a new knowledge infrastructure that is currently under rapid construction. The existence, the possibilities and the consequences of this do not appear to be sufficient to penetrate into historical research on urban planning. This also seems to apply to the value of remote sensing that now - with the advent of a new generation of small but highly advanced commercial satellites - constantly provides large-scale information on the restless culture landscape.