

25 YEARS LONG HISTORY ON WORLDWIDE GEOINFORMATICS MARKET.

Victor Adrov
Managing Director, Racurs, Russia

Crete, Greece. September 2018



RACURS TODAY

John Romero

You might not think that programmers are artists, but programming is an extremely creative profession. It's logic-based creativity.

Джон Ромеро

Возможно, вы не думаете, что программисты - это художники, но программирование - чрезвычайно креативная профессия, основанная на логике.

Racurs company's business mission is to provide the world-wide geospatial community with advanced and cost-effective digital photogrammetry solutions and services for creation of wide range of output products from the available remote sensing data.

Scope of activity

- PHOTOMOD development and further integration into Russian and international markets.
- Photogrammetric production services using both airborne and satellite imagery.
- R&D in the field of remote-sensing data processing software, methods, and algorithms.
- Remote-sensing data distribution in Russia and the CIS countries.

Partnership and associations:

- A voting member of GIS - Association of Russia since 1995
- A sustaining member of ISPRS since 1998
- A member of RSPRS since its foundation in 2000



RACURS TODAY



- Employees over **50** people
- 60 partners across **45** countries
- More than **900** user's companies over the world (**80** countries)
- Almost **10.000** PHOTOMOD workplaces
- More than **100.000** distributed satellite images
- More than **17.000.000** km² digital maps, DEM and orthophotoplans in various scales



Оптимистический принцип IBM

Машины должны работать; люди должны думать

Optimistic IBM principle

Equipment must work; people must think

RACURS TODAY

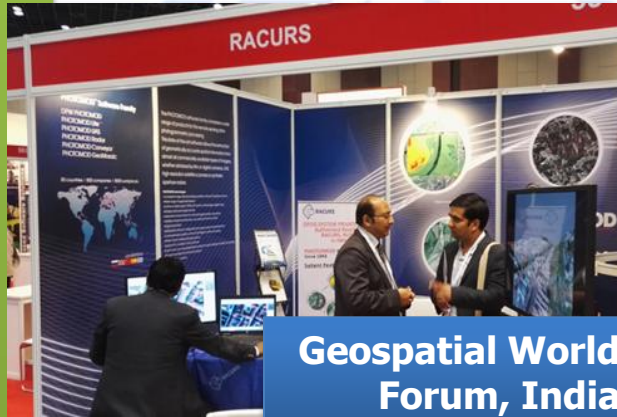
Where to meet us



INTERGEO, Germany



Congress of the ISPRS



Geospatial World Forum, India



Congreso Internacional de Geomatica, Cuba



InterExpo GEO-Siberia, Novosibirsk



Other events...

International conferences

RACURS TODAY

Where to read about us

2018 **Remote Sensing, 10(2)**

G. Goldbergs, S. Maier, etc. Efficiency of Individual Tree Detection Approaches Based on Light-Weight and Low-Cost UAS Imagery in Australian Savannas. *Remote Sensing*.

2017 **Remote Sensing, 9(3)**

I. Balenović, A. Simic Milas, H. Marjanović. A Comparison of Stand-Level Volume Estimates from Image-Based Canopy Height Models of Different Spatial Resolutions.

Šumarski list, 141 (1-2)

I. Balenović, A. Seletković, R. Pernar. Accuracy comparison of photogrammetrically estimated forest stand attributes on aerial images of different spatial resolution.

GIM International, 1

Durk Haarsma. Russian Focus on the World.

2016 **Remote Sensing, Spatial Inf. Sci., ISPRS archives**

- A.E. Zubarev, I. E. Nadezhkina, etc. Special software for planetary image processing and research
- A. G. Chibunichev, V. M. Kurkov, A. V. Smirnov, A. V. Govorov, and V. A. Mikhailin. Investigation of Phototriangulation Accuracy with Using of Various Techniques Laboratory and Field Calibration.

GeospatialWorld, November

Andrey Sechin. Lidar and Photogrammetry.

Nova Mehanizacija Šumarstva (New Forestry Mechanisation), 37

I. Balenović, H. Marjanović. Selection of the Optimal Spatial Resolution of Image-Based Digital Surface Models for Use in Forestry – Example from the Area of Lowland Oak Forests.

Geoprofi, 5

R. Permyakov, P. Tarasova. KOMPSAT-3 Test Project.

Geodesy and aerophotosurveying, 2 (60)

Chibunichev A., Kurkov V., Smirnov A., etc. Investigation of Accuracy in Phototriangulation Using Laboratory Calibrating Methods and Field Calibrating Methods.

GIM International, 1

Andrey Sechin. Parallel Computing in Photogrammetry.

...and others see at www.racurs.ru

RACURS PRODUCTION DEPARTMENT

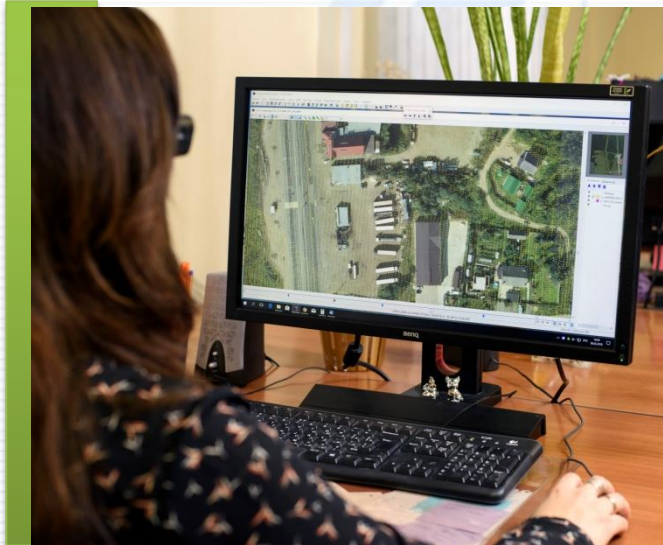
Maisner's Law

Any production never use the result it produced.

Закон Мейснера

Ни одно производство никогда не пользуется производимым им товаром.

Doing the impossible



- Sufficient technical and human resources to implement projects of practically any size and complexity
- A number of commercial orders for photogrammetric projects is successfully completed in accordance with customer requirements
- Practice-based experiences are taken into account in PHOTOMOD software development and impossible projects can be implemented

We offer all digital photogrammetric production services, including:

- Digital aerotriangulation and adjustment
- DTM and orthophoto production
- Stereo and mono feature collection
- 3D-modelling



RACURS'S CONFERENCES

FROM IMAGERY TO DIGITAL REALITY: ERS &
PHOTOGRAMMETRY
You are welcome!

- ✦ 2001 Irkutsk, Russia
- ✦ 2002 Saint-Petersburg
- ✦ 2003 Moscow, Russia
- ✦ 2004 Minsk, Belarus
- ✦ 2005 Jurmala, Latvia
- ✦ 2006 Bechichi, Montenegro
- ✦ 2007 Nesebar, Bulgaria
- ✦ 2008 Porech, Croatia
- ✦ 2009 Attika, Greece
- ✦ 2010 Gaeta, Italy
- ✦ 2011 Tossa-de-Mar, Spain
- ✦ 2012 Algarve, Portugal
- ✦ 2013 Fontenblo, France
- ✦ 2014 Hainan, China
- ✦ 2015 Yukatan, Mexico
- ✦ 2016 Agra, India
- ✦ 2017 Hadera, Israel
- ✦ 2018 Crete, Greece

Fred Allen

A conference is a gathering of people who singly can do nothing, but together can decide that nothing can be done.

Фред Аллен

Конференция – это собрание важных людей, которые ничего не могут сделать в одиночку, но вместе могут принять решение, что ничего нельзя сделать.



RACURS HISTORY. 1993-2018

Once upon a time...

Francis Bacon

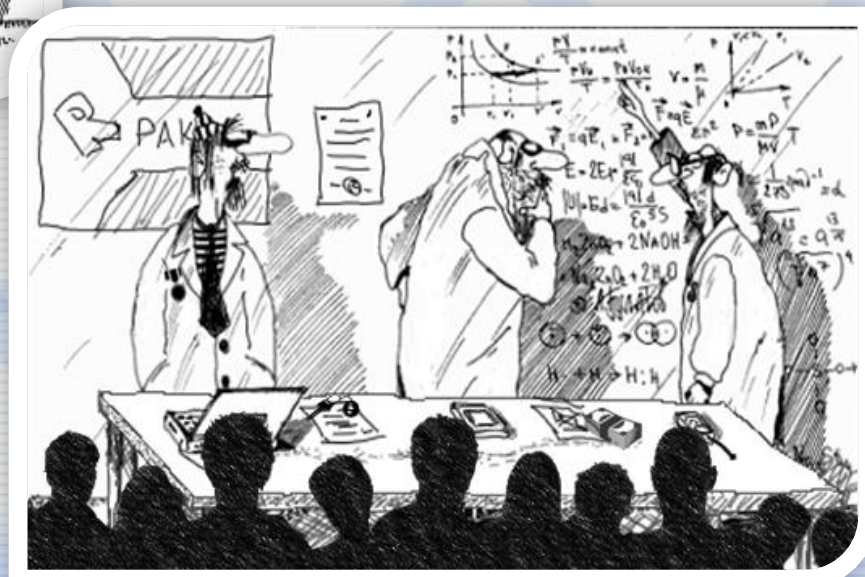
The acts or events of true history have not that magnitude which satisfies the mind of man.

Фрэнсис Бэкон

Чем менее история правдива, тем больше она доставляет удовольствия.



... and they lived happily ever after

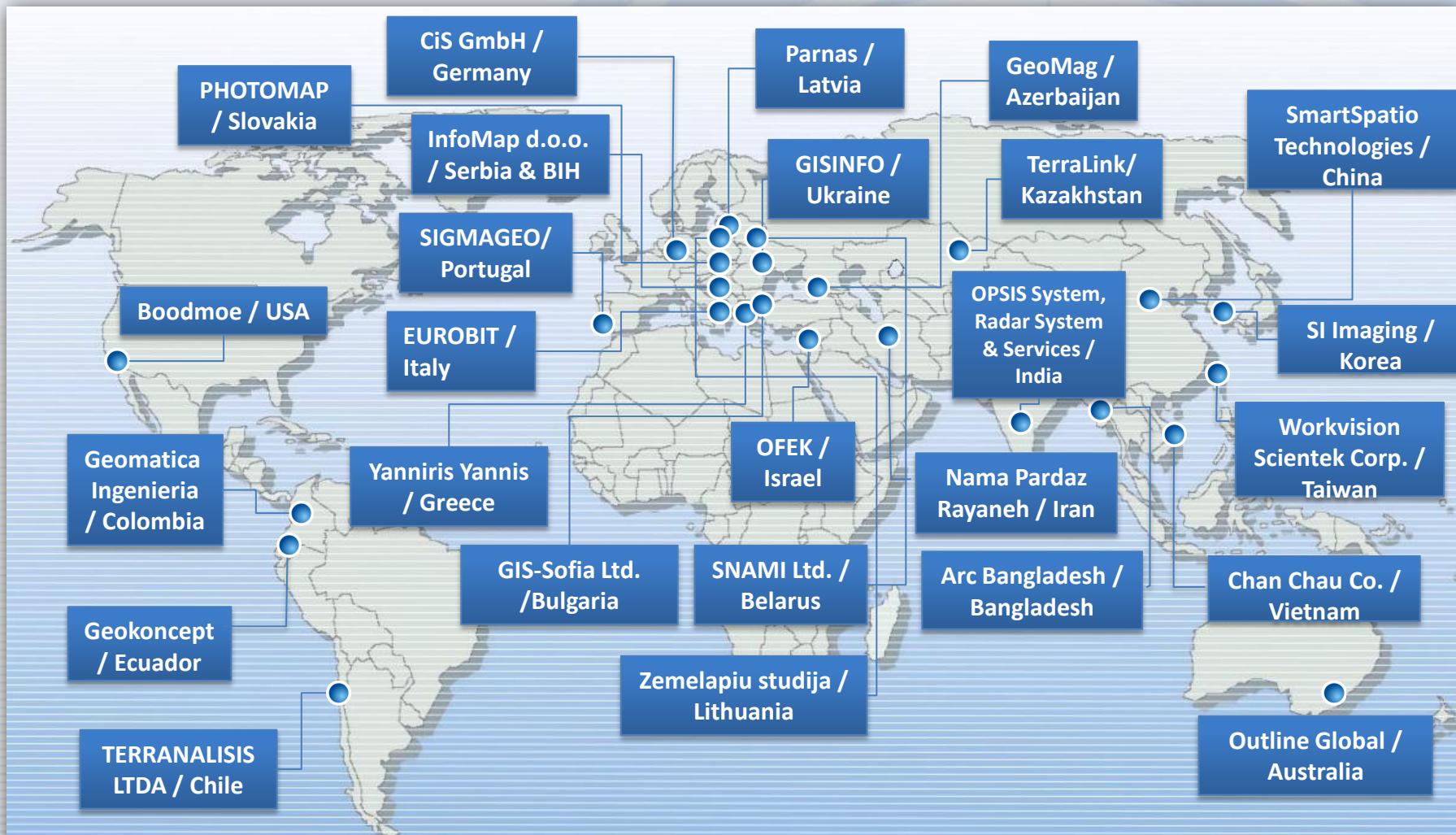


...RACURS HISTORY...

as time went...



PHOTOMOD DISTRIBUTORS 2018



Первый закон Бриджа
Виноват всегда партнер

First Law of Bridge:
It's always the partner's fault

RACURS - 2018

PHOTOMOD Distribution Map

Oscar Wilde

When something is regarded as wicked, it will always have its fascination.

Оскар Уайльд

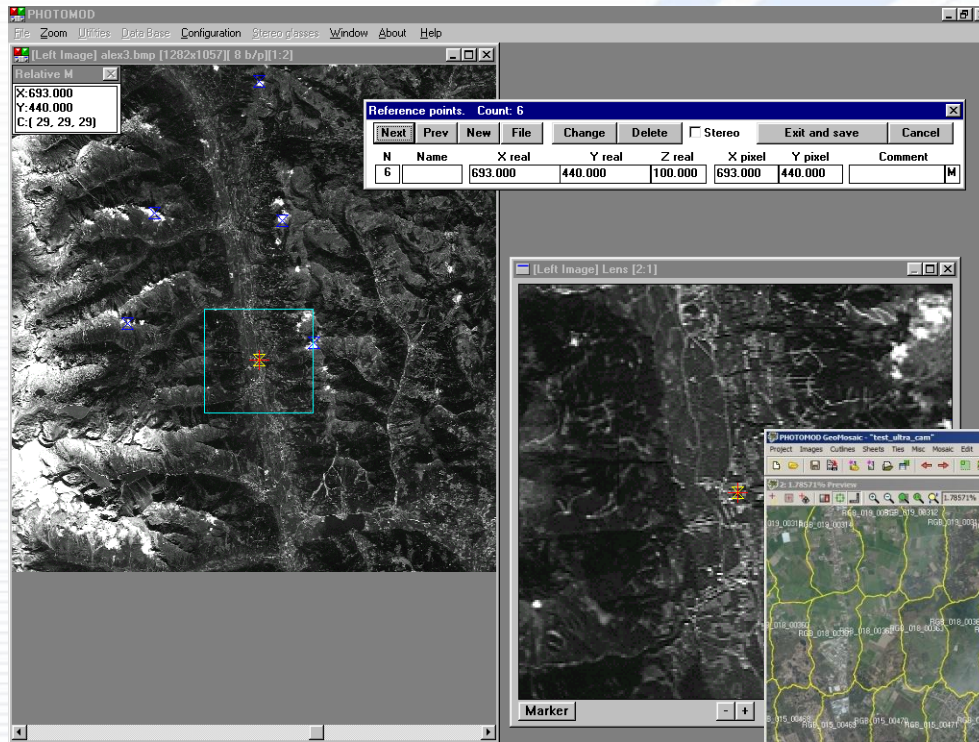
Все то, что пользуется популярностью, порочно.



10.000 PHOTOMOD workplaces. 80 countries.

PHOTOMOD 1994 VS 2018

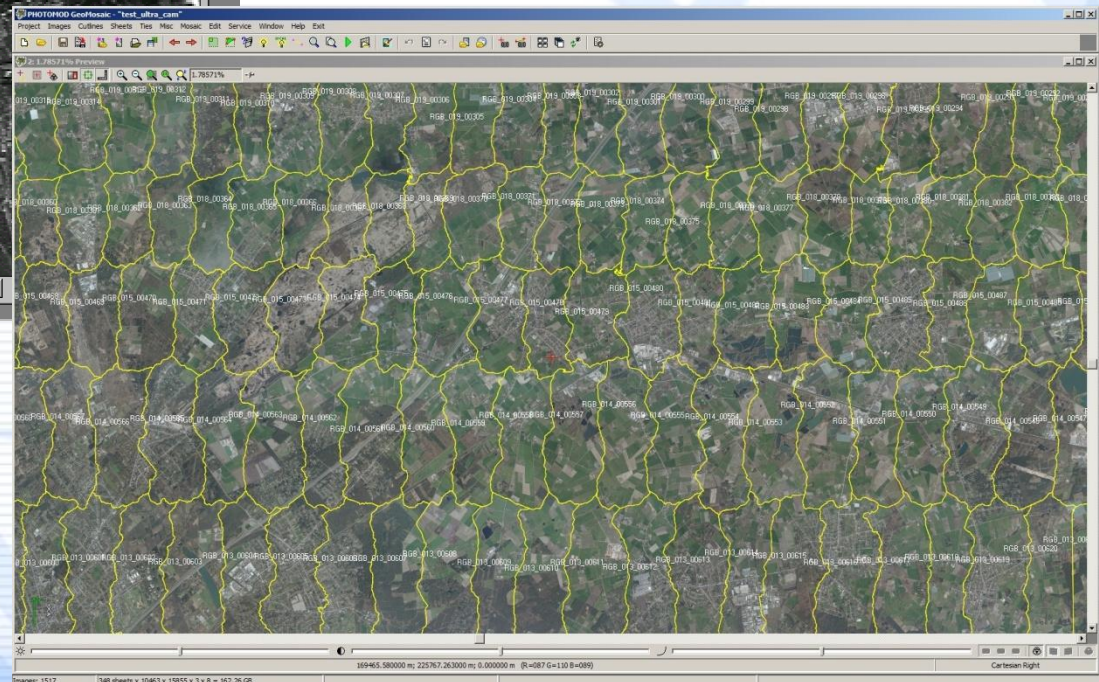
One stereopair



*Laws of computer programming
If a program is useful, it will have to be changed.*

*Законы компьютерного программирования
Если программа представляет практическую ценность, в
нее приходится вносить изменения.*

Unlimited number of images from different sources



Outputs in 1994:

DEM, TIN, contours lines, vectors,
orthophoto

Outputs in 2018:

DEM, TIN, contours lines, vectors,
seamless orthomosaic, digital maps,
dDSM, true ortho, 3D-models

PHOTOMOD. FLAGSHIP PRODUCT

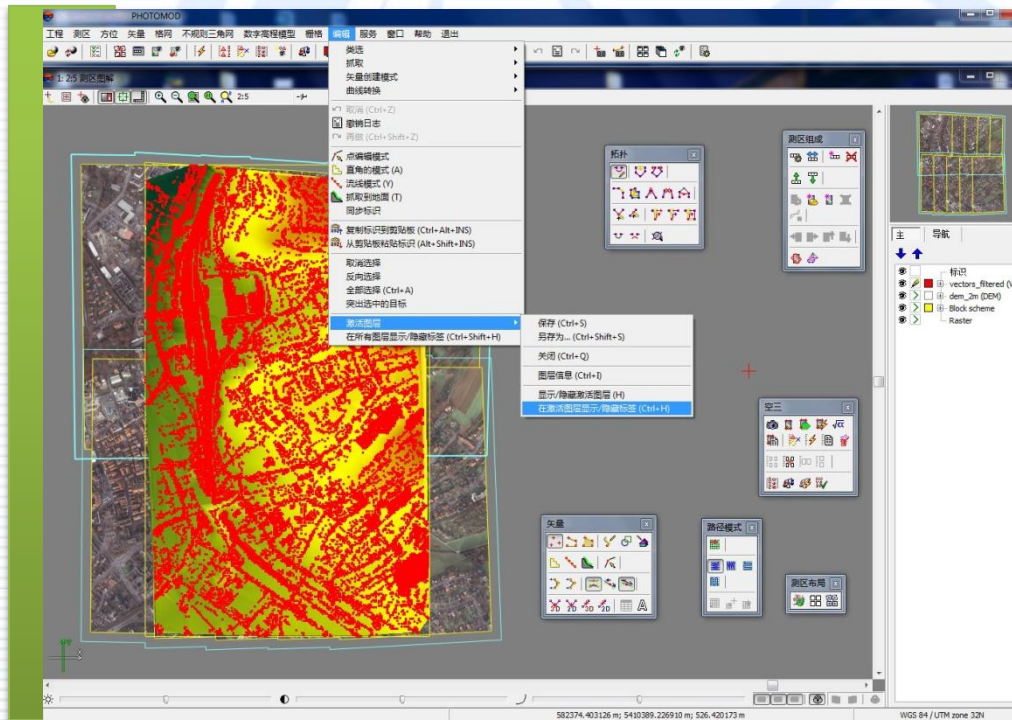
PHOTOMOD Localization

Antony Hoare

There are two ways of constructing a software design: One way is to make it so simple that there are obviously no deficiencies, and the other way is to make it so complicated that there are no obvious deficiencies. The first method is far more difficult.

Энтони Хоар

Есть два способа разработки программного обеспечения. Первый — сделать ПО настолько простым, чтобы в нём не было недостатков. Второй — сделать его настолько сложным, чтобы в нём не было очевидных недостатков.



Chinese



Greek



English



Russian



Spanish

PHOTOMOD MAIN FUNCTIONS

Unknown author

It's not a bug, it's an undocumented feature.

Неизвестный автор

Это не баг, это фича.

- Processing of aerial and satellite images
- Aerial triangulation and block adjustment
- Flexible strategy for DTM generation and editing
- Contour lines building, editing and smoothing
- 3D feature extraction
- Orthomosaicking
- Digital maps creation and output
- 3D models creation

Fast Intelligent Powerful

PHOTOMOD SOFTWARE

It can be easily configured
as:

*Murphy's Thirteenth Law:
Every solution breeds new problems.*

*Следствие из закона Мерфи:
Всякое решение плодит новые проблемы.*

- **Complete standalone DPW**
One PC configuration for working with small projects
- **Distributed high productive network environment**
Any number of instances of each functional module can be installed on a group of PCs connected to LAN for large projects realisation
- **Complimentary workplaces**
for using with systems of other vendors to increase the overall productivity in making the most time consuming operations such as 3D feature extraction and DTM creation

PHOTOMOD. SPECIAL EQUIPMENT

Sattinger's Law:
It works better if you plug it in.

Закон Саттингера
Если вставить вилку в розетку, прибор будет работать лучше.

Stereo viewing



3D mice



PHOTOMOD MODULES

Grid Low

The machine program does what you told it to do, not what you want it to do.

Закон Грида

*Машинная программа выполняет то, что вы ей приказали делать,
а не то, что бы вы хотели, чтобы она делала.*

Flexible, Ease of use

- **PHOTOMOD Core** — main system managing shell
- **PHOTOMOD AT** — aerial triangulation measurements
- **PHOTOMOD Solver** — block adjustment for central projection images (Solver A) and for satellite scanner images (Solver S)
- **PHOTOMOD DTM** — DTM creation
- **PHOTOMOD dDSM** — dense DSM generation algorithm
- **PHOTOMOD StereoDraw** — 3D feature extraction, 3D modeling
- **PHOTOMOD 3D Mod** — 3D modeling
- **PHOTOMOD Mosaic** — orthomosaicking
- **GIS Panorama 2011 Mini** — digital map creation
- **PHOTOMOD ScanCorrect** — compensation of geometric inaccuracy of flatbed polygraph scanners
- **PHOTOMOD GeoCalculator** — free geodetic calculator

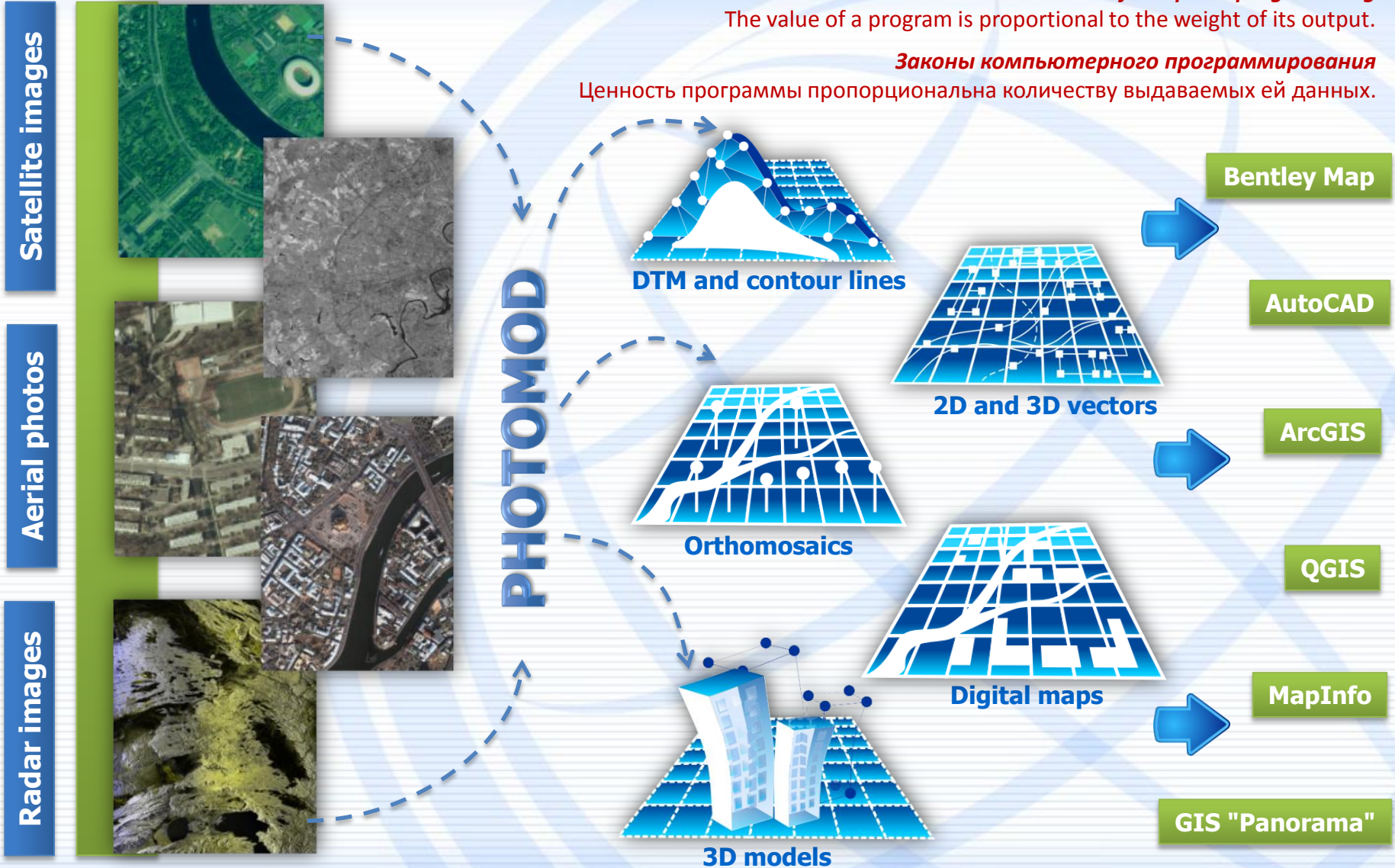
PHOTOMOD. INPUT AND OUTPUT DATA

Laws of computer programming

The value of a program is proportional to the weight of its output.

Законы компьютерного программирования

Ценность программы пропорциональна количеству выдаваемых ей данных.



PHOTOMOD AUTO



Block layout



**Aerial
triangulation**



**DTM extraction
and filtering**



**Orthomosaic seam lines
and color balancing**



PHOTOMOD IN CLOUDS

CLOUDEO

ENVI in the Cloud - Academia

FieldScout

FieldSense

LandMask

PHOTOMOD Radar Workbench

PHOTOMOD Radar Workbench - Academia

PHOTOMOD Workbench

PHOTOMOD Workbench - Academia

ShowMySite

Harris Geospatial Solutions

Geocledian

Ceptu

HySpeed Computing

Racurs

Racurs

Racurs

CloudEO

- Industry licenses for ENVI, ICL, Photogrammetry and SARscape
- Full functionality of the desktop licenses
- Readily...

- Monthly licenses for ENVI, ICL and SARscape for academia
- Readily installed on powerful IT
- Storage, backup and...

- The remote field scout for land planner and decision makers in agriculture
- Web-based field monitoring...

- Use this IOS or Android APP and monitor crop health most...
- Access data and imagery on web, smartphone and tablet...

- Monitor land and shoreline extent over time
- Understand the history - detect recent changes
- Determine the presence...

- Use for full-scale processing of SAR



Categories	Company	US\$/Hour
AT & Camera calibration ...	Racurs	\$4.76 → \$1.95
Digital Photogrammetric Workstation	info ⓘ	
AT & Camera calibration ...	Racurs	\$0.69 → \$0.51
Personal PHOTOMOD for small scientific and educational projects	info ⓘ	
Photomod GeoCalculator	Coordinate Systems	\$0.50 → \$0.37
GeoCalculator & Direct Georeferencing & Datum Seven Parameters Calculator	info ⓘ	
Photomod GeoMosaic	Orthophoto	\$1.30 → \$0.68
Combine georeferenced images from any sources into a single seamless color-balanced mosaic	info ⓘ	
Photomod UAS	AT & Camera calibration ...	\$1.52 → \$0.76
Full photogrammetric UAS-oriented software	info ⓘ	
Photomod Radar	SAR Processing	\$2.76 → \$1.28
Process	info ⓘ	
Photomod Radar Viewer	SAR Processing	\$0.86 → \$0.56
SAR viewer	info ⓘ	
QGIS & GRASS GIS	GIS	\$0.86 → \$0.51
QGIS - Open Source Desktop GIS; GRASS - Geographic Resources Analysis Support System	info ⓘ	
GeoDa	GIS	\$0.86 → \$0.51
Introduction to Spatial Data Analysis: Exploratory (Spatial) Data Analysis & Spatial Regression	info ⓘ	
SAGA	GIS	\$0.86 → \$0.51
System for Automated Geoscientific Analyses and effective implementation of spatial algorithms	info ⓘ	



INDUSTRY LEADERS WORK WITH US

PHOTOMOD TRAINING COURSES

Individual or group training courses may be organized at the client's site as well as in Moscow.

*From Murphy's technology laws
When all else fails, read the instructions.*

Из законов Мерфи о технологиях

Если ничто другое не помогает, прочтите, наконец, инструкцию!

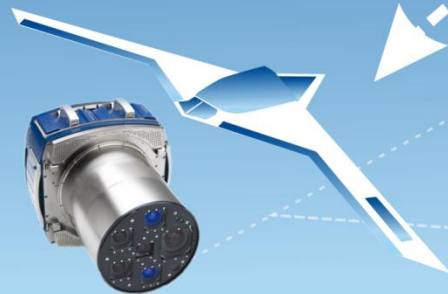


Typical duration of the training: 5 or 10 days.

PHOTOMOD. FACTORS OF DEVELOPMENT

Photogrammetric technologies

Demand in geodata



Sensors & platforms



Computer tools



Algorithms



PHOTOMOD. TRENDS



Charles Kettering

My interest is in the future because I am going to spend the rest of my life there.

Чарльз Кеттеринг

Я интересуюсь будущим потому, что собираюсь провести там всю свою остальную жизнь.

- Photogrammetric technology progress depends on **evolution of sensors and platforms**, increase in productivity of computer tools and new efficient algorithms developments
- One of directions of photogrammetric technology developments is the development of special high-productive solutions for **fully automatic** creation of such products as orthomosaics, terrain models and 3D-models
- **Cloud technology** development leads to appearance of new models of photogrammetric production workflow and services
- Modern photogrammetric algorithms allowing creation of accurate and detailed **3D-models** of cities and objects both as point clouds and vector models. Such models can used as a spatial backbone of comprehensive 3D GIS

Photogrammetry, remote sensing and geo-information in big data era will face more opportunities and more challenges when building smart earth and smart cities. Our discipline will surely contribute more to the sustainable development of human society!

DEREN LI, Wuhan University, China

XXIII ISPRS Congress, 16 July 2016, Prague, Czech republic

*You cannot get the right answers if you don't have the right questions.
Ты не можешь получить правильные ответы, если у тебя
нет правильных вопросов.*

Thank you for attention!