Outlook by Incoming President

Positioning Photogrammetry vis-à-vis Computer Vision

A priority for the new Commission President is to revisit the definitions of the Commission's own terms of reference in light of a need to position photogrammetry as a whole and the Commission's field of interest vis-à-vis generic Computer Vision. Computer Science and Engineering have developed Computer Vision as a separate discipline. This has happened without a great deal of interaction with photogrammetry. Obviously, champions of Computer Vision were and are aware of the field of photogrammetry, but the interest has been and is limited. 'Photogrammetry' is seen as dealing with the Earth's surface. The 'close range' aspects of photogrammetry have never been perceived as a defining element of the field.

A Motto for the Inter-Congress Period 2000-2004: Photogrammetric Computer Vision

During 2000-2004 Commission III proposes to operate as the Commission for 'Photogrammetric Computer Vision' and to contribute more clearly to efforts of positioning the field of photogrammetry vis-à-vis computer vision. The traditional view often defines photogrammetry in the context of the geo-sciences. Photogrammetry is seen as; modelling objects and scenes on the Earth's surface But in light of a long tradition of non-topographic photogrammetry, this focus on 'geo-information' misses the mark. We need to answer the question: Is it photogrammetry when the goal of the vision task is to be 3-D and accurate? Photogrammetrists perceive the idea of a 'Photogrammetric Computer Vision' as a vague notion. However, in a delineation of the field of photogrammetry vis-à-vis computer vision, such a notion will be very useful and create clarity. We will need to explain the concept and create meaningful definitions that work in the minds of both, the world of photogrammetry and the world of computer vision.

Representation Hall of the Austrian National Library, Vienna.

Is there Photogrammetric Computer Graphics?

The argument can be made that the ortho-photo is a computer graphics product, representing a method of visualising a scene of interest. Again one might argue that this is applicable only if it deals with the Earth's surface. But if we review typical computer graphics issues, namely, 'image based modelling' and 'image based rendering', we see many topics of photogrammetric interest, so that one might argue that there is a thing one could denote as 'photogrammetric computer graphics'.

Eight Working Groups

A total of eight Working Groups have been formed with a leadership that has its home partly in Photogrammetry, partly in Computer Vision. The new structure builds on many of the Working Groups that were in existence during the previous period 1996-2000. This structure covers various 'hot topics' of 'Photogrammetric Computer Vision'.

The Working Group on Sensor Pose Estimation has tradition and follows WG III/1 from the previous period 1996-2000. The traditional topographic motivation is hoped to be broadened into a generic 3-D vision motivation. If one accepts this concept, then triangulation needs to address also images looking at motion, and time series or image sequences other than those resulting from a standard aerial surveying flight.

The Working Group on Surface Reconstruction also derives from its predecessor in the previous period 1996-2000. The traditional focus of this Working Group was on 'stereo-matching'. It is proposed that other depth cues besides geometric stereo disparities be studied. The suggestion is to see the issue of image based shape reconstruction as a broad topic of interest, using the ideas of Shape-from-X, and broadening the application's focus from the Earth's surface to non-topographic objects. Since topography typically is looked at from only one side, and results in so-called 2.5D models, an additional issue is raised when a fully 3-dimensional model of an object needs to get constructed.

The Working Group on Laser Scanning is also concerned with the topic of 3-D reconstruction, but in this case not from images, but from direct distance measurements by lasers, and from point clouds from InSAR data, possibly augmenting the point clouds with imagery to better delineate regions and extract edges of objects. The range of interests of this Working Group is rather broad. But one could broaden it even further if one were to consoder surfaces from point clouds irrespective of their origin. This would include point clouds obtained from images, from underwater SONAR, from profiling techniques.

The Working Group on automated object modelling has three predecessors in the 1996-2000 period At the time it was argued that the subject matter should be separated into some form of low-level, mid-level and high-level vision. We are abandoning this separation at this time in the WG-structure. Obviously, this represents the topic of 'automated

image interpretation' . Considerable interest exists in photogrammetry since this has applications in the automated population of geographic data bases. Topographic objects such as roads, buildings, fences, bridges etc. need to be mapped. The question immediateley comes to mind: 'Is there a photogrammetric automated object recognition?' Is it 'photogrammetry' when the objects are topographical? Probably not. But the question illustrates that we need to create an understanding where photogrammetry stands, and this Working Group can and should help in achieving this clarity.

A new Working Group on the Theory and Algorithms for industrial vision is being introduced, consistent with the Commission's charter to address and focus on theory and algorithms. A careful co-operation with Commission V is needed in this area. The new Working Group is interested in 3-D vision in industrial settings, in reconfigurable calibration and, most importantly, in the hot topic on 'uncalibrated vision', a concpept that is counterintuitive to photogrammetrists, but makes a lot of sense in the proper context.

The Working Group on Fusion has a legacy in the preceding period. One might argue that 'fusion' of data, data structures and methods is everywhere, and therefore should not be a separate focus. But by having a separate working group on conceptual aspects of information fusion, or multi source vision, one demonstrates that the basic necessity of using multiplicity, where available and reasonable, needs more attention than it currently receives. InSAR is part of an integrated bundle of data including SAR-coherence, magnitude, polarisation and shape, and therefore aspects of InSAR will find a home in this WG.

Another new Working Group is to address Virtual Environments. Both Virtual Reality and Augmented Reality create a need for rapid modelling of the human habitat and environment. This issue is of course present in many Working Groups, even Commissions. But as far as 'Automation' is concerned, Commission III needs to become active, not only in the context WG on autotmated object modelling. Issues are the integrated analysis of both terrestrial and aerial imagery, the extraction of texture, automated generation of models with level-of-detail, the inferred attribution Rendering in real time and following a moving user presents its own complexities. This implies that tracking be very accurate and in real time. City modelling is the most often discussed application for photogrammetric Virtual Environments.
Very important is the concern for reliability and performance of algorithms, as reflected in a Working Group for this topic. The subject is or should be ubiquitous. But by creating a separate working group, we 'flag' the topic and expect it to create guidelines, test data, ideas, references and algorithms for the use by others in assessing the value of their creative algorithm work.

In order to better consider the world of computer vision, it is recommended that we seek to 'populate' computer vision conferences. Working Groups will organise workshops before, after or as part of those conferences. In this manner, there is reinforced attention being paid to the events and innovations in those vision conferences, and people attending those conferences learn better to appreciate what photogrammetry is. Again, the general motto could be 'Photogrammetric Computer Vision', and present session under this topic at EVVC, ICCV, CVPR, ICOPR, CAIP and the likes. This can be as illuminating for photogrammetrists as it can be good marketing in the vision communities.

Working Groups of Technical Commission III for 2000-2004

WG III/1 Sensor Pose Estimation
Chair: Henrik Haggrén (Finland)
Co-Chair: Ayman Habib (USA)

WG III/1 Terms of Reference
- Block adjustment: projective vs. perspective transformation
- Registration algorithms
- Orientation procedures for 3-D scene reconstruction
- Block triangulation for airborne digital sensors and cameras
- Use of features as entities in image orientation processes

WG III/2 Surface Reconstruction from Images as Information Source
Chair: Michel Roux (France)
Co-Chair: Amnon Krupnik (Israel)

WG III/2 Terms of Reference
- Stereo matching
- Shape from X
- 3-D versus 2.5D (in collaboration with WG III/3);
- Improvement provided by automated object identification and by image/scene understanding (in collaboration with WG III/4)

WG III/3 3-D Reconstruction from Airborne Laser Scanner and InSAR Data
Chair: George Vosselman (The Netherlands)
Co-Chair: Hans-Gerd Maas (Germany)

WG III/3 Terms of Reference
- Algorithms for point cloud processing (in collaboration with WG III/2 on surface reconstruction)
- Data fusion (in collaboration with WG III/6)
- Products: Digital surface models, digital elevation models, 3-D city and landscape models
- Applications: (in collaboration with WGs VII/3, VII/4, VII/5 on coastal mapping, flood prediction, urban planning,

telecommunications planning, monitoring of power lines, noise and gas propagation, tax verification, real estate sales etc.)

WG III/4 Automated Object Extraction
Chair: Helmut Mayer (Germany)
Co-Chair: James Bethel (USA)

WG III/4 Terms of Reference
- Segmentation and aggregation/grouping of image features based on classification and computer vision approaches
- 3-D object extraction and image/scene understanding, (in collaboration with WG III/2)
- Knowledge representation and manipulation, control structures, management of uncertainty, and learning, i.e., automatic model generation
- Geometric, semantic and temporal modelling of man-made and natural objects including their relations in satellite, aerial and close-range imagery
- Utilisation of prior knowledge, especially in the form of CAD models, GIS, or results from digital surface model analysis
- Performance evaluation (quality control, test procedures) (in collaboration with WGs III/7 and III/8)
- Liaise with the Computer Vision community

WG III/5 Algorithms for Industrial Vision
Chair: Carsten Steger (Germany)
Co-Chair: Stefan Scherer (Austria)
WG III/5 Terms of Reference
- Calibration: Off-line versus on-line, geometric versus radiometric calibration; active versus passive systems, non-stereo and shape-from-X techniques
- Reconstruction: real-time versus non-real time, 2-D versus 2.5-D versus 3-D
- Recognition: object-centred versus viewer-centred, quantitative versus qualitative
- Model- and appearance based inspection
- Micro-surfaces: sensor models, active image acquisition, microscopic shape-from-X
- Performance and reliability: assessment of the investigated industrial vision algorithms, in collaboration with WG III/8 and WG V/1

WG III/6 Multi-Source Vision
Chair: Olaf Hellwich (Germany)
Co-Chair: Beata Csatho (USA)

WG III/6 Terms of Reference
- Information fusion from multi-resolution multi-source data such as SAR, multi-spectral, hyper-spectral, panchromatic and laser scanner data
- Modelling of uncertainty in multi-source computer vision
- Using additional knowledge sources, such as GIS, to support object extraction
- Evaluation of the effectiveness and efficiency of multi-source information fusion

WG III/7 Modelling Large Scale Urban Environments

Chair: David M. McKeown, Jr. (USA)
Co-Chair: Seth Teller (USA)

WG III/7 Terms of Reference
- Integrated/simultaneous analysis of terrestrial and aerial imagery for urban model and texture extraction
- Automated generation of urban models with level-of-detail and inferred attribution
- Merging of information from remotely sensed imagery, traditional cartographic products, CAD models, and urban GIS
- Techniques for integration of GPS, automated image matching, and interactive construction of virtual environments
- Photo-realistic rendering for a moving user
- Optical tracking and navigation for augmented reality

WG III/8 Reliability and Performance of Algorithms
Chair: Nicolas Paparoditis (France)

WG III/8 Terms of Reference
- Data set: B&W and colour mages, various stereo overlaps, airborne laser and InSAR reference data
- Digital airborne data source: test data sets
- Reference terrain models and digital map data
- Simulation: data sets for optical, SAR and laser sources for parameter tuning of algorithms
- Specifications: rules for the validation of algorithms and the tuning of algorithm parameters
- New quality criteria: surface shape rendering with discontinuities, slope breaks, surface roughness, quality versus compression rates of DSM triangulation techniques (in collaboration with WGs III/2 and III/7)
- Accuracy versus robustness: definition, evaluation and tradeoffs;
- Establishment of evaluation protocols and organisation of international algorithm comparisons.

Plans of Commission III
WGIII/6 will be holding sessions at the IEEE/IGARSS 2001 International Geoscience and Remote Sensing Symposium in Sydney, Australia in June and is also organising a IEEE/ISPRS Joint Workshop on Remote Sensing and Data Fusion Over Urban Areas in Rome in November 2001.

ISPRS TECHNICAL COMMISSION IV
SPATIAL INFORMATION SYSTEMS AND DIGITAL MAPPING

Outgoing President	**Incoming President**
Dieter Fritsch (Germany)	Costas Armenakis (Canada)
Outgoing Secretaries	**Incoming Secretary**
Monika Sester (Germany)	Yuk-Cheung Lee, Scientific (Canada)
Markus Englich	Francine Cusson, Administrative (Canada)

Report of Outgoing President

In the year 2000 we can review the position of the Commission in the light of the changes introduced after the Congress in Vienna. . It was decided during the Vienna Congress that in future this commission should be a "homebase" for Geographical Information Systems, in particular dealing with fundamental theoretical developments, operational aspects and GIS applications. The review today clearly confirms that this move was very. Co-operation has started with the International Cartographers Association (ICA) and with the Spatial Data Handling Expert's Group of IGU - the incoming meeting of SDH in 2001 will be a Joint Meeting together with ISPRS Commission IV. It should be an objective of the future President to integrate SDH and TC IV.

It was also realised that the integration of image analysis and GIS is an important issue for data collection processes, in particular for GIS data revision. Up to now most of the image analysis strategies are data driven in a bottom up mode. Using existing GIS data this will strengthen the knowledge-driven approach, in top-down mode. It seems to be clear, that especially for GIS data revision processes the combination of top-down and bottom-up is the result for the future.

Technical Commission IV started to integrate indoor mapping capabilities offered by CAD and Facility Management Systems with 3D GIS. Therefore there is a need to interface Computer Aided Facility Management Systems with 3D city models to make our real world also virtually accessible. ISPRS can play an active part here. Preparations have been made to use high resolution satellite imagery producing these products, but unfortunately through the lack of data not that much experience could gained. This hopefully will change in near future.

TC IV started also with models for spatial-temporal data management and analysis to consider time as an additional co-ordinate. It became clear that the work should be continued to study the behaviour of spatial objects according to its geometry, topology and semantics. TC IV brought out a book for the documentation of existing global databases, this book is a valuable source for all those scientists and practitioners who are concerned with environmental monitoring.

Outlook by Incoming President

The ISPRS Commission IV on Spatial Information Systems and Digital Mapping covers a wide spectrum of scientific, technical and application fields. During 1996-2000, under the successful presidency of Prof. Dr. Dieter Fritsch of Germany, Commission IV has evolved to emphasise the need for investigating the spatial information systems and databases theory, modelling, development and applications. We intend to continue and expand these efforts by stimulating further activities towards the integration of remotely sensed imagery in spatial information systems.
The theme of the Commission will be 'New Solutions for Spatial Understanding'.

The temporal and dynamic aspects of geo-data, spatial databases, modelling and analysis will continue as active research areas. Interest in the fourth dimension facilitates the understanding of the evolution of spatial elements. Research will be oriented towards the determination and representation of interaction among space, time, attributes and procedures. The use of multi-source data in a synergetic approach will require reliable measures on the consistency and quality of data and will stimulate further work on the modelling and propagation of uncertainty in data.
The need for connectivity, data sharing, open models, and transparency to the user for effective geo-processing and accessing non-homogeneous databases, will require the scientific community to address problems of designing, modelling, organising and accessing distributed and heterogeneous databases over networks, including the Internet. Internet and web-based developments will go beyond just data accessing to address queries, analysis, processing and visualisation, including mobile and wireless environments. With respect to the acquisition of geo-data, the idea that "one collects and many use" will continue to spread with the establishment of local, national and regional data frameworks. Therefore, the design and implementation of geo-spatial data infrastructures in the form of large databases, distributed databases, and clearinghouses along with data catalogues, metadata and metadata tools will also be studied. The related issues of vertical and horizontal data integration for data aggregation, multi-scale representation and knowledge extraction and discovery will be dealt with in the work on data generalisation and data mining.

The populating of spatial databases from new airborne and spaceborne sensors will continue with the investigation of their potential in providing geometric and thematic data. The evolving role of digital imagery in modern geospatial databases, due to its high information content and high degree of understanding will be investigated. At the same time, we

anticipate a shift towards the maintenance of these databases through the use of enhanced updating approaches involving multi-resolution, multi-spectral and multi-temporal imagery. The work on automated change detection, feature extraction and feature classification from imagery for mapping purposes will continue. The existing spatial databases will play the role of 'prior' knowledge to provide cues and guidance in the (semi-) automated processes. Existing algorithmic and image segmentation techniques will be tested and transferred to operational environments.

To generate enhanced data sets and expand the use of image analysis and processing techniques, data fusion techniques employing multi-source actual sensors and complimentary virtual sensor-like data will be investigated. The use of InSAR and LIDAR technologies for DEM generation will expand including their integration with optical video and frame sensors. To serve decision-making and societal needs, digital mapping operations will integrate both topographic and thematic aspects, with expansion to 3-D and even near real-time and 4D applications. The enhancement of extraterrestrial mapping will continue along with the space exploration activities. Landscape modelling and advanced visualisation and multimedia methods will further support the data exploration and understanding process. Reconstruction of reality in virtual reality environments from abstract and symbolic data representations, in conjunction with the cognitive pattern recognition process, will emulate certain functions of the human brain's synthetic process and will significantly improve the interpretation capabilities.
As environment and sustainable development will continue to be high in the international forums, contributions will be made also towards the advancement and dissemination of knowledge on global environmental databases and mapping. Together with this will be the advancement of techniques, such as monitoring of landscape changes, for sustainable development.

We plan to put emphasis on the synergy and collaborative operation of the working groups and the activities of Commission IV to integrate theories, concepts, technologies, data, products, and systems for the better understanding and management of the space and our environment. To complete our holistic approach we will seek inter-commission co-operation through joint working groups and initiatives, while at the same time we will actively pursue co-operation and contacts with other related organisations, such as SDH, ICA, FIG, OGC and ISO/TC211.

The proposed theme for the Commission is "New Solutions for Spatial Understanding". This is to underline the pursue of innovative approaches by the Commission at the threshold of the 21st century as we move from data, through information, to knowledge for the better understanding of and interaction with our space and environment.

The upcoming quadrennial period 2000-2004 is going to be scientifically and technically challenging for Commission IV. The working groups of Commission IV will address the presented topics, trends, and developments as well as their impact on geo-information systems and digital mapping in accordance with the Terms of Reference and the resolutions approved at the ISPRS Amsterdam Congress.

Working Groups of Technical Commission IV for 2000-2004

WG IV/1 Spatial and Temporal Data Modelling and Analysis

Chair: Yvan Bédard (Canada)
Co-Chair: Wenzhong (John) Shi (Hong Kong)

WG IV/1 Terms of Reference
- Fundamentals of spatio-temporal spaces
- Spatio-temporal database design and development
- Spatio-temporal query and analysis
- Three-dimensional GIS modelling
- Multi-dimension and multi-scale models in GIS
- Spatial data quality and spatial model quality in the context of spatio-temporal GIS

WG IV/2 Federated Databases and Interoperability

Chair: Jianya Gong (China)
Co-Chair: Rolf A. de By (The Netherlands)

WG IV/2 Terms of Reference
- Conceptual aspects of inter-operable database environments
- Distributed spatial data models
- Connectivity, data sharing, open models and transparent geo-processing
- Link and integration of imagery, DEM, attribute and vector data from federated databases
- Generic access, search and retrieval methods for heterogeneous databases
- Concurrence control and data security for federated databases
- Spatial data standardisation (OGC, ISO/TC211)
- Inter-operation specifications for spatial data
- Internet GIS, based on heterogeneous databases
- Collaboration with Commission II (WG II/3, II/4)

WG IV/3 Data Generalisation and Data Mining

Chair: Monika Sester (China)
Co-Chair: Dianne Richardson (Canada)

WG IV/3 Terms of Reference
- Methods for the generalisation, aggregation and abstraction of image and vector data
- Data structures for the representation, processing and integration of multi-source and multi-scale data

- Concepts and techniques for hierarchical data analysis related to image and map object classification
- Methods and algorithms for the cartographic presentation of spatial objects with special focus on real-time, integrated approaches
- Enhancement of spatial data mining through inference using hierarchical classification and aggregation techniques, and synergy between image and map objects
- Co-operation with the ICA Commission on Map Generalisation

WG IV/4 Spatial Data Infrastructures
Chair: Parth Sarathi Roy (India)
Co-Chair: David Holland (UK)

WG IV/4 Terms of Reference
- Design and access of large spatial databases
- Development of comprehensive metadata, quality evaluation procedures and their standardisation
- Development of techniques for data integration in spatial information systems
- Logical and mathematical data modelling for mapping of spatial data infrastructures
- Development of basic framework concepts for the selection, aggregation and integration of fundamental data

WG IV/5 Image-based Geospatial Databases
Chair: Peggy Agouris (USA)
Co-Chair: Dimitris Papadias (Hong Kong)

WG IV/5 Terms of Reference
- Design aspects and characteristics of image-based geospatial databases
- Image queries and content-based geospatial information retrieval methods
- Geospatial knowledge management, synthesis, propagation, and communication in image databases
- Integration of digital images and GIS for spatial reasoning
- Imagery in digital libraries and web-based GIS environments
- Multimedia in integrated spatial information systems
- Co-operation with WG II/5

WG IV/6 Landscape Modeling and Visualisation
Chair: Marguerite Madden (USA)
Co-Chair: Jochen Schiewe (Germany)

WG IV/6 Terms of Reference
- Assessment of traditional and new remote sensing data for generating and visualising landscape models (e.g., orthoimages, DSMs, DEMs and 3-D city models)
- Integration of multi-source and multi-scale data in local and regional landscape modelling and visualisation applications
- Application and examination of dynamic and kinematic models for integrating multi-temporal landscape data sets and revising spatial databases
- Application and assessment of advanced visualisation, virtual reality and multimedia methods for 2-D, 3-D and 4-D mapping tasks in stand-alone or web-based environments
- Collaboration WG III/7

WG IV/7 Data Integration and Digital Mapping
Chair: Michael Hahn (Germany)
Co-Chair: Ryosuke Shibasaki (Japan)

WG IV/7 Terms of Reference
- Determination of the characteristics and issues related to data fusion at image, feature and information level in collaboration with WG III/6
- Integration of multi-type air- and space borne imagery as well as GIS and map data for the enhancement of spatial databases
- Techniques for high quality topographic, thematic and 3-Durban mapping requirements and applications using multi-source data
- Mapping from high resolution satellite imagery
- Quality estimation and evaluation of the fused spatial data
- Monitoring of object changes from multi-source and multi-temporal data
- Integration of 3-D spatial databases with simulation models for event representation

WG IV/8 Global Environmental Databases
Chair: Ryutaro Tateishi (Japan)
Co-Chair: David Hastings (USA)

WG IV/8 Terms of Reference
- Collection and dissemination of state-of-the-art information and knowledge on development of global environmental databases
- Evaluation, characterisation and assessment of global environmental databases
- Promotion of integrated global environmental databases
- Co-operation with related initiatives -Kyoto Protocol, Global Mapping, UN Cartographic Initiative addressing environmental global databases management
- Publication of the second volume of the book "Global Environmental Databases"
- Co-operation with WG VI/4 and VII/6

WG IV/9 Extraterrestrial Mapping
Chair: Randy L. Kirk (USA)
Co-Chair: Jan-Peter Muller (UK)

WG IV/9 Terms of Reference
- Status and technical definition of coordinate systems and geodetic control networks for mapping of planets and satellites
- Documentation of basic spacecraft data-sets for extrater-

restrial mapping, current and planned extraterrestrial map-making activities, and planetary cartographic products
- Development and documentation of new techniques for data acquisition and extraterrestrial mapping
- Development of GIS applications to support extraterrestrial exploration and science
- Web-based delivery of extraterrestrial map products and GIS data
- Co-operation with related working groups from ICA, IAU, NASA and ESA

Plans of Commission IV
Working Group IV/6, Landscape Modelling and Visualisation is planning a workshop at The University of Georgia from October 29 – 31, 2001.

ISPRS TECHNICAL COMMISSION V
CLOSE-RANGE TECHNIQUES AND MACHINE VISION

Outgoing President
Hirofumi Chikatsu (Japan)

Incoming President
Petros Patias (Greece)

Outgoing Secretaries
Eihan Shimizu (Japan)

Incoming Secretary
Alexandra Koussoulakou (Greece)

Report of Outgoing President
The last four years (1996-2000) have witnessed rapid progress in close-range digital photogrammetry. Real-time imaging applications have developed and close range photogrammetry has become a more widely adopted measurement tool in fields such as industrial metrology, machine and robot vision, medical and sports science, archaeology, architecture and construction management. Over this period, Commission V has pursued the goal of becoming a focal point, within both the ISPRS and associated organisations, for the communication of ideas and research progress in interdisciplinary areas where close-range imaging is used for 3-D scene reconstruction and visualisation. These developments have culminated in the Congress where they have been presented and discussed.

Innovations in digital imaging and recording technology over the past four-years have spanned a wide scientific spectrum, which has offered a significant opportunity for Commission V to broaden its focus and become more interdisciplinary in its activities. In particular, recently developed laser scanning technology will contribute greatly to issues such as real-time 3-D data acquisition, modelling and scene reconstruction. However, there are still many research goals related to existing theories and technologies that need to be realised and work on these areas can be expected to continue. Such current topics include real-time image sequence analysis, automated sensor orientation and calibration, automated feature extraction and image matching, modelling, and integration of ground-based vision techniques with aerial/space imagery.

There were many interesting new developments and applications in on-line and off-line multi-image and multi-sensor system configurations, laser scanning, three line scanner, virtual reality and computer animation. To further the aim of ensuring that Commission V remains closely associated with such new progress in close-range imaging,

Outlook by Incoming President
Traditionally Commission V was the focal point for close-range photogrammetric applications. Unlike other Commissions, Commission V followed a vertical approach developing theories, pursuing research and implementing it all to a wide scientific spectrum of close-range Photogrammetry applications and real-world problems, with close co-operation to the other ISPRS Commissions.
This approach attracted the interest of many researchers, coming from disciplines other than Photogrammetry, thus offering Commission V a significant opportunity to broaden its focus and become more interdisciplinary in its activities. Commission V can serve as a focal point within both ISPRS and associated organisations, for the communication of ideas and research progress in interdisciplinary areas where close-range imaging is used for 3-D scene reconstruction and visualisation.

Further pursuing this goal, we plan to enhance the interdisciplinary nature of Commission V, as close-range imaging applications, has become a more widely adopted measurement tool in fields such as industrial metrology, machine and robot vision, medical and sports science, archaeology, architecture and construction management.

Automation in Vision Metrology Systems and Industrial Applications remain a main issue and involves the further realisation of many research goals related to existing theories and technologies. These include the development of off-line and on-line systems and solutions for metrology and robot visions, and the evaluation of systems' performance in theoretical and practical aspects. Further, the use of new sensors call for new developments in data fusion, automated sensor orientation and calibration, and new algorithmic advances.

Virtual Reality is an active research area with very interesting applications. It attracts the interest of many discipline, within which close-range Photogrammetry has a distinct role in contributing to creation of geometrically accurate and realistically looking real scene and object modelling. This points at least to three research routes: (a) Development of knowledge-assisted 3-D scene understanding and reconstruction, (b) Integration of computer graphics and VR technology, and (c) Design strategies for multi-sensor data collection and integration for complex scenes and environments.

Medical applications of close-range Photogrammetry are currently characterised by real-time requirements, high geometric accuracy for surgery and anthropometry, monitor and reconstruction of dynamic events like human motion. There is a vast amount of useful applications of such research, and Commission V plans to actively support research and development in this area.

Architecture and Archaeology is another big area of photogrammetric applications. Although the contribution of photogrammetric techniques is widely acknowledged and used, the new generation of architects and archaeologists, becoming more accustomed to digital technology and Information Systems, demand more complex solutions. This calls for further research and development from ISPRS side in areas like innovative technologies and development of new products, development of low-cost and rapid techniques, use of Internet and VR technology, integration of close-range vision techniques and spatial information systems and finally the development of standard procedures and products.

The previous collaboration with the computer animation community for the exchange of knowledge, techniques and applications is reaching to more maturity. Much study and research is still required in the areas of integration of live figures and environment generation tasks into the animation process and procedures, as well as on the interaction of real and virtual objects.

As wireless field computing applications for close-range acquisition and processing earn more ground, a new wide area of research and applications is opening up. New issues like (a) the integration of office-to-field solutions for data collection, remote data access, and mobile management, (b) methodologies and applications of integrating close range and high-resolution air-/space-borne imagery, (c) distributed multimedia geospatial databases incorporating close range imagery are coming up.

Finally, the area of Image Sequence Analysis, needs the co-operation of both Commission V and Commission III in pursuing issues like image sequence analysis, temporal analysis, time-constrained solutions, dynamic analysis and tracking, integration of image data with navigation sensor data and multi-sensor information.

Working Groups of Technical Commission V for 2000-2004

WG V/1 Automation for Vision Metrology Systems and Industrial Applications

Chair: Stuart Robson (UK)
Co-Chair: Thomas Luhmann (Germany)

WG V/1 Terms of Reference

- Development of off-line and on-line systems, digital imaging systems and solutions for metrology and robot vision
- Development of algorithms and procedures for automated sensor orientation and system calibration
- Mathematical models and algorithms for vision metrology with emphasis in automation
- System performance evaluation in theoretical and practical aspects in collaboration with WG III/8
- Sensor fusion and the integration of disparate data types
- Target and feature recognition in multi-image correspondence
- Range image acquisition, localisation and segmentation
- New sensors and areas of application for vision metrology
- Co-operation with CMSC

WG V/2 Scene Modelling and Virtual Reality

Chair: Sabry El-Hakim (Canada)
Co-Chair: George Karras (Greece)

WG V/2 Terms of Reference

- Creation of accurate and realistic looking virtual reality (VR) models from real scenes and objects
- Knowledge-assisted 3-D scene understanding and reconstruction for VR applications
- Integration of computer graphics and VR technology with close-range vision techniques
- Improvement of performance aspects, such as speed and automation, of all procedures of 3-D- scene reconstruction
- Design strategies for multi-sensor data collection and integration for complex scenes and environments
- Identifying new VR applications requiring high precision 3-D models created with photogrammetric techniques
- Increasing the collaboration between ISPRS and computer graphics, computer vision, and computational geometry groups

WG V/3 Medical Image Analysis and Human Motion

Chair: Frank van den Heuvel (The Netherlands)
Co-Chair: Hans-Peter Meinzer (Germany)

WG V/3 Terms of Reference

- Development of real-time medical imaging systems
- Use of photogrammetric and computer vision techniques for data analysis in medical imagery
- Dynamic analysis of human motion

- 3-D medical imaging for anthropometry and expression analysis
- 3-D representation and visualisation and medical VR, including support to tele-medicine
- Fostering co-operation between ISPRS and the communities of medical/biomedical engineering, sports science and human/apparel engineering

WG V/4 Image Analysis and Spatial Information Systems for Applications In Cultural Heritage
Chair: Hirofumi Chikatsu (Japan)
Co-Chair: Gabriele Fangi (Italy)

WG V/4 Terms of Reference
- Development and integration of close-range vision techniques and spatial information systems for recording, 3-D reconstruction, modelling and visualisation of structures and items of Cultural Heritage
- Incorporation of innovative technologies and development of new products
- Development of low-cost and rapid techniques in documentation and monitoring of the cultural heritage
- Development of standard procedures and products in co-operation with related disciplines
- Use of Internet and VR techniques to facilitate promotion of cultural heritage
- Close co-operation with national and international groups (e.g. CIPA), as well as ISPRS WGs VII / 4 and VII /5

WG V/5 Quick Response and Distributed Computing for Close-range Applications
Chair: Antony Stefanidis (USA)
Co-Chair: Vincent Tao (Canada)

WG V/5 Terms of Reference
- Methodologies and applications of integrating close range and air-/space-borne imagery.
- Integration of office-to-field solutions for data collection, remote data access, and mobile management
- Integration of indoor and outdoor 3-D models in urban and industrial areas
- Distributed multimedia geospatial databases incorporating close range imagery and other types of geospatial information
- Wireless field computing applications for geodata acquisition and processing

WG V/6 Visualisation and Animation
Chair: Armin Gruen (Switzerland)
Co-Chair: Shunji Murai (Japan)

WG V/6 Terms of Reference
- Development of image-based techniques for integration of live figures and environment generation tasks into the animation process and procedures
- Study of methods and techniques to support the interaction of real and virtual objects
- Encouragement of collaboration with the computer animation community for the exchange of knowledge, techniques and applications
- Promotion of application-specific photogrammetric technology through collaboration with related ISPRS Working Groups and through presentations at technical meetings of the animation community

IC WG V/III Image Sequence Analysis
Chair: Marc Pollefeys (Belgium)
Co-Chair: Guoqing Zhou (USA)

IC WG V/III Terms of Reference
- Algorithms and processes in image sequence analysis, temporal analysis, time-constrained solutions and dynamic analysis and tracking
- Integration of image data with navigation sensor data and multi-sensor information
- Devices for image sequence acquisition and storage
- Systems and applications in robot vision, machine vision, medical imaging, autonomous navigation, motion analysis, deformation analysis and data capture for VR

Plans of Commission V
The following conferences are being organised by WGs under the auspices of Commission V:
- Videometrics and Optical Methods for 3-D Shape Measurement VII, SanJose, USA, January 24-26, 2001
- International Workshop on Recreating the Past "Visualisation and Animation of Cultural Heritage", Ayutthaya/Thailand, February 26- March 1, 2001
- 5th Conference on Optical 3-D Measurement Techniques, Vienna/Austria, October 1-3, 2001

ISPRS TECHNICAL COMMISSION VI
EDUCATION AND COMMUNICATION

Outgoing President	Incoming President
Klaas Villanueva (Indonesia) 1996-97	Tania Maria
Lukman Aziz (Indonesia) 1997-2000	Sausen, (Brazil)

Outgoing Secretary	Incoming Secretary
Fahmi Amhar (Indonesia)	João Ávila, (Brazil)

Report of Outgoing President

WG VI/1 on Education has developed an Educators Network to identify people involved with education, remote sensing and photogrammetry through out the world. This has been successfully established and active. The working group has also updated the UN Directory on Education, Training, Research and Fellowship Opportunities in Space Science and Technology and its Applications.

WG VI/2 on Computer Assisted Teaching has established a webpage for information, software, data dissemination and exchange of information. It has also collected and developed non-commercial software for CAT which is currently available via internet (LDIP, ORTO, WinASEAN, GIWIN, CD-ROM Remote Sensing Navigator).

WG VI/3 on International Co-operation and Technology Transfer has kept close contact with regional member organisations in Asia, Africa, and East Europe to help them in preparing the workshops, tutorial sessions as well as to encourage them in ISPES activities.

WG VI/4 Internet Resources and Spatial Data Sharing has carried out an investigation of the internet environment for each ISPRS ordinary member and has promoted homepages created by each ordinary member, commission and working group and linked by the ISPRS main homepage. It has presented Internet and webpage guidelines for ISPRS.

Outlook by Incoming President

In order to fulfil the terms of reference, Commission VI will, during the coming 4 years, encourage the participation of developing countries in Commission VI activities. This will promote education and training in Photogrammetry, Remote Sensing, and GIS in their own countries. We will also stimulate the UN Centre for Space Science and Technology Education and other Training Centres to participate in the ISPRS Educational activities, through grants, fellowships, and scholarships. It will also be necessary to encourage the dissemination of ISPRS training activities and opportunities through Ordinary, Associate, and Regional members, within their area of influence and to promote the relationship with international organisations in order to promote ISPRS educational activities. In order to reach a large number of professionals in all continents, Commission will encourage the use of Internet and computer resources in ISPRS Educational activities and attempt to stimulate the development of material for promoting the scientific and professional profiles of ISPRS areas in elementary and secondary education. As well as stimulating the Working Groups to organise Seminars, Workshops, and Training in their areas of expertise, it is also necessary to do this in co-operation with regional members of ISPRS and sister societies, who should endeavour to organise workshops for education in the developing world.

The Commission also has specific tasks:

- To maintain and update, at least annually, the Directory "Education, Training, Research and Fellowship Opportunities in the Remote Sensing and GIS and its Applications";
- To develop a directory about tutorials on Remote Sensing and GIS and to make it available on the Web;
- To encourage the development of similar Directories on Educational Photogrammetry activities;
- To increase the number of subscribers and stimulate the use of the Network Educators, for educational announcements.

The Commission has already started on its programme of work. During the period 1996-2000 TCP Tania Maria Sausen was Chair of WGVI/4, Education and she has created an EDUCATOR NETWORK, with the objective to identify people involved with education in photogrammetry, remote sensing and SIS throughout the world in order to exchange information about projects, seminars, courses, tutorials, symposia and congresses. This database has subscriptions of 100 institutions of 51 different countries. In order to enhance this an EDUCATORS NETWORK subscriber's list has been created. People who take part in this network will be directly linked to the ISPRS TC VI - Education and Communication WG and be able to receive and send information about education to all subscribers.

WG VI/1 has also done some preparatory work to set-up and start its work. A web page was established with various useful information on educational resources (especially free web sites giving information on such as courses, tutorials, glossaries and dictionaries), software, lists of educational institutions, bibliographic information (books, journals etc.), conference proceedings and other links. Tutorials at ISPRS events will also be placed at our WEB page and we have already contacted all convenors of the Amsterdam tutorials to send us their notes. This webpage is planned to be updated continuously with aim to be a major digital and freely accessible database on education and training. Addresses of people interested in education

and training from all continents have been collected and a first circular letter has been sent out.

Working Groups of Technical Commission VI for 2000-2004

WG VI/1 Education and Training

Chair: Emmanuel P. Baltsavias (Switzerland)
Co-Chair: Theodore Bouloucos (The Netherlands)

WG VI/1 Terms of Reference

- Identification and promotion of educational and training opportunities, taking into account regional needs
- Identification, promotion and organisation (in co-operation with educational and research institutions) of educational material (courses, tutorials, glossaries etc.), especially in electronic form
- Collection and dissemination of information on higher level education;
- Organisation of educational and training activities, especially at ISPRS events and with the co-operation of ISPRS members
- Promotion of scientific publications in our fields and collection and dissemination of respective bibliographic information
- Co-operation with firms, esp. Sustaining Members, for training at technical level (e.g. operators) and support of educational and training activities in developing countries
- Co-operation with International Spatial Information Societies, UM and other relevant organisations on education and training
- Stimulating the development of materials for promoting ISPRS scientific and professional activities in elementary and secondary education

WG VI/2 Computer Assisted Teaching

Chair: Mark R. Shortis (Australia)
Co-Chair: Pierre Grussenmeyer (France)

WG VI/2 Terms of Reference

- Collection, analysis, dissemination and promotion of materials, software and data (hard copy and/or soft copy) for computer assisted teaching
- Investigation of the role of computer assisted teaching in modern education and training such as material, methodologies, and tools
- Assessment and evaluation of highly interactive multimedia materials and the transformation of tertiary level courses in remote sensing, photogrammetry, SIS

WG VI/3 International Co-operation and Technology Transfer

Chair: Mojca Kosmatin Fras (Slovenia)
Co-Chair: Ulrike Karin Rivett (South Africa)

WG VI/3 Terms of Reference

- Development of matrices of joint activities with ISPRS Regional Members and other international organisations
- Development of activities to foster relationships between Regional Member organisations and the relevant WG
- Development of connections with international organisations to urge the wider promotion and use of photogrammetry, remote sensing, GIS and related disciplines
- Further development of international co-operation and public relations for ISPRS professions and stimulation of young professionals for co-operation in ISPRS activities
- Identification of channels for international co-operation in education and stimulation of international and regional organisations to support and fund activities promoted by ISPRS (in co-operation with the Council)
- Identification and use of support mechanism addressing needs for technology transfer, i.e. knowledge transfer and improvement of the infrastructure, especially in developing countries
- Establish links and liaise with ISU

WG VI/4 Internet Resources and Distance Learning

Chair: Sanjay Kumar (India)
Co-Chair: Carlos G. Patillo (Chile)

WG VI/4 Terms of Reference

- Development of Education Forum through Internet about remote sensing, SIS and photogrammetry in co-operation with WG VI/1
- Identification and provide links to sources of geospatial data and accessibility through Internet Map Server Applications
- Development and maintenance Web Directory about Tutorials on Remote Sensing, SIS and Photogrammetry
- Development of Technical Guides for Distance Learning implementation through Internet
- Maintenance of ISPRS Internet guidelines
- Identification and dissemination of RS, SIS and photogrammetry applications provided in Internet
- Collaboration with WG IV/8, WGII/3 and WGII/6

Plans for Commission VI

A number of workshops and seminars are planned:

- WG VI/4 is organising a session at the 4th Annual International Conference and Exhibition on Geographic Information Science in New Delhi, India, 7-9th February 2001.

- Seminar: "Education and technology transfer in Photogrammetry, Remote Sensing and Spatial Information Sciences in Latin America", Porto Allegre, Brazil, 9-10 October, 2001 (in co-operation with WG VI/3).

- Workshop "Photogrammetry, RS and SIS technologies for human settlements", Dar es Salaam, Tanzania, March, 2002 (in co-operation with WG VI/3 and a local host).
- Workshop within the frame of an Asian Conference on Remote Sensing possibly on RS, GIS and GPS technologies for environmental monitoring, agriculture and disaster management. Date and place have not been fixed yet.

ISPRS TECHNICAL COMMISSION VII
RESOURCE AND ENVIRONMENTAL MONITORING

Outgoing President
Gabor Remety-Fülöpp (Hungary)

Incoming President
Rangnath Navalgund (India)

Outgoing Secretaries
Peter Winkler (Hungary)
Frank Heygi (Canada)

Incoming Secretary
Shailesh Nayak (India)

Report of Outgoing President

Applied remote sensing became more and more inevitable technology tool contributing to human's progress toward sustainability by support solving environment-related tasks on local, regional and global level. Remote sensing became integrated part of the advanced Information Technology and Telecommunication infrastructure, basement for the information society. Topics include building spectral databases and large datasets (local, cross border, continental or global), enhancing validation and calibration procedures in multi-source, multi-temporal environment, which are some of the strategic imperatives of the application-oriented research and development initiatives. These activities support the introduction of operational utilisation of the technology.

WG VII/1 on Fundamental Physics and Modelling has covered topics which included endmember selection/spectral unmixing, extraction of plant parameters via model inversion and semi-analytical approach, modelling the surface temperature, combining spectral and spatial information for classification purposes, solar energy simulation for rainforest environments, geometric rectification of hyperspectral airborne pushbroom data. Applications were mainly focused on geoscience (exploration, mine tailings monitoring and assessment, soil erodibility, soil distribution, river morphology), water (quality, phytoplankton and wave height extraction), agriculture (classification, stress detection, and retrieval of soil moisture, biomass, LAI, etc.), and GIS applications (demining). Optical, radar, and thermal data acquired with airborne as well as with spaceborne sensors were utilised to extract the information products. In some cases, a fused data set, e.g. optical combined with radar data, was used to retrieve the desired information.

Thematic applications of High Spatial Resolution Satellite Imagery were covered by WG VII/3.
Some data integration for urban planning and management, applications for improved rural management including precision farming, as well as support of local environmental impact studies using high resolution imageries were demonstrated at the Congress, but fewer as expected.

WG VII/5 has worked on Global Monitoring and organised session related to the Kyoto Protocol at the ISPRS Congress jointly with ISPRS WG IV-6 (Global databases supporting environmental monitoring). It provided an opportunity for a larger number of EO scientists to participate and discuss the importance of Earth Observation technology in the context of global treaties. The session "Spaceborne Low Frequency Microwave sensors - assessing user needs and technical limitations for global biomass estimations" (jointly with ISPRS WG VII-6 Radar Applications) addressed particular issues related to a new generation of microwave systems for assessment of global terrestrial carbon stocks.

Members of the WG on Radar applications have been active in the organisation of PACRIM2 which will see the NASA-JPL Airborne SAR (AIRSAR) flown in sixteen countries in the Pacific, Australian and Asian region in the April-May 2000 time period. WG VII/6 conducted a Tutorial on 'Recent Developments in Radar Science and Applications' given by Dr. Tony Freeman from the Radar Sciences Group at JPL. This collaborative science research mission provides the opportunity for environmental scientists in the region to acquire multi-polarimetric and interferometric SAR. In addition the Modis-Aster simulator MASTER will also be flown on this mission to acquire imagery in the visible NIR, SWIR and thermal portions of the electromagnetic spectrum.

A major activity of the WG VII/7 (Non-Renewable Resources and Geotechnical Applications active participation of the 28th International Symposium on Remote Sensing of Environment and the 3rd African Association of Remote Sensing of the Environment (AARSE) on "Information for Sustainable Development". Cape Town, March 27-31, 2000. WG VII/7 was involved in TC VII-8, TU11 and WS5 of the ISPRS Congress in Amsterdam.

ISPRS Council and the Joint Council Technical Commission Presidents Meetings were hosted by the Hungarian Society of Surveying, Mapping and Remote

Sensing at FÖMI Remote Sensing Centre's premises on April 5-6 and April 11. Additionally, ISPRS Seminar entitled „Photogrammetry and Remote Sensing at the Millennium" was held in Budapest with the active participation of ISPRS officers on April 7, 2000.

Outlook by Incoming President

In a relatively short span of three decades since the launch of LANDSAT-I in 1972, space borne remote sensing has proved itself to be an indispensable tool for resource inventory and environmental monitoring at global, regional and local scales. Integrated use of RS and GIS techniques coupled with advancements in communication and information technologies are providing solutions to facilitate sustainable development of natural resources, environmental protection and disaster management. Launch of space missions carrying advanced sensors operating in very high spatial, spectral and temporal resolution mode both in optical and microwave regions provide additional dimensions to earth observation and demand better calibration, data analysis, fusion and integration techniques. While applications-oriented research in some of the countries has lead to operational and commercial use of this technology in many fields, many countries particularly in the developing world are yet to harness the benefit of technology fully. Major effort is required in development of international co-operation for promoting the use of RS & GIS in meeting challenges in the field of food security, environmental monitoring, urban sustainability, disaster mitigation, development of integrated monitoring systems for optimal management of resources, etc. Effective use of global data sets to understand geosphere –biosphere interaction and development of techniques to assimilate satellite derived parameters in models to understand global change need attention. The nine resolutions passed for Commission VII by the General Assembly in Amsterdam reflect these developments and provide directions to further work. Trends and challenges in some of these areas are briefly summarised.

Understanding and modelling spectral response of targets at different wavelengths and under different viewing geometry is basic to remote sensing. Development of methods for inverting spectral measurements to derive geophysical and biophysical parameters for their further use in process based models is needed. Some of the parameters are emissivity, aerosol optical depth profile, LAI, FAPAR, ocean colour etc. In view of the launch of many large swath sensors such as IRS-WiFS, SPOT-Vegetation, understanding effect of viewing geometry on spectral signatures will be important. Hyperspectral imaging data will contain the inherent problem of mixed classes because of low spatial resolution. Hence, extraction of end members from spectral mixtures using various methods like principal component analysis, fuzzy algorithms or parallel co-ordinate representation techniques will need attention. Increasing availability of multi-dimensional (multi-frequency, multi-polarised, multi-date, multi-look angles) digital radar data opens up many areas of research to understand microwave signatures. Availability of very high spatial resolution, hyperspectral, multi-temporal optical data along with thermal and microwave data is opening up new field of data fusion and integration techniques. Standardisation of various procedures for data fusion needs to be developed.

Sustainable agricultural production is of utmost importance in ensuring food security to the increasing population. It calls for identification of problems and optimal land use planning at watershed level, and adoption of proper soil and water conservation measures. RS and GIS have a major role to play in developing methods for ensuring sustainable development of renewable land and water resources. Study of cropping system which addresses crop-crop interaction, the long term effects of various cropping sequences on productivity, soil and environmental health is important. Research needs to be focused to identify indicators of sustainability, effect of green house gases on biomass production and carrying capacity. Application of high spatial resolution multi-spectral data for precision farming is another important area of research. While remotely sensed data has demonstrated its usefulness in crop monitoring and yield prediction, there is need for development of national level integrated systems for crop production forecasting and further research in improving yield models. FASAL (Forecasting Agricultural Output using Space, Agrometeorolgy and Land based Observation) programme being evolved in India is an interesting concept.

Advances made in the information and telecommunication technology have led to conceptualising resource monitoring systems by integrating remote sensing and in situ observations in GIS environment. Development of spatial information systems to support optimal resource management models and decision support to help e-governance should be gaining momentum. Standards for such databases and their inter-operability need to be identified. Availability of high spatial resolution optical as well as radar data, advances in GIS and GPS technology should provide impetus. Major research programmes need to be developed for environmental impact analysis, risk assessment, integrated coastal zone management, ecological assessment of reclamation, groundwater pollution, etc. Networking between information provider and end-user, standardisation of data-exchange format, etc. need to be developed.

A large number of cities all over the world are already using satellite and aerial data with GIS for preparation of development plans, transport network optimisation, utility management etc. Availability of high spatial resolution remote sensing data shall enhance one's ability to monitor urbanisation, study its impact on environment and to help planning rural infrastructure. Delineation and mon-

itoring of environmentally sensitive areas would require attention. Research will also be focused on the use of high resolution SAR data, and its DEM likely to available from RADARSAT-II, ENVISAT, SRTM etc. Recently, there has been emphasis on the conservation and management of natural heritage sites and cultural landscapes. The role of remote sensing (aerial photographs, high resolution multi-spectral data, radar data, etc.) in GIS environment for restoration of some such sites has been demonstrated. Standard procedures to routinely monitor such sites and conservation and preservation practices need to be evolved in close co-operation with CIPA and other international bodies.

Earthquakes, landslides, volcanic eruption, fires and floods are natural hazards that kill thousands of people and destroy billions of dollars of habitat and property each year. Floods are the most serious disasters followed by earthquakes, (man-made) accidents and landslides. Disaster management comprehends the aspects of risk analysis (assessing vulnerability or hazard analysis) and preparedness, prevention (disaster warning or early warning), disaster relief (rescue), and disaster mitigation and planning. Remote sensing has made significant contributions in identification of risk zones. However further efforts are required in providing warning and alert. Development of systems which integrate space observations, modelling and space communication are important. Post-disaster management comprises rescue, relief, and rehabilitation / reconstruction. Remote sensing play its most spectacular role in disaster damage assessment. The various technologies, which would be of significant use in disaster management, are rainfall measurement for flood and landslide warning, soil moisture measurements for flood, landslide and drought warning, application of high spatial resolution imagery for damage assessment, SAR data for timely damage assessment (in an operational phase, by using many satellites to enhance the repetition cycle), slope analysis for landslide vulnerability, determination of tectonic motion for earthquake prediction as a trigger for landslides.

SAR Interferometry technique shows promising results for topographic mapping and change detection, especially, where the detection of height differences in terrain is necessary, e.g., in risk analysis with respect to earthquakes, mass movement and volcanic outbreaks. Through use of differential SAR Interferometry (DInSAR) it is possible to monitor minute surface movements which accompany a range of natural disasters. This technique is in rapid development and operational applications are starting to emerge.

Space observations are an important step toward recording and under standing Earth changes, both natural and man-made. As remote sensing affords the opportunity to view the earth synoptically as an entity, it has been possible to create long-term data sets on various aspects of global change, such as, radiation budget, atmospheric chemistry, ocean surface topography and circulation, sea surface temperature, oceanic biological productivity, ocean/atmosphere coupling, global vegetation, desertification, coastal change, volcanoes, snow cover, human induced changes. Among the complications in producing time series of remotely sensed data for large areas are the problems of storing data and processing them in a consistent and timely fashion. Also, many of the derived data sets from remote sensing should be checked for consistency using physical principles. Complementing the advances made in the understanding of the Earth system from remote sensing has been the advances made from numerical models. Models of the Earth's atmosphere and oceans are being used to predict global changes and particularly the likelihood of global warming and its consequences. Efforts are put into modifying or designing these models to be able to accept remote sensing data as inputs. Considering the huge nature of this data and the analysis methodologies, there is strong need for international co-operation among the space technology providing countries for creating global database and co-operating in the large scale validation of numerical predictions. Organisations like IGBP and CEOS are a step towards that. Close co-operation with TC-IV is envisaged.

Working Groups of Technical Commission VII for 2000-2004

WG VII/1 Fundamental Physics and Modelling

Chair: Karl Staenz (Canada)
Co-chair: Marc Leroy (France)

WG VII/1 Terms of Reference

- Study of spectral, spatial and temporal signatures of various earth surface features (land and ocean) with special reference to hyper spectral and microwave aspects
- Studies to understand view angle effects on spectral signatures
- System studies to define a set of sensors / constellation of satellites for theme applications and radiometric and geometric calibration requirements; in conjunction with WG I / 2
- Investigations in the area of retrieval of geophysical parameters
- Co-operation with WG III/5 on advance information extraction techniques : classifiers, data fusion techniques
- Co-operation with institutions maintaining data bases on spectral signatures, CEOS CalVal WG and EARSeL SIG on Imaging Spectrometry

WG VII/2 Sustainable Agriculture & Eco-system Approach

Chair: Andrew K. Skidmore (The Netherlands)
Co-chair: Lei F. Tian (USA)

WG VII/2 Terms of Reference
- Improve crop monitoring and yield modelling methodology with synergistic use of space, agrometeorology and in-situ observations in GIS environment
- Investigate the interaction of agriculture with ecosystems, especially management that reduces agricultural impacts on the environment
- Geo-information and management requirements for the ecosystem approach
- Ensure optimal use of agriculture inputs for precision farming employing high spatial and spectral resolution and other data
- Improve models for assessment, efficient utilisation and conservation of water resources for agriculture using optical, thermal and microwave data with other data
- Integrated studies for cropping systems in various regional set-ups for attaining sustainable agriculture

WG VII/3 Integrated Monitoring Systems for Resource Management
Chair: Sandra Maria Fonseca da Costa (Brazil)
Co-chair: Li Yingcheng (China)

WG VII/3 Terms of Reference
- Modelling and management of natural resources using integration of RS, in-situ measurements and other data in GIS environment
- Use of spatial information systems for generating alternate scenarios to facilitate monitoring and optimal management : forestry, geology, hydrology, coastal zones, snow and ice
- Contribute to the establishment of reliable indicators of sustainability
- Co-operation with international environmental programmes such as IGBP and ICORSE for development of process-based models to sustainability

WG VII/4 Human Settlement and Impact Analysis
Chair: Gabor Remetey-Fulopp (Hungary)
Co-chair: Carsten Juergens (Germany)

WG VII/4 Terms of Reference
- Data analysis for urban land use studies and for improved urban planning using aerial and high spatial resolution space borne data
- Remote observations for monitoring urban environment and change detection
- Use of Remote Sensing & GIS for infrastructure development for rural settlements
- Study impact of urbanisation, industrial growth, mega engineering structures on ecological and social environment, urban sustainability; tracking of disease vectors
- Documentation, conservation and management of natural heritage and cultural landscapes in co-operation with UNESCO / ICOMOS / CIPA
- Interface with IHDP

WG VII/5 Disaster Monitoring, Mitigation and Damage Assessment
Chair: H. Singhroy (Canada)
Co-chair: Michael Abrams (USA)

WG VII/5 Terms of Reference
- Identification of potential risk zones for different type of disasters such as forest fire, cyclone, floods, volcanoes, earthquake, land slides etc.;
- Integrated observation and communication strategies for disaster detection, monitoring and damage assessment in co-operation with CEOS and IGOS;
- Enhance predictive modelling capabilities;
- Development of disaster management plans for pre, during and post disaster situations;
- Foster the creation of more effective information systems to support disaster management activities

WG VII/6 Monitoring and Modelling Global Change
Chair: Yoshifumi Yasuoka (Japan)
Co-chair: Mark Imhoff (USA)

WG VII/6 Terms of Reference
- Use of long term regional and global data bases using historical and satellite data over terrestrial eco-systems, snow and glaciers, atmosphere, oceans to monitor and model global change in co-operation with WG IV/8
- Evolve standards for data exchange and quality evaluation of satellite derived bio-geophysical parameters
- Develop strategies and algorithms for assimilating remotely sensed data in global change models
- Co-operation with international programmes, e.g. International Global Change Atmospheric Chemistry (IGAC), to support implementation of international policies and treaties

Plans of Commission VII
Two international workshops on Physical Measurement and Signatures in Remote Sensing (January 8-12, 2001, Aussois, France) and on Spectral Sensing Research (June 10-15, 2001, Quebec, Canada) are planned.
A close interaction with the CEOS Cal/Val group and TC I is planned.