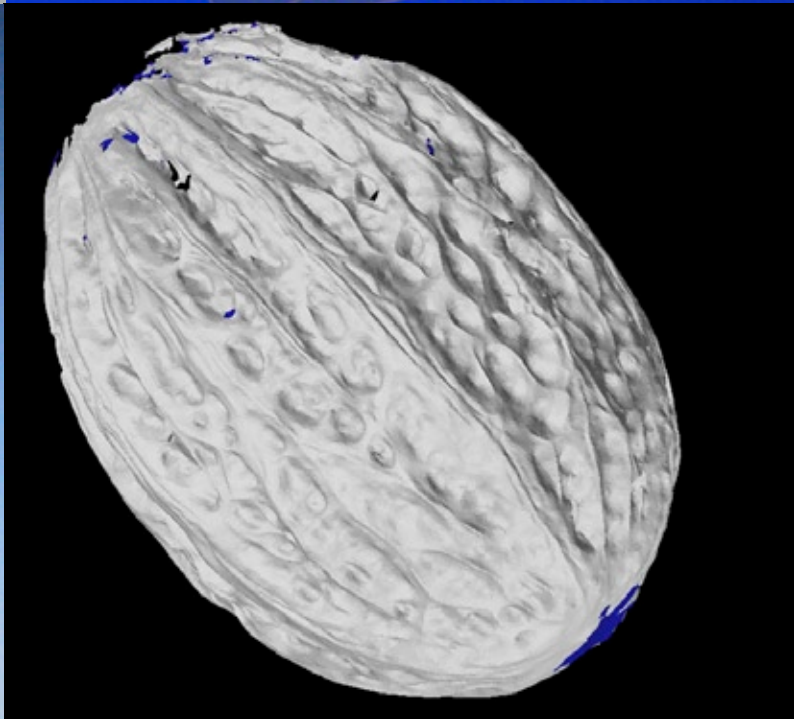
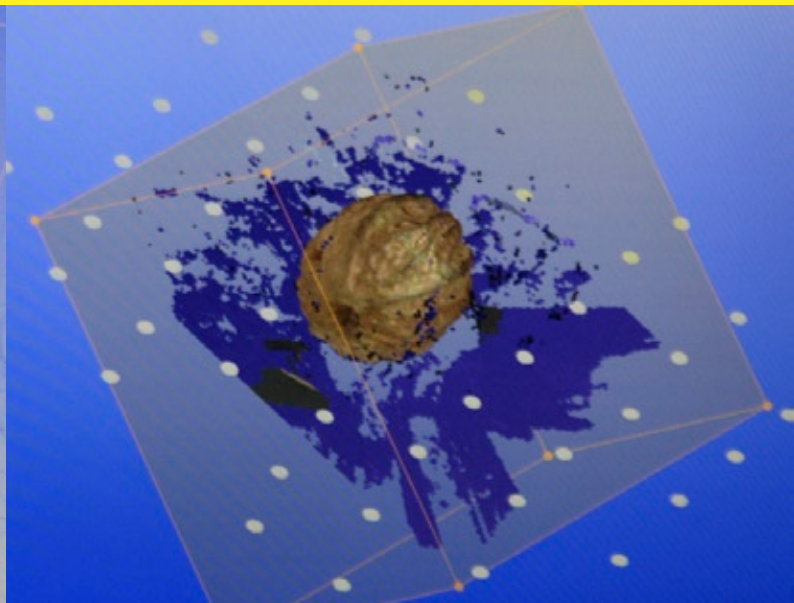
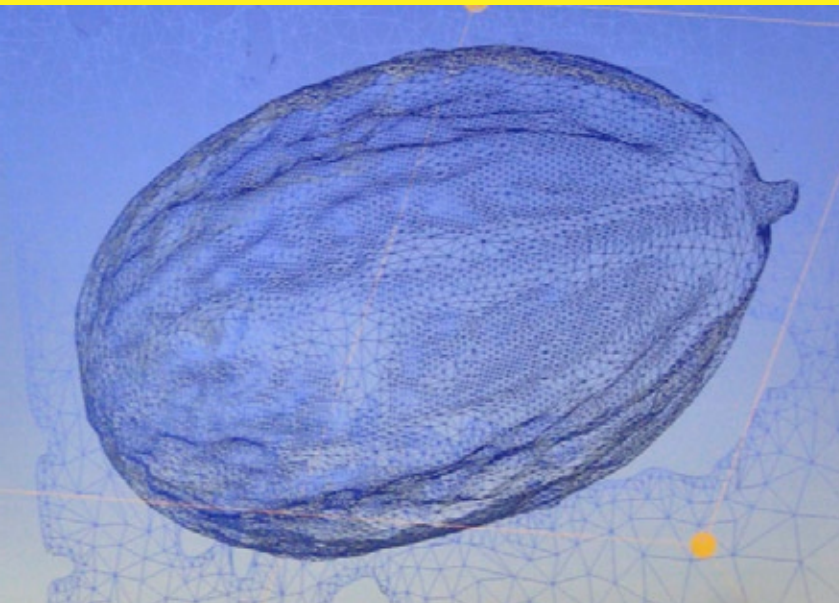


# 3 Dimensional Scanning for Maya ethnobotanical research



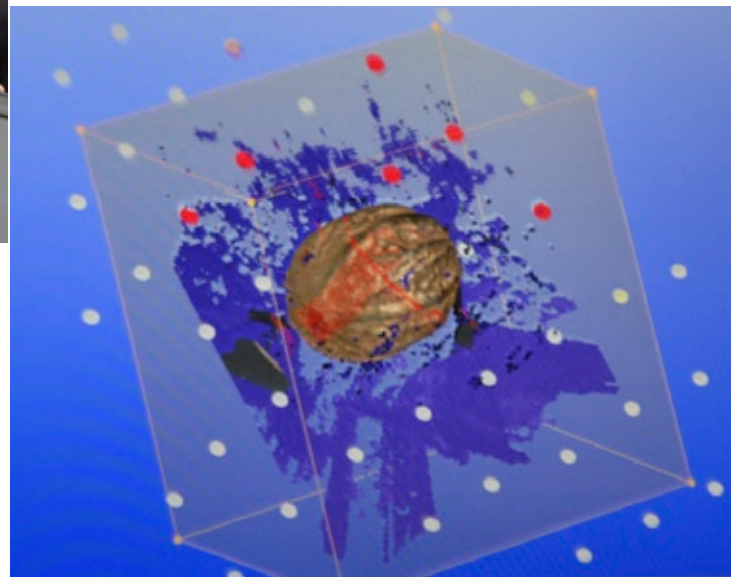
### 3 Dimensional Research Projects

FLAAR Mesoamerica is a non-profit educational organization that it's dedicated to research, educate and outreach on how digital imaging technologies can record our visual links to the past, present and future, especially related to pre-Colombian cultures of Mesoamerica. FLAAR also evaluates large format printers and has been a beta tester for scanners and high-resolution digital cameras.

As technology advances every day and there are new trends in digital imaging, FLAAR is now introducing into 3D imaging capturing and 3 dimensional analysis for the preservation and documentation of cultural heritage. In May 2009 two of FLAAR staff technical writers attended Rapid 2009 an exposition and conference on 3D Scanners, 3D Software and Rapid prototypers, the goal of our technical writers was to learn about this technology for future projects on ethnobotanical and archeological research. According to Eduardo Sacayón a technical writer and Biologist on the FLAAR team: "Three dimensional scanners can be used to obtain morphometric data for species analysis since morphometric analysis has been used by entomologists to study insects and by geologist to study fossil record. Until now most of this measurements where taken manually and 3D scanning systems could provide a more accurate way to obtain species morphometric data for future research projects".



*Eduardo Sacayón technical writer for FLAAR Reports at CREAFORM booth at RAPID 2009 scanning and analyzing cacao pod for future ethnobotanical research.*



*3D visualization of cacao pod for ethnobotanical research.*

Archeological research can also be done with 3D scanners and 3D software since they are high-quality tools that can help with the preservation, documentation and restoration on archeological sites around the world. Some archeological sites have already been digitized for their analysis and preservation. Since FLAAR dedicated to evaluating and researching digital imaging technology for preservation of the cultural heritage on Pre-Columbian cultures of Mesoamerica it is now in its interest the 3 dimensional scanning for analyzing and research of ethnobotanical and fauna that is represented on historical remains in Maya art.

**Future research project for 3 dimensional scanning of cacao pods for analysis and preservation in Maya art historical remains.**



*FLAAR is interested in 3 dimensional scanning Maya archeology sites, ceramic vases, artifacts and figurines for analysis and preservation. In this photograph you can see Classic period Maya ceramic effigy cacao pods, photograph by Nicholas Hellmuth for La Ruta Maya Conservation Foundation.*



*Here you can see the resemblance with the Classic period Maya ceramic effigy cacao pods and real cacao pods. Photographs of cacao by Alen Bubanja student volunteer from University of Ljubljana.*



*Classic period Maya ceramic effigy cacao pods, photograph by Nicholas Hellmuth for La Ruta Maya Conservation Foundation*



*Here you can see the resemblance with the Classic period Maya ceramic effigy cacao pods and real cacao pods. Photographs of cacao by Jaime Leonardo from FLAAR Mesoamerica*

3 Dimensional Scanning for ethnobotanical research

Our Institute has been a beta tester for Betterlight (tri-linear scanning camera) since 1997. It has also evaluated a 22-megapixel Phase One P25+(from Global Imaging Inc) and has issue more than a dozen FLAAR Reports on Phase One cameras. FLAAR also has an 80-megapixel Cruse Camera (about \$120,000) and issued evaluations every year.

We have started training on 3D imaging capturing and analysis with some of our personal at RAPID 2009 and in IB-proCADD installations in Lujbania Slovenia, which is a distributor on Eastern Europe for Zcorporation products.



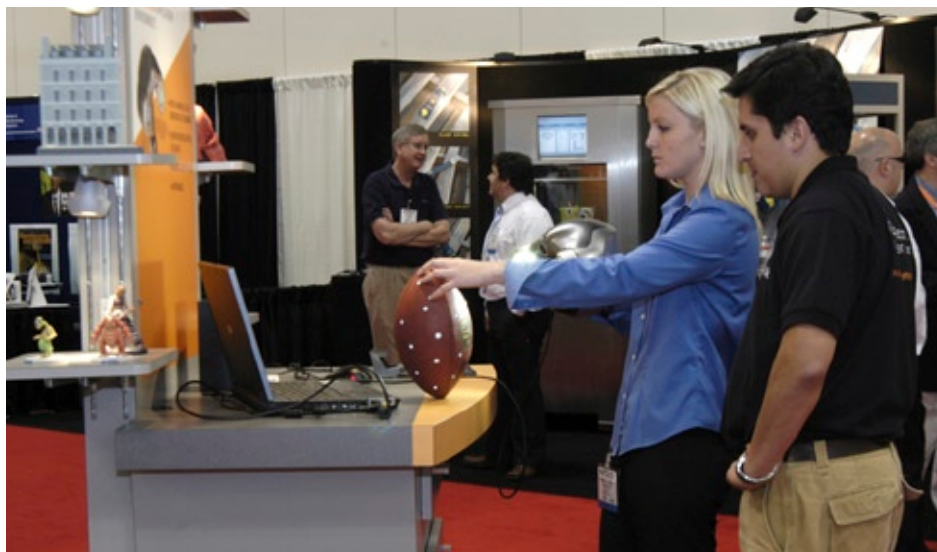
*Dr. Hellmuth with evaluated equipment.*



*Eduardo Sacayón technical writer for FLAAR Reports, at Metris booth at RAPID 2009 learning about their 3D scanners.*



*Metris 3D Laser Scanner Arm.*



*Juan Luis Sacayón technical writer for FLAAR Reports, at Zcorporation booth at RAPID 2009 learning about their 3D scanners.*



*ZScanner 700 Laser Scanner.*



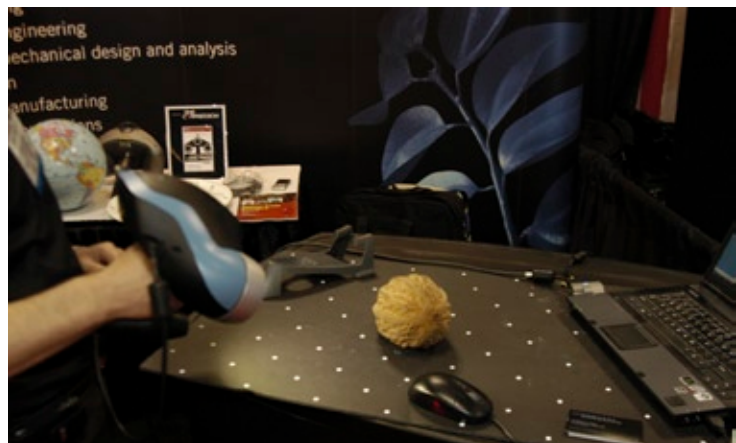
*Juan Luis Sacayón technical writer for FLAAR Reports  
with high end scanner at IB-proCADD installations  
Ljubljana Slovenia November 2008*

FLAAR is a US corporation, non-profit, registered with IRS since 1969. Our facilities in Guatemala are registered as a non-profit under their local laws. We have 12 employees there, including 2 archaeologists, 3 photographers, several graphic designers, 3 web designers, support personnel, and managers. FLAAR also is opening an office in Europe this year (in the past we had an office in Switzerland 3 years, in Austria 8 years, and in Germany 9 years). Our main interest is evaluating digital imaging technology for the preservation of cultural heritage and as an educational research center we offer the opportunity for FLAAR staff personal some of them students who are working on their thesis to learn and evaluate the equipment, opening there perspective and enabling them with tools for the working market. This is some of the equipment FLAAR will like to obtain and get training for students to do future research projects:

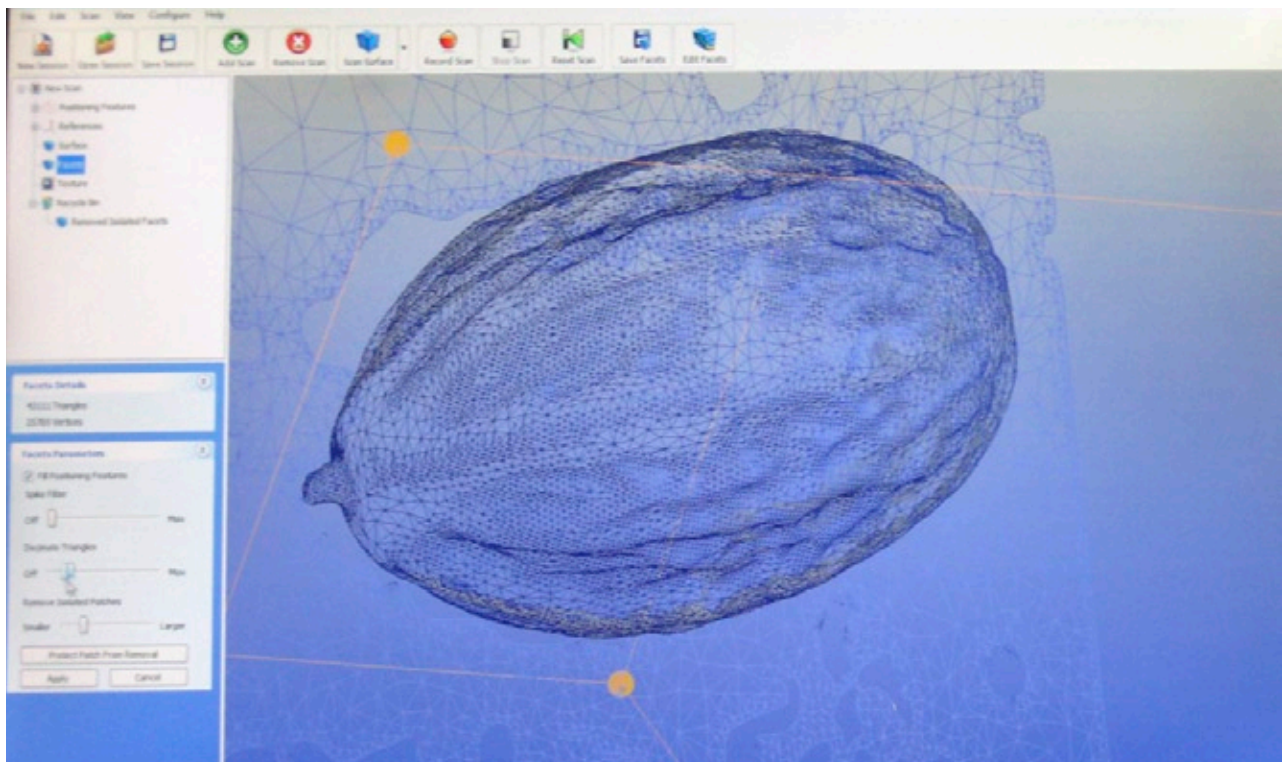
**CREAFORM**

**Portable handheld 3D scanners:**

- VIUscan
- REVscan
- EXAscan
- MAXscan
- ERGOscan



*Creaform VIUscan at RAPID 2009, scanning cacao pod for ethnobotanical research.*



*Cacao pod scan with Creaform VIUscan.*

**FARO Technologies**

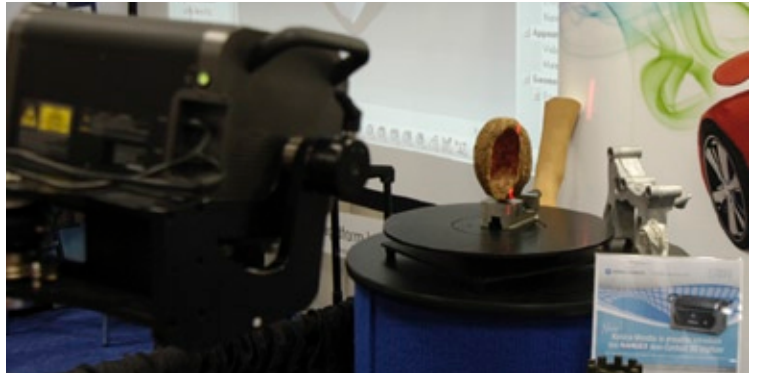
**Long range laser scanners:**

- Photon Laser Scanner
- LS 880
- LS 420



**KONICA MINOLTA**

- RANGE 5
- RANGE 7
- VIVID 9i
- VIVID 910

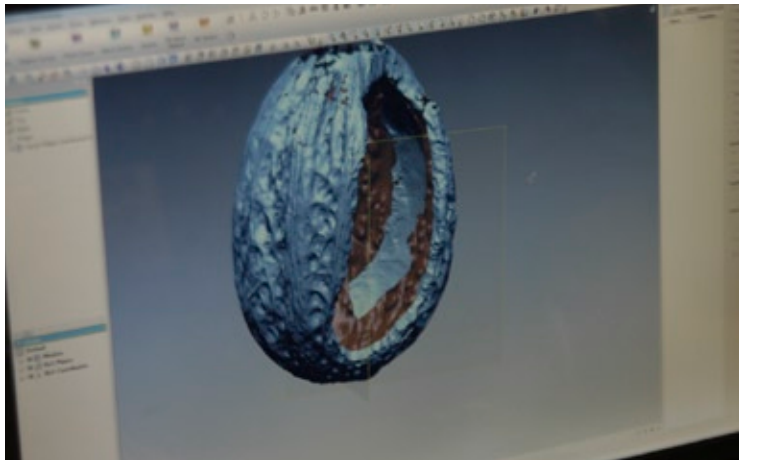


*Konica Minolta Range 7 at RAPID 2009, scanning cacao pod for ethnobotanical research.*

**METRIS**

**Handheld scanners:**

- ModelMaker scanners MMD/MMC
- K-Scan MMD



**Three Rivers**

- 3D Lasercode LC-1 scanner

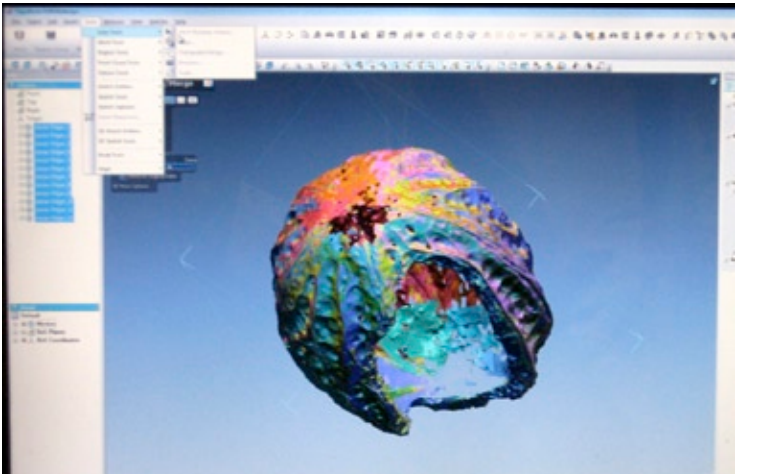
**3D3 Solutions**

- HDI 3D Scanner

**TRIMBLE**

**Long range laser scanners:**

- Trimble VX Spatial Station
- Trimble GX 3D Scanner



*Cacao pod scan with Konica Minolta Range 7*



**Leica**

**Long range laser scanners:**

- Leica ScanStation 2
- Leica HDS6100

**Z Corporation**

**Portable handheld 3D scanners:**

- ZScanner 700
- ZScanner 700cx
- ZScanner 700px
- ZScanner 800



*ZScanner 700 at IB-ProCADD Installations  
Slovenia 2008*

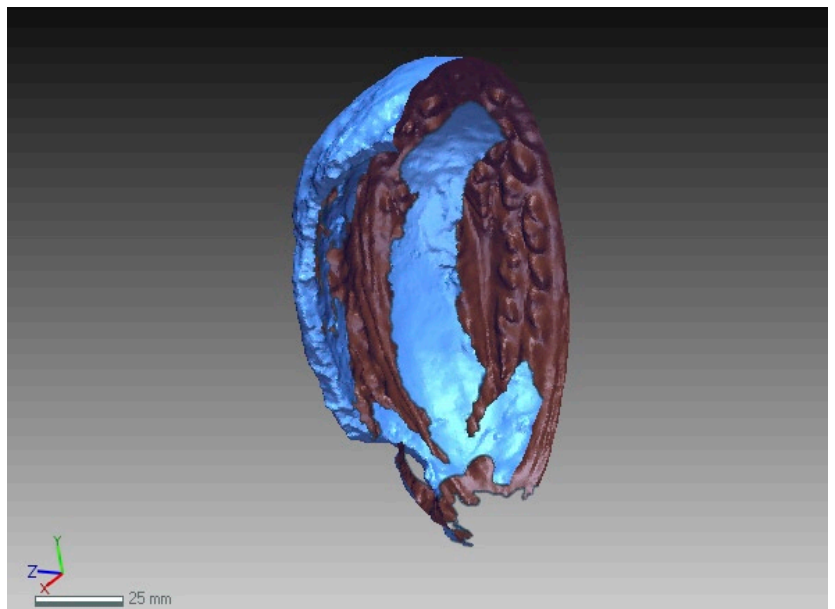
**3D Software**

**RAPIDFORM**

- Rapidform XOR/Redesign
- Rapidform XOY/Verifier
- Rapidform XOS/Scan

**Geomagic**

- Geomagic STUDIO
- Geomagic QUALIFY
- Geomagic PIANO



*Rapidform Software analyzing cacao pod for ethnobotanical research.*

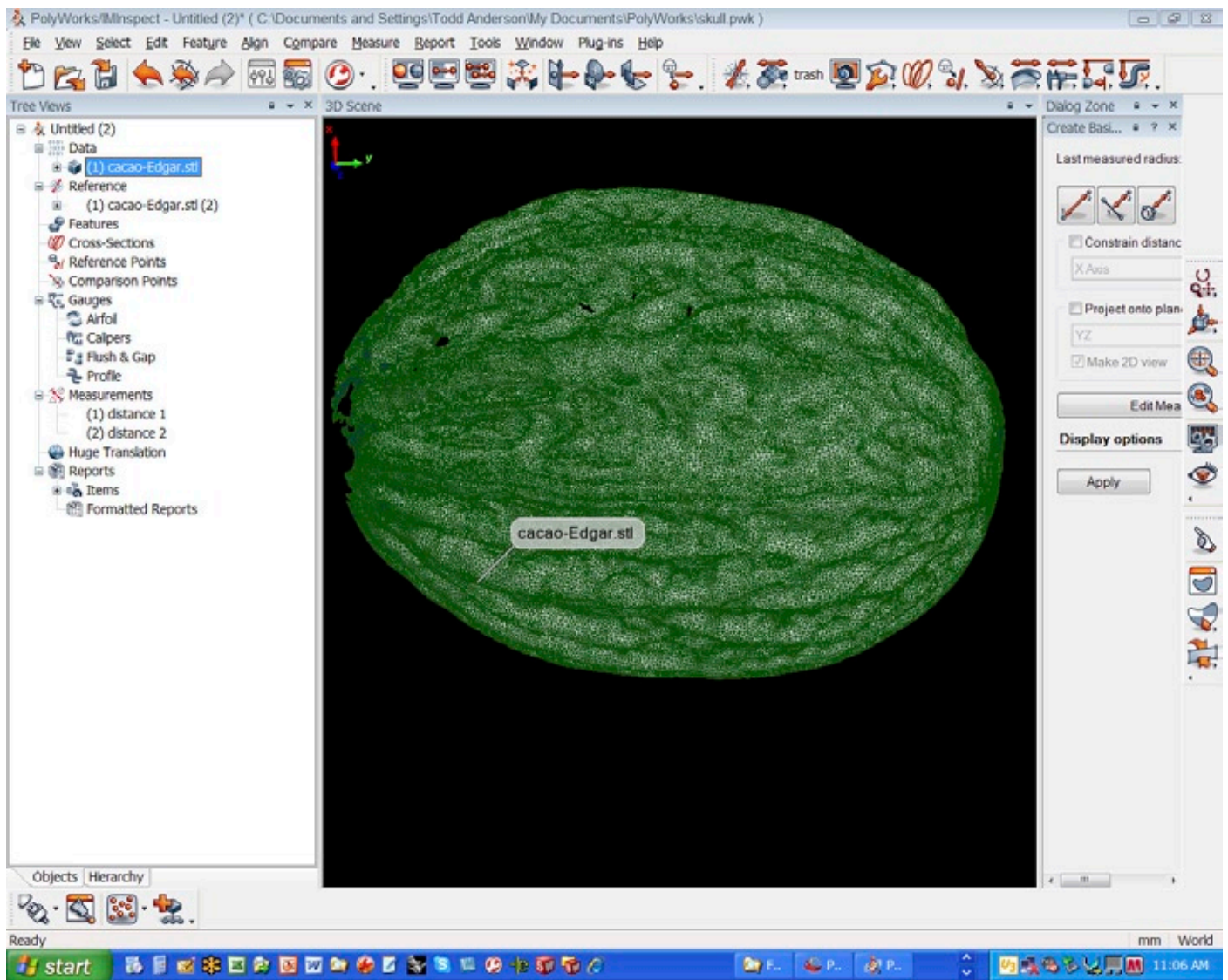
**Materialise:**

Magics

Mimics

**InnovMetric:**

Polyworks Software



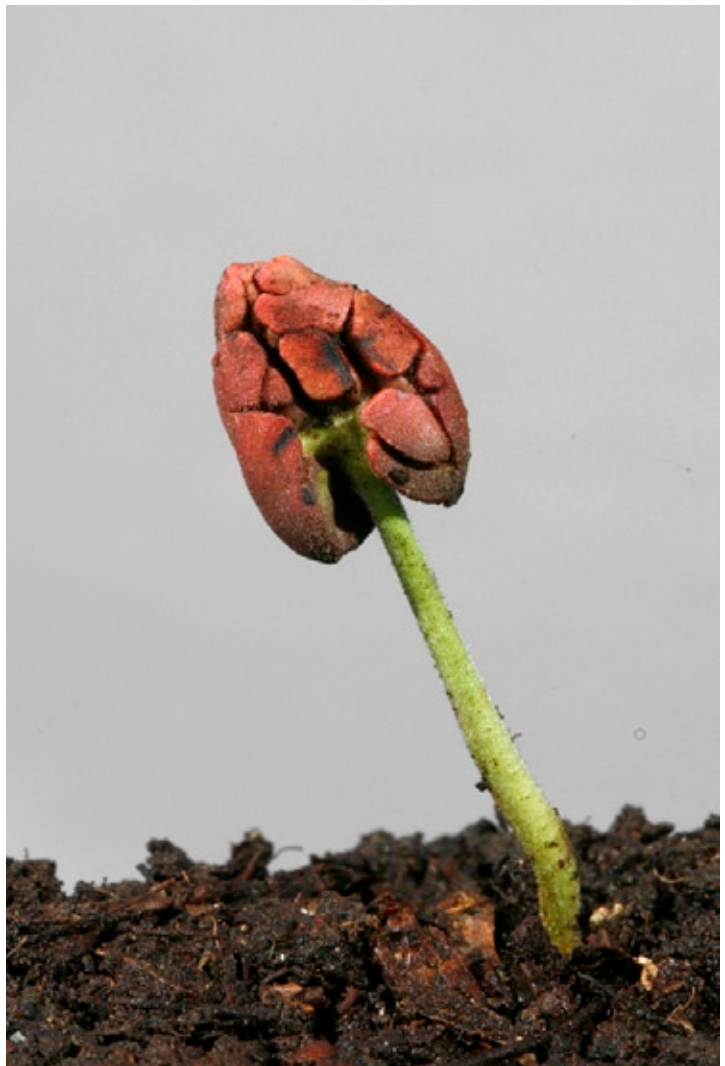
*PolyWorks Software analyzing cacao pod for ethnobotanical research.*

## Appendix A

### FLAAR Maya Ethnobotanical Research Projects.



*Cacao seeds germinating in the FLAAR botanical research center.*



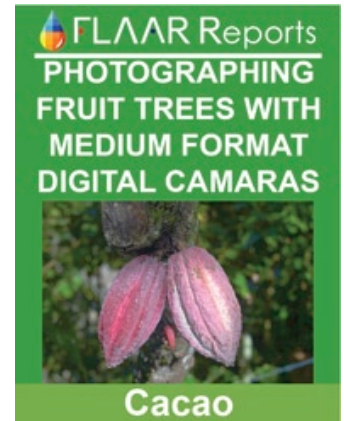
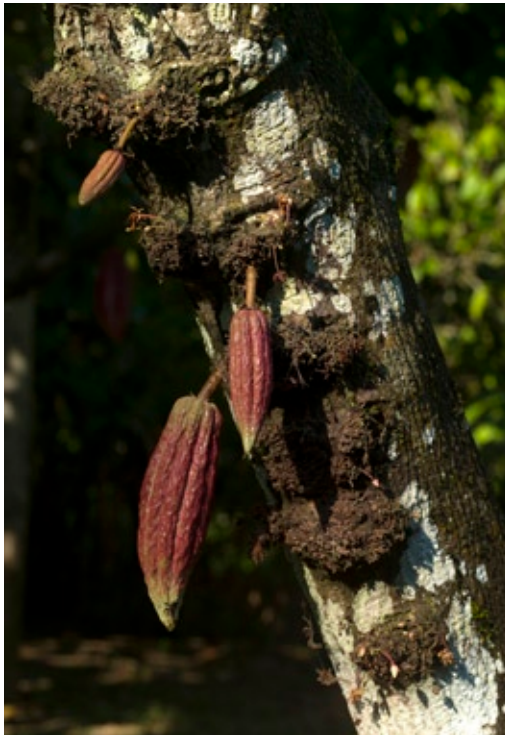
*Cacao seeds germinating at FLAAR Mesoamerica test center.*



*Cacao seeds germinating in the FLAAR botanical research center.*



*Cacao seeds germinating at FLAAR Mesoamerica test center.*



*Learn more with:  
FLAAR Reports on how  
to photograph fruit trees  
with medium format digital  
cameras.*

*Red Theobroma cacao pocha from Alta Verapaz Guatemala 2007.*



*Red Theobroma cacao pocha from Alta Verapaz Guatemala 2007.*





*Green and yellow variety of Theobroma cacao pochas Guatemala 2007*



*This photograph is illuminated using the sunlight and Westcott reflectors as a source of light. As you can see the advantages of using this source of lighting are a high-quality brightness and an excellent saturation on the colors.*



*Photographing cacao pochos with Westcott Reflectors*



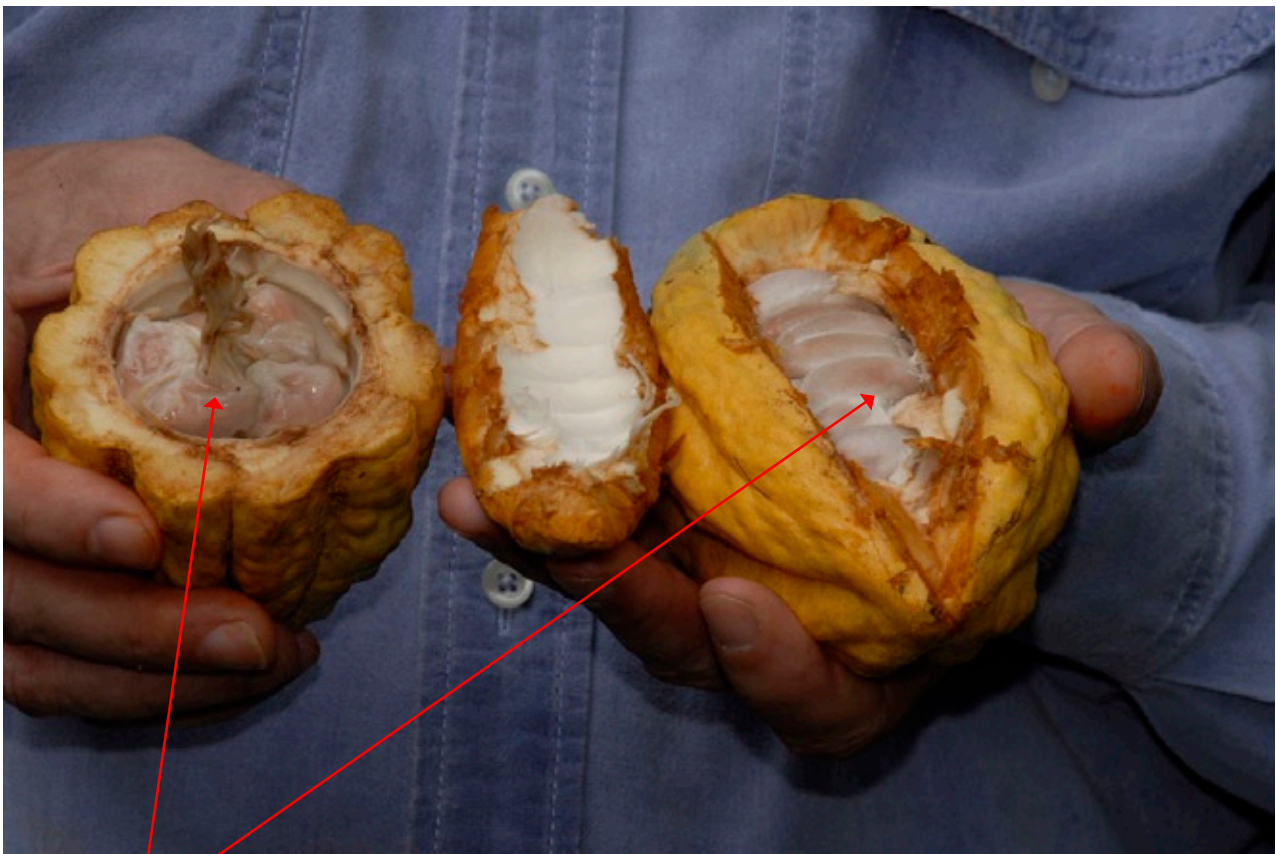
*This image is with a perfect exposure using natural sunlight.*



*Red, green and yellow variety of Theobroma cacao pochas Guatemala 2007*



*Dr. Nicholas Hellmuth collecting cacao pods Sayaxché Petén Guatemala 2007.*



*Edible cacao pulp.*



*Cacao pulp.*



*Extracting the cacao pulp.*



*Dr. Nicholas Hellmuth tasting the cacao pulp a very tasty fruit.*



*Photographs of cacao with Canon EOS 5D by Alen Bubanja student volunteer from University of Ljubljana.*



*Photograph of cacao fruit with Phase One P25+ by Nicholas Hellmuth.*



*Cacao products available from Guatemala.*



*Gitzo tripod.*



*Arca Swiss Monoball tripod ballhead & Phase One P25+.*



*Dr.Nicholas Hellmuth & Biologist Mirtha Cano photographing cacao at field in Alta Verapaz Guatemala 2007.*



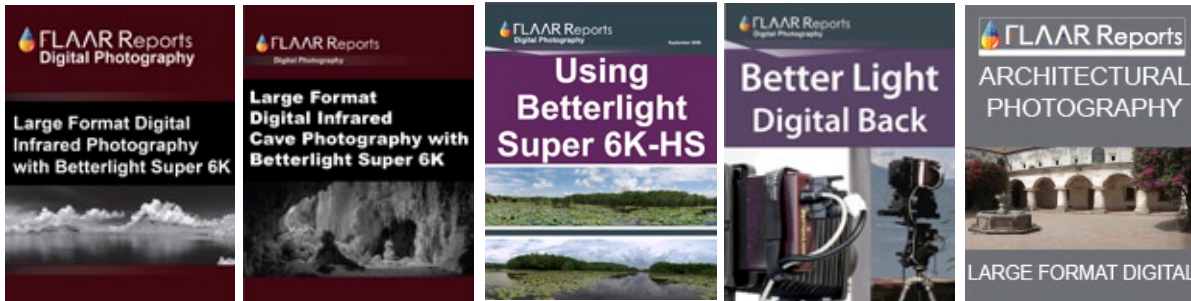


*Dr. Nicholas Hellmuth, Tina Kosir student volunteer from University of Ljubljana Slovenia, Mirtha Cano & local people from San Antonio Suchitepéquez collecting cacao pods.*

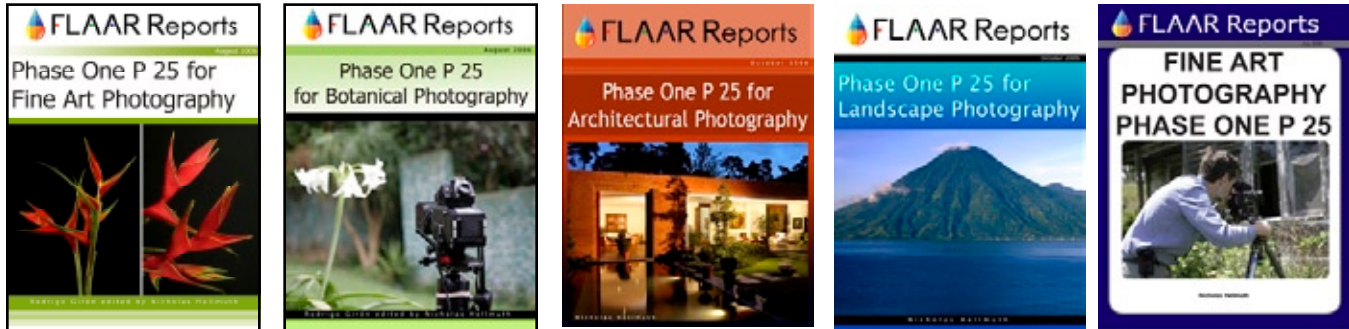


*Biologist Mirtha Cano & Tina Kosir student in 3D imaging at a cacao process facility in Guatemala.*

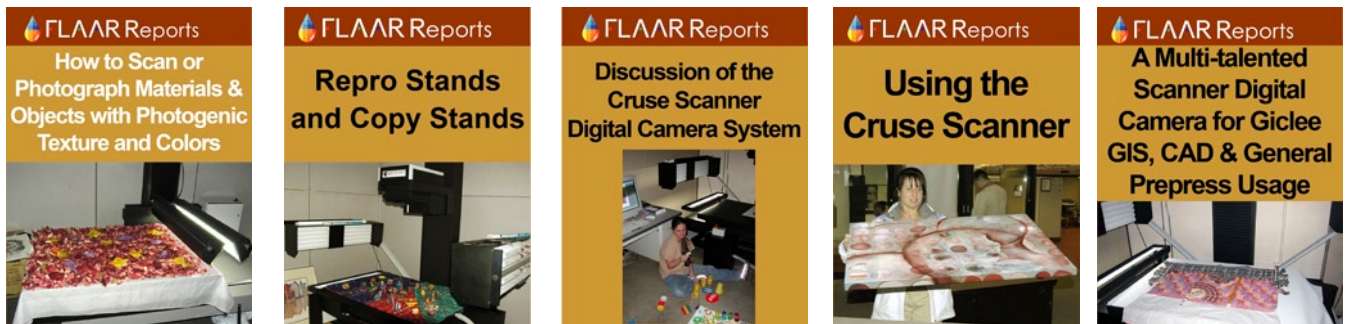
**FLAAR Reports and reviews on high end digital imaging capture.**



*FLAAR Reports on the Betterlight Super 6K-HS.*



*FLAAR Reports on Phase One.*



*FLAAR Reports on Cruse Scanner.*