

BACK TO THE ROOTS IN PHOTOGRAMMETRY, REMOTE SENSING AND GIS

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ABSTRACT

It is the intention of this paper, to gain permanently updated guidelines for a state of the art curriculum in Photogrammetry, Remote Sensing and GIS in coincidence with the valid structure of the ISPRS Commissions and Working Groups, which therefore both should not be fixed, but permanently maintained, according to current needs.

As a first important basic step to attract the Public interest in Photogrammetry, ISPRS via internet should announce an international competition for an attractive term, to replace the name "Photogrammetry and Remote Sensing".

Of course this renaming must be accompanied by a substantial reorganizing of the obviously inconsequent queue of the present ISPRS Commissions, which might systematically lead to the proposed 5 candidates for the new ISPRS commissions to replace the 7 existing ISPRS Commissions and which shall serve as a guideline for curriculum improvements, too.

In this context it is shown, dealing with roots of Photogrammetry, Remote Sensing and GIS is required and still gains a surprising potential for further research, e.g., with respect to Stereophotogrammetry, but also for improving practical applications, like for Monument Tachymetry and Photogrammetry, as carried out for example, for the antique ruins of Patara (Turkey) etc..

KURZFASSUNG

Mit diesem Beitrag sollen stets aktuelle Richtlinien zur Erstellung von Lehrplänen in Photogrammetrie, Fernerkundung und im GIS Bereich gewonnen werden. Diese Richtlinien sollten im wesentlichen mit der Struktur der ISPRS Kommissionen übereinstimmen. Darum sollte als ein erster Schritt ein internationaler Wettbewerb für eine angemessenen Namensänderung der ISPRS im Internet ausgelobt werden, nicht zuletzt auch, um ein breiteres Publikum für unseren Berufsstand zu interessieren. Natürlich muss diese Namensänderung mit einer substantiellen Reorganisation der offensichtlich inkonsequenten Reihenfolge der bisherigen 7 ISPRS Kommissionen einhergehen. Es werden 5 Themenbereiche und damit Kandidaten für die neuen ISPRS Kommissionen vorgeschlagen, die gleichzeitig als Richtlinien für die Inhalte von Lehrplänen dienen sollen.

Im Kontext dieses Beitrages wird einmal mehr aufgezeigt, dass allein schon die bislang oft vernachlässigte Beschäftigung mit den Wurzeln unseres Fachgebietes sehr wichtig ist und immer noch ein überraschend grosses Forschungspotential aufweist. So werden beispielhaft allein für den grundlegenden Bereich der Stereoskopie 20 Forschungsthemen aufgelistet und die moderne video gestützte Tachymetrie propagiert, die beispielsweise für die Monument Photogrammetrie der antiken Stätten in PATARA (Türkei), immerhin ein Kandidat für Atlantis, sehr erfolgreich angewendet wurde.

1. INTRODUCTION

This paper deals with the deriving of guidelines for a state of the art curriculum in Photogrammetry, Remote Sensing and GIS, in coincidence with the valid structure of the ISPRS Commissions and Working Groups, which therefore both should not be fixed, but permanently maintained, according to current needs. In this context it is shown, dealing with roots of Photogrammetry, Remote Sensing and GIS is required and gains a surprising potential for further research, e.g., with respect to Stereophotogrammetry, but also for improving practical applications, like for Monument Photogrammetry, as carried out for example, for the antique ruins of Patara (Turkey) etc..

2. FOTOMATICS to replace ISPRS?

Therefore, as a first important basic step to attract the Public interest in Photogrammetry and facing the truth, that not even the motto of the ISPRS 2000 congress in Amsterdam does contain the "antique toungebreaker" "Photogrammetry and Remote Sensing", within this paper it is highly recommended, ISPRS should announce an international internet-competition for an attractive term, to replace the name "Photogrammetry and Remote Sensing". Early Suggestions are, e.g. "Fotomatics", as a part of "Geomatics", as proposed by the authors. Additional candidates for a renaming of our Society are according to CASE "Spatial Information Sciences" or "Iconic Informatics", as proposed by WANG.

2.1 New ISPRS Commissions are Curriculum guidelines!

Of course this renaming must be accompanied by a substantial reorganizing of the **obviously inconsequent queue of the present ISPRS Commissions**, which might lead to the following proposed 5 candidates for the new ISPRS commissions to replace the 7 existing ISPRS Commissions and shall serve as a guideline for systematic curriculum improvements, to be openly discussed: (1) Professional Matters; (2) Projects (for applied Fotomatics); (3) Image Generation (including sensors, image and text Data bases available via, e.g. www); (4) Geometric Image Processing (including geometric ground truth, geometric algorithms, digital image rectification, GIS etc.); (5) Image Interpretation (including artificial intelligence etc.).

Based on this topics, more sophisticated guidelines for curricula in Photogrammetry, Remote Sensing and GIS which contain traditional and advanced professional fields have to be developed and permanently to be maintained. It is liked to emphasize, at least the visualization of sophisticated photogrammetric problems will remain from traditional photogrammetric instruments.

In this context it is highly recommended, professional curricula in particular should the roots of Photogrammetry, Remote sensing and GIS. This is mainly due to attract the Public in our profession, to improve in education and to stimulate for Photogrammetric research. In addition hereby practical figures result, even for photographers, like the stated improved formula for an optimum base length for stereo photography or the strengthening of the need of the interior orientation for photogrammetric triangulation purposes.

2.2 Back to the roots!

Here the basic field of stereoscopy represents an important part of roots of Photogrammetry, Remote Sensing and GIS:

From a proper investigation of the basic principals of stereo aids it is shown, even the future of the whole computer industry can be changed, which refers to a candidate for a new PC generation (!), the so called "3D tube" which generates "real"(!) 3D laser based models within a cylindrical Plexiglas tube, see figure 1.

Already within this basic field of stereoscopy easily can be defined 19 additional research topics, which so far have not satisfactory been solved: This is a real challenge, to attract experts as well as the Public for our profession:

Some research gaps for technique and arts aspects are:

1. The market potential for stereo images
2. The history of stereoscopy
3. The effects of combination of pictures showing different pixel size
4. The effects of Fusion of different Sensor images (e.g. optical and radar)
5. The effects of combination of day- and nighttime pictures
6. The effects of combination of "before and after" pictures.
7. The role of the dominant Eye.
8. The potential of stereo-panorama-pictures
9. The potential of a connected amount of stereo mates
10. Natural or super elevated deep perception?
11. The professional potential of existing archives for 3D-pictures and movies:
To be mentioned are namely the Bill-Gates archive, the Keystone and the Underwood and Underwood archive, as well as the Meydenbauer archive, see also figure 2.

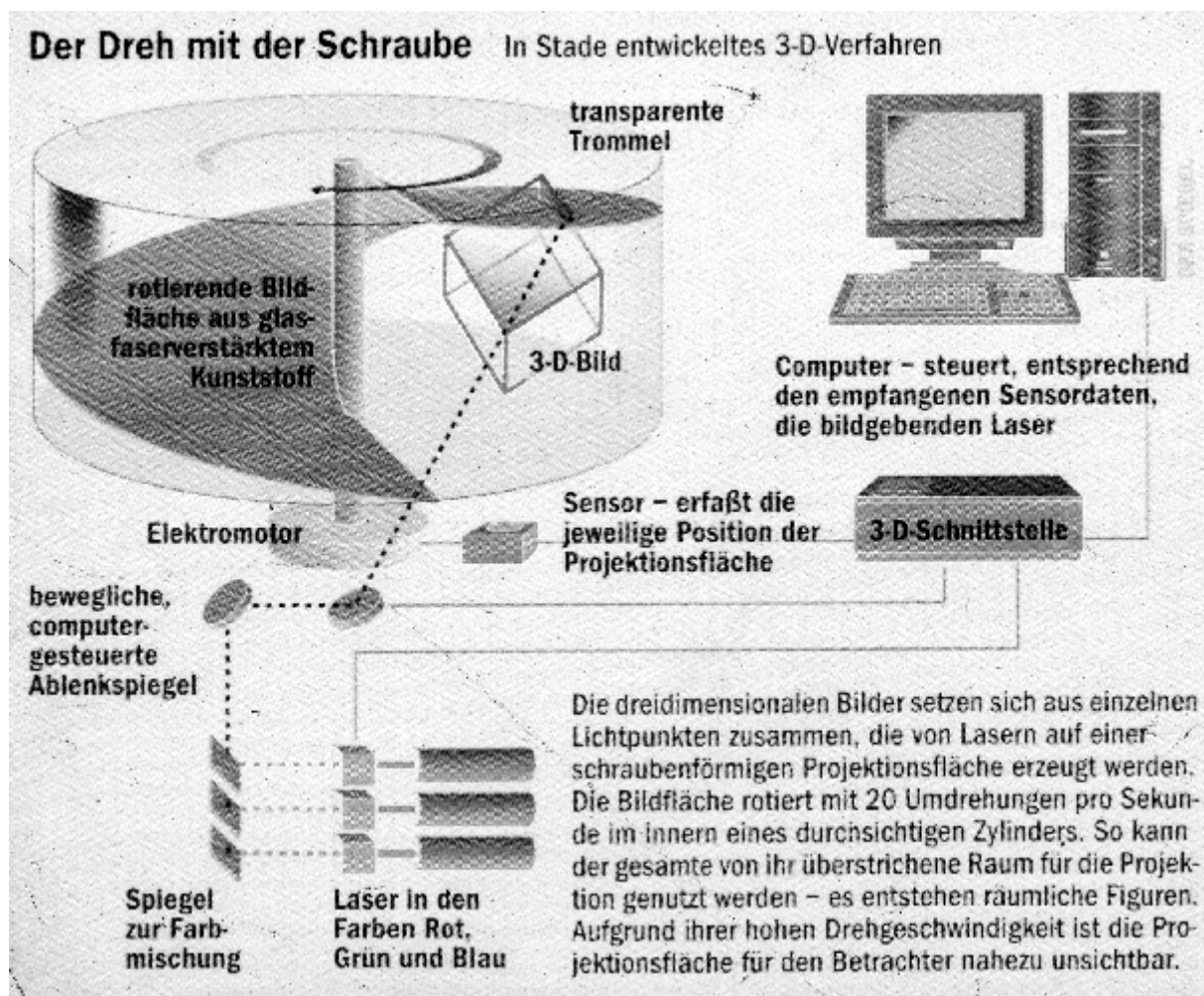


Figure 1. The 3D-tube, a candidate for a new PC-Generation according to the Spiegel magazine.



Figure 2. As a sample and as homage to the host of the ISPRS 2000 congress a rare stereo pair of old Amsterdam is shown; courtesy of the stereo image archive Prof. Schuhr, showing one sample of estimated existing 1 million existing unique classical stereo mates.

An additional research gap for technique and arts aspects is:

12. The optimum base length for 3D documentation purposes:

For objects showing a great varying in depths, the base length to minimum distance ratio should be 2:10 or even more relaxed.

The reason is, stereo mates taken with a base length extending 0.25 times minimum object distance, run into a decay of the stereo impression.

For objects showing almost no varying in depths, the base length to distance ratio should be at least 1: c (cm); with c= focal length.

Additional research gaps for technical aspects are:

13. Optimizing of 3D-methods

14. Recovering of a lost (or never existed) stereo mate

15. Increasing of the depths perception due to stereo mates showing different focus

16. The geometric potential of stereo mates

Additional research gaps for arts aspects are:

17. The art critical argue with the genre stereo photography is not satisfying so far. This holds for existing historical "masterpieces" of stereo pictures as well as for new stereo mates of the sujets human beings, portrait, nature, landscape, architecture, technique etc..

18. Differences in the decision for the motive using 2D and 3D photography strongly from an artist point of view are still waiting for a proper investigation.

19. Artists manipulation of 3D pictures by, e.g. Computer, are still a task for creative photographers, though within this field big efforts already have been achieved.

As another important experience from practical applications of basic Photogrammetry, videoclips successfully have been used, to replace sketches and signals for controlpoints! This method has been applied for photogrammetric mapping of the ruins of Europe' s largest antique houses of parliaments in Patara (Turkey), even a candidate for Atlantis, see figure 3:



Figure 3. Video based Monument Tachymetry, as here applied in PATARA (Turkey), a state of the art method, to replace time consuming sketches and signals for geometric purposes.

3. CONCLUSIONS

It has been carried out, moving back to the roots of Photogrammetry, Remote Sensing and GIS gains a surprising potential for the reorganizing of ISPRS, as well as for curriculum development and for further research, in particular with respect to the third dimension and for practical applications in the Monument Tachymetry and Photogrammetry. From a systematic dealing with roots of Photogrammetry it is shown, modern Digital Image Processing- and GIS-Systems stay within the good tradition of Photogrammetric Instruments, which partly remain for visualization purposes. There is no doubt, the digital technology will replace the analog and analytical photogrammetric instruments, maybe even completely.

State of the art guidelines for curricula in Fotomatics permanently must aware improvements in modeling, in soft- and hardware, as well as in analysis and standards etc.. As verified within this paper, recent developments in education and communications, in data access and data exchange in Photogrammetry , Remote Sensing and GIS must deal with the World Wide Web.