

## Digital Photogrammetry: Challenge and Potential

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An evaluation of the status and development of digital photogrammetry must distinguish several aspects and considerations of a different nature:

(1) As a minimum requirement, digital photogrammetry has to provide at least the performance of the previous level of analog and analytical photogrammetry. Digital image workstations would have to perform at least as well as digital analytical plotters. Such minimum requirements exercise no powerful thrust for switching over to digital methods, unless the new technology would allow considerably faster and cheaper operations, which is only partly the case.

(2) The basic power of new technologies lies in the potential for new, extended operational concepts and the possibility to go beyond the performance and products of the previous technological level. In digital photogrammetry, this is the vast potential for automation. There is a number of processes and products which are particularly suited for digital automation. The prime examples within the conventional scope of photogrammetry are automatic digital aerial triangulation, automatic generation of digital elevation models by image correlation techniques, and digital orthophotos, not to mention various measurement and orientation functions which have been automated. Such automated products are carrying and pushing the successful transition from analytical to digital photogrammetry. Their quality and economy will be decided by the acceptance by producers and users of digital photogrammetry.

(3) Digital mapping and object extraction from digital image data by image workstations will depend on interactive human intervention for a long time. Thus, there seems no particular advantage over the use of conventional analytical plotters. This is not completely true, however, as the interactive operations by digital image workstations can be effectively supported and speeded up by the automation of various elementary functions and processes. Also, all tools for graphical data processing and complex editing functions can be used which help, in addition, to turn interactive modes of operation into efficient procedures.

(4) Another point in favor of digital methods is the total system aspect. It applies, for the time being, mainly to close-range digital photogrammetry, including digital cameras, and

to spaceborne digital photogrammetry and remote sensing systems.

(5) The acceptance and transition to digital photogrammetry in practice is presently decided by the technical and quality performance of the automated products as mentioned in item (2), as well as by the image workstations for interactive modes of operation. There is, however, an equally important second basic aspect of a long-term nature concerning the added value performance of digital photogrammetry. Digital systems can integrate, merge, intersect, and compare different sets and different kinds of data, resulting in wider and more flexible operations within and beyond the field of mapping. The applications are expanding out into general information systems. These are long-term developments which will eventually constitute and provide the driving power for the further expansion, application, and integration of digital image information technology.

(6) A last consideration, beyond the level of item (5), concerns the potential of digital systems to deal with multi-data and multi-sensor systems. These operations constitute an even more generalized level of information processing and management and can only take effect at a later stage.

(7) In summarizing and evaluating the above considerations, the direction which digital photogrammetry will take and the steps it will go through seem to be clearly staked out. There is no doubt that digital photogrammetry, having managed the first steps, will continue to be developed and applied, out of the pushing power of its internal and conceptual consistency. The critical phase is the present initial switchover from analytical to digital methods and operations. Here, success will depend on the performance of the automatic and interactive modes of operation, within the conventional range of photogrammetry. In view of the power of the new technology, it can be expected that the ongoing transition will continue and succeed quite rapidly, at least in highly developed countries. In other countries the transition and the acceptance may take longer. There is hardly any doubt that the present initial establishment of digital photogrammetry is being successful. After that stage, it will be a self-propelling irreversible system which will be propagated further by the described general long-term effects.

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