Scan to BIM for Manager

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# What to learn? (Scan to BIM for Manager)

Course outline:

- Basic BIM concept
- Check clash report of BIM model
- Check version history of BIM model
- Basic photogrammetry for construction
- Basic laser scanning for construction
- Handling point cloud (from photogrammetry and laser scanning works) in BIM platform
- Establishing as-built BIM

Basic BIM concept

From BIM 3D to 4D

Don't be a self-proclaimed BIM user

How to Construction Design is designed now?
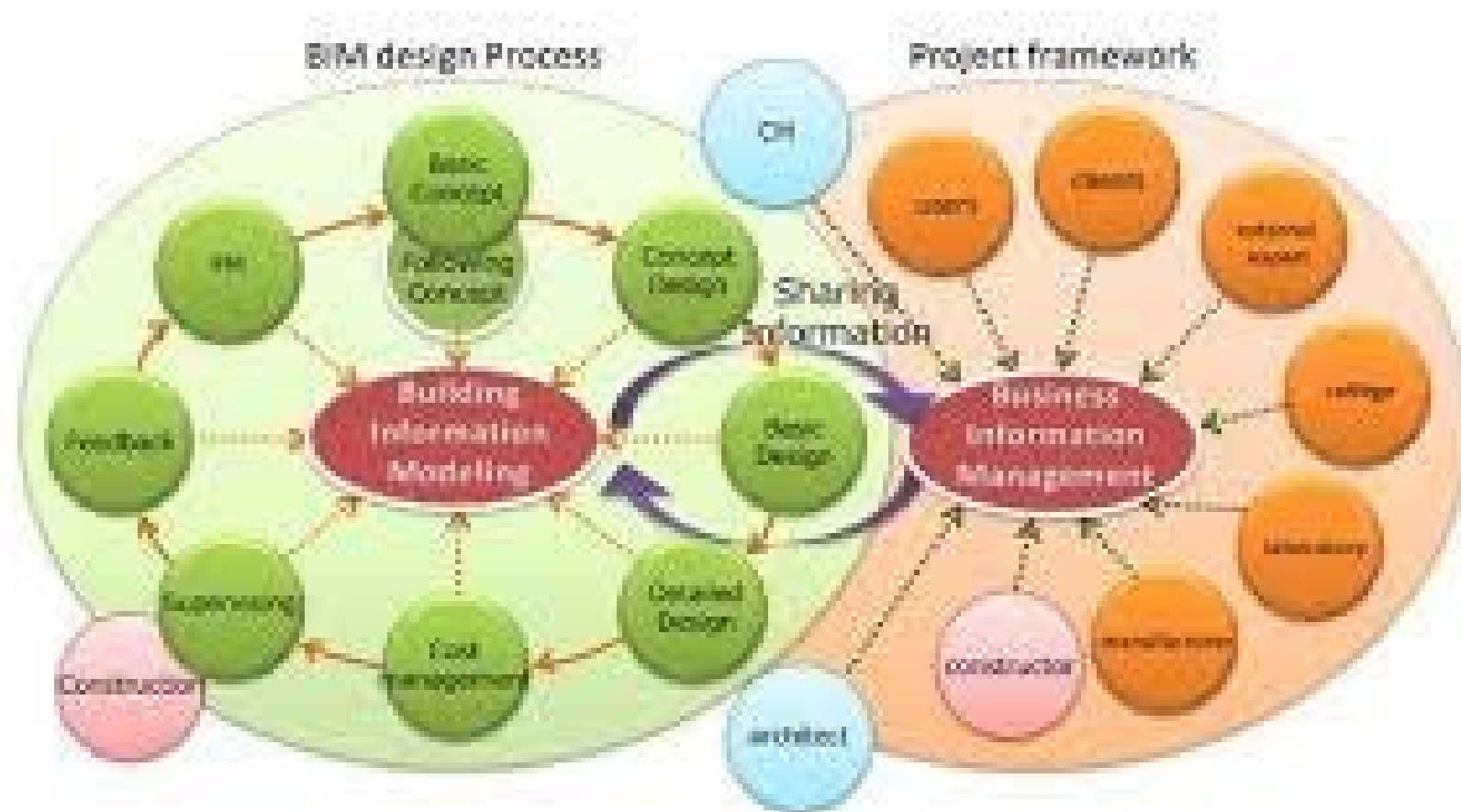
How to Construction is presented now?

Conventional software used

- CAD – Computer Aided Drafting
- AutoCAD, MicroStation
- 3D Geometry models
- Geometry representation of construction; aid for visualization and design/construction
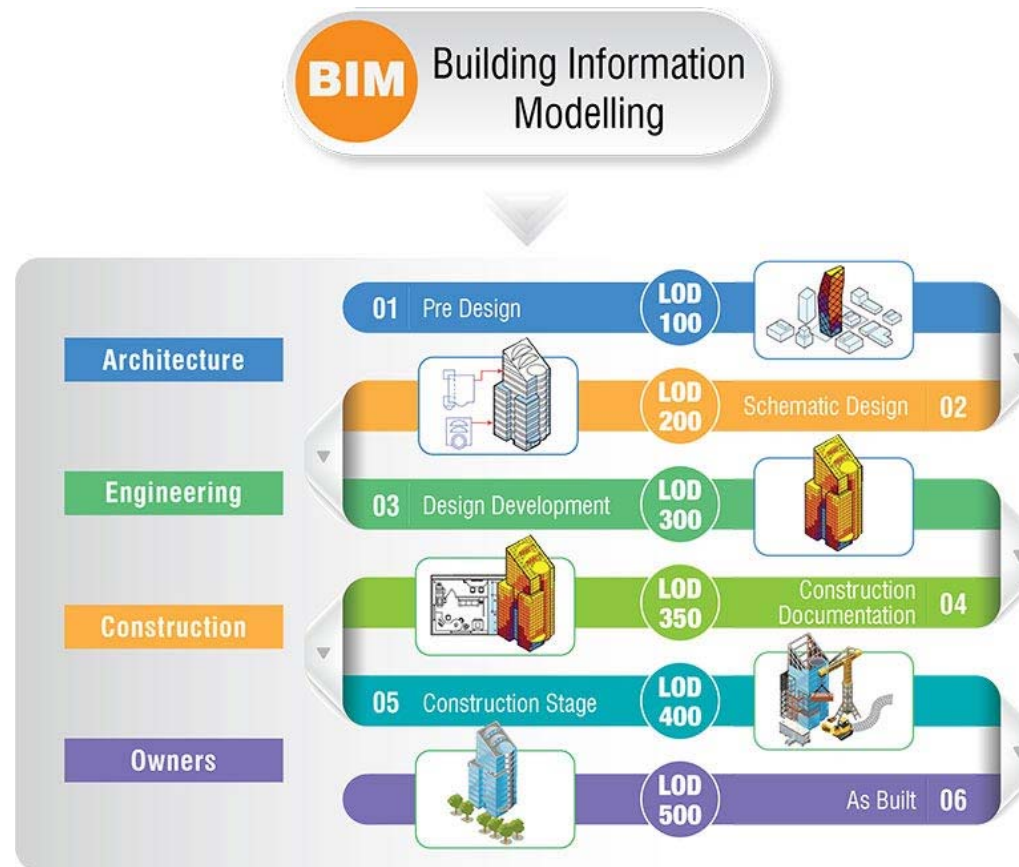- Autodesk 3DS Max

What CAD cannot be done?

Everyone expect **3D visualization**

Drawings are coordinated

- Plan, elevation section

- Real object elements are

- Represented by:

     - -symbols

- Drawing Convention

- Schematic diagram

BIM development stages

BIM in Surveying Profession

●Teaching theoretical background of the BIM method (concepts, workflows and standards).
●Best practice presentations from large projects and SME (from surveyor's point of view).
●Presentation of the latest software (surveying, integration and collaboration with BIM, CAD, GIS).

BIM benefits

- **Benefits when using to BIM**

Check clash report of BIM model

Interference check of services utilities
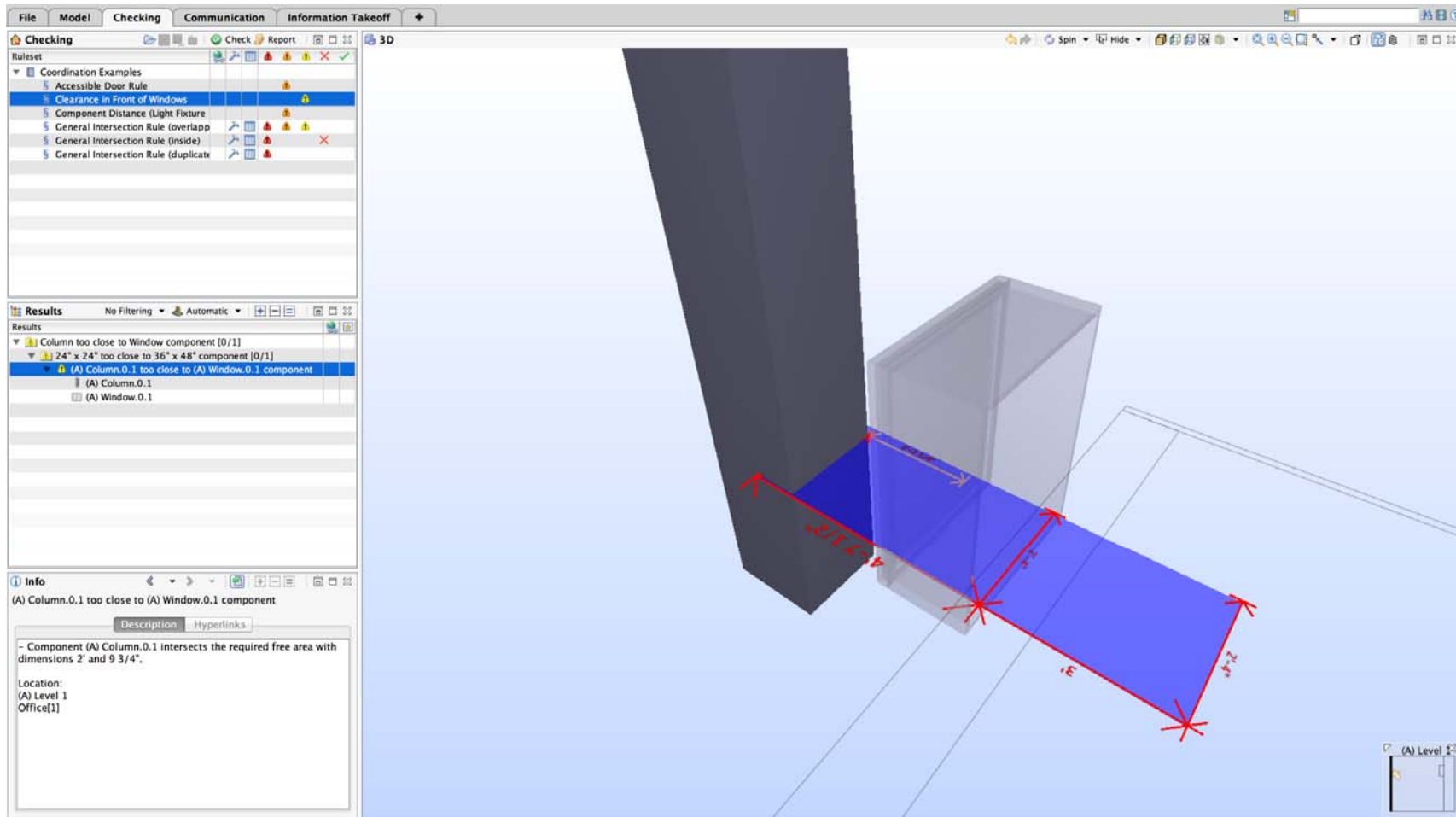
Check version history of BIM model

- What is the definition of CDE (Common Data Environment)

- The Common Data Environment (CDE) is simply a digital place in which the information comes together. With vast amounts of digital data being created and shared during a project's lifecycle, the CDE becomes an ideal environment in which to promote a collaborative working culture.

- **BS1192 workflow**

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Remote Sensing:

- **the acquisition of information about an object or phenomenon without making physical contact with the object and thus in contrast to on-site observation.**

- **Photogrammetry is kind of** <mark>passive mode</mark> **of remote sensing!**

- **Laser scanning is** <mark>active mode</mark>**!**

Remote sensing using passive sensor system

Remote sensing using active sensor system
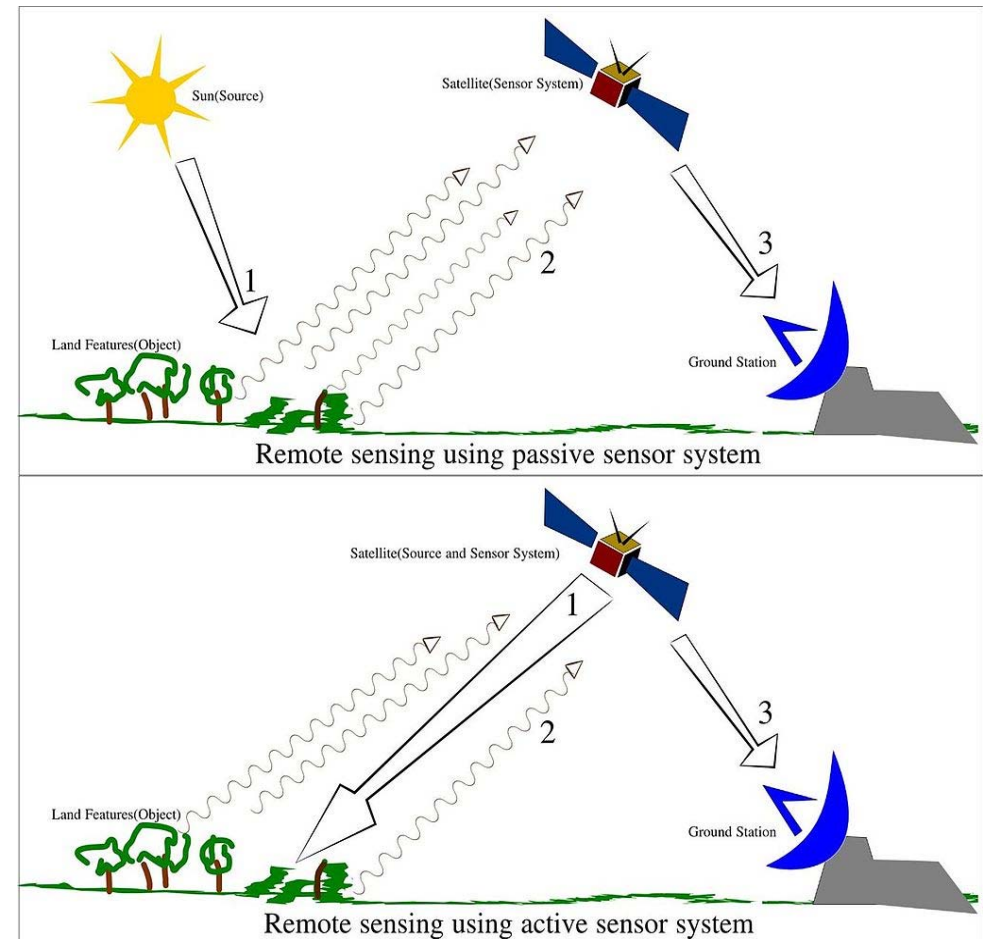
Types of remote sensing

- Passive sensors gather radiation that is emitted or reflected by the object or surrounding areas.

- Reflected sunlight is the most common source of radiation measured by passive sensors. Examples of passive remote sensors include film photography infra-red, charge-coupled devices, and radiometers.

- Active collection emits energy in order to scan objects and areas whereupon a sensor then detects and measures the radiation that is reflected or backscattered from the target.

- RADAR is an example of active remote sensing where the time delay between emission and return is measured, establishing the location, speed and direction of an object.

Concept of photogrammetry

- Photogrammetry is the art and science of making measurements from photographs, especially for recovering the exact positions of surface points.
- Photogrammetry is as old as modern photography, dating to the mid-19th century and in the simplest example, the distance between two points that lie on a plane parallel to the photographic image plane, can be determined by measuring their distance on the image, if the scale (s) of the image is known.
- Photogrammetric analysis may be applied to one photograph, or may use high-speed photography and remote sensing to detect, measure and record complex 2-D and 3-D motion fields by feeding measurements and imagery analysis into computational models in an attempt to successively estimate, with increasing accuracy, the actual, 3-D relative motions.

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- Over 170 years of history, first used in 1839 by French Louis Daguerre. before airplanes, balloons, kites and even pigeons were used to take some aerial photographs

- Aerial photography, the earliest form of remote sensing, was developed as a science following World War I.

- Classification by platform
  - Aerial photogrammetry
  - Vertical aerial photogrammetry
  - Oblique aerial photogrammetry
  - Terrestrial photogrammetry

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Principal point

Negative image

f

Perspective centre (centre of camera lens)

f

Positive image

Principal point

H

Camera axis (vertical)

Nadir point

Object

Perspective centre

Principal distance

f

Principal point

Positive image plane

r_a | r_b

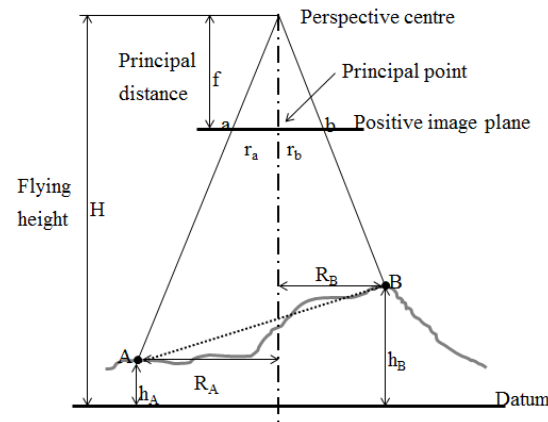Flying height

H

R_B

B

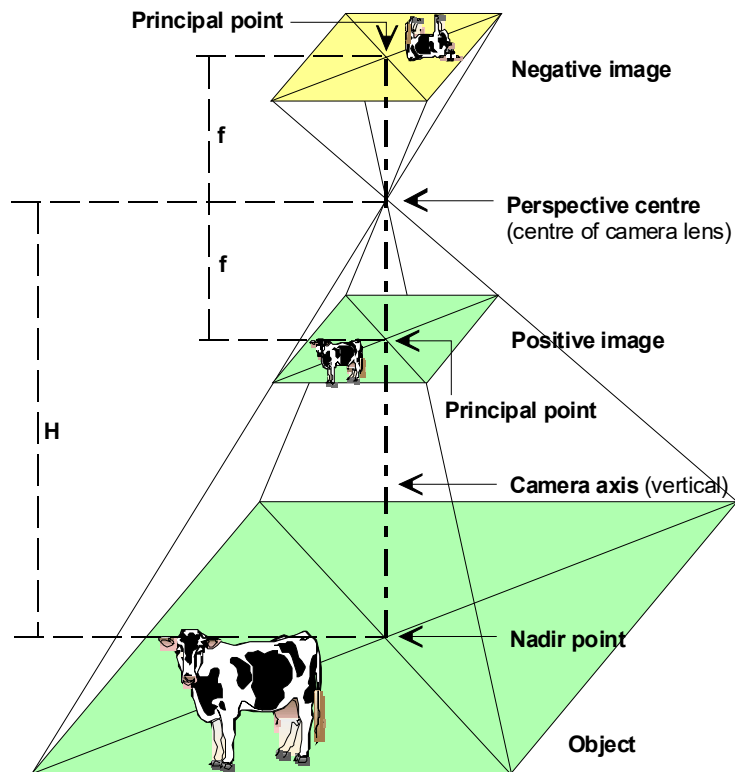R_A

A

h_A

h_B

Datum

Figure 1-8 Vertical aerial photograph. (Courtesy Carl Zeiss, Oberkochen.)
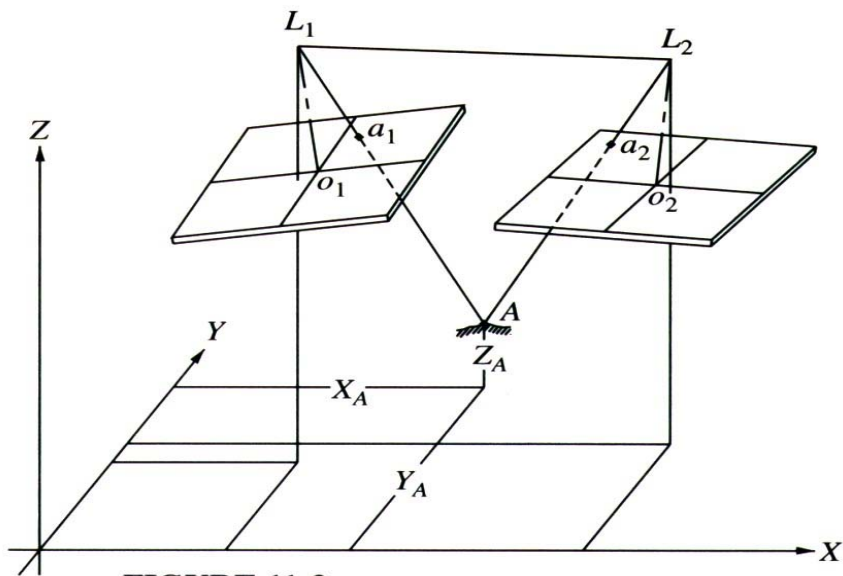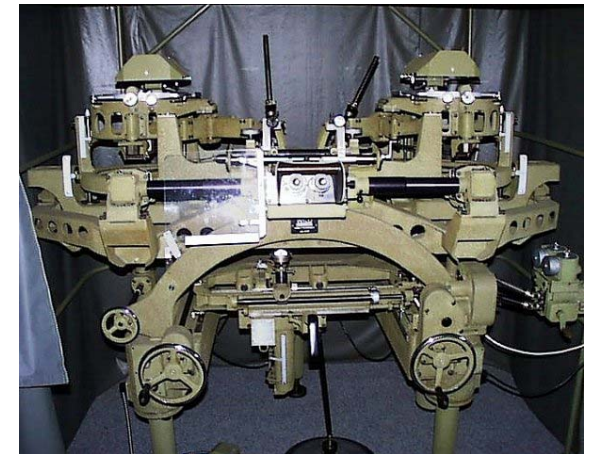
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FIGURE 11-3
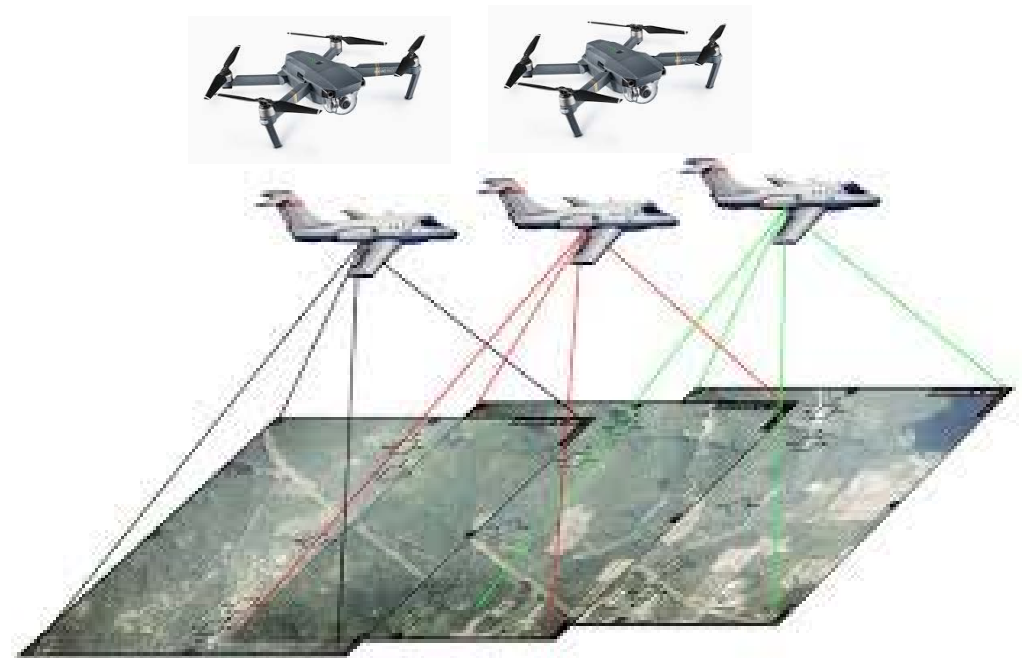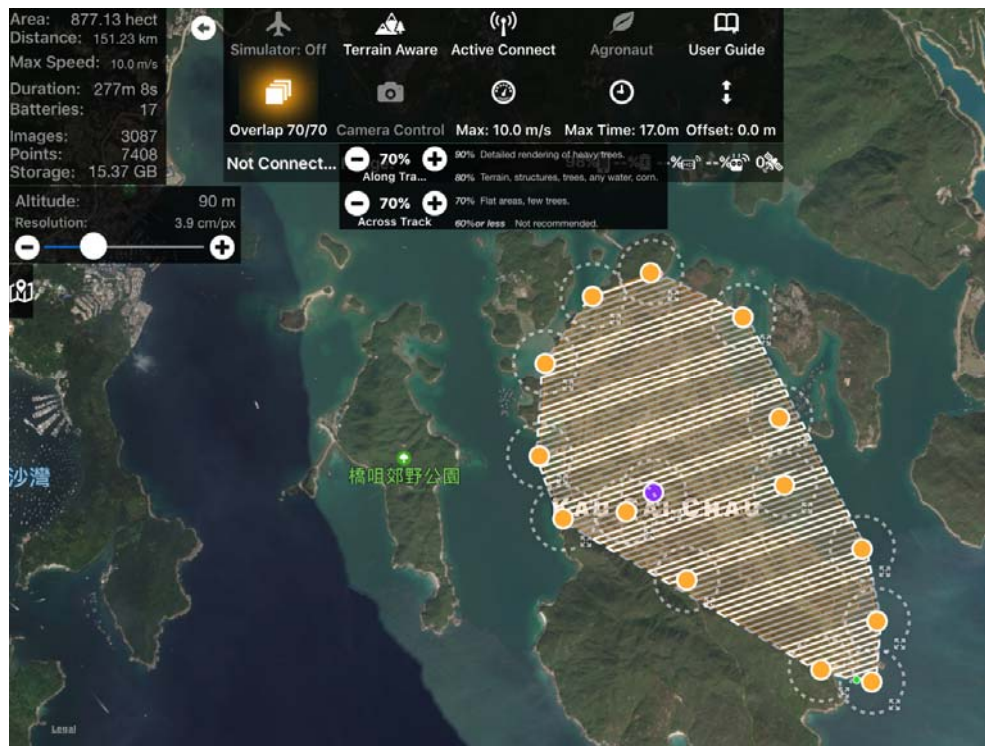Space intersection with a stereopair of aerial photos.

Overlapping concept in Photogrammetry

- Image stitching or photo stitching is the process of combining multiple photographic images panorama with overlapping fields of view to produce a segmented or high-resolution image.

- Commonly performed through the use of computer software, most approaches to image stitching require nearly exact overlaps between images and identical exposures to produce seamless results,

- Although some stitching algorithms actually benefit from differently exposed images by doing high dynamic range imaging in regions of overlap.

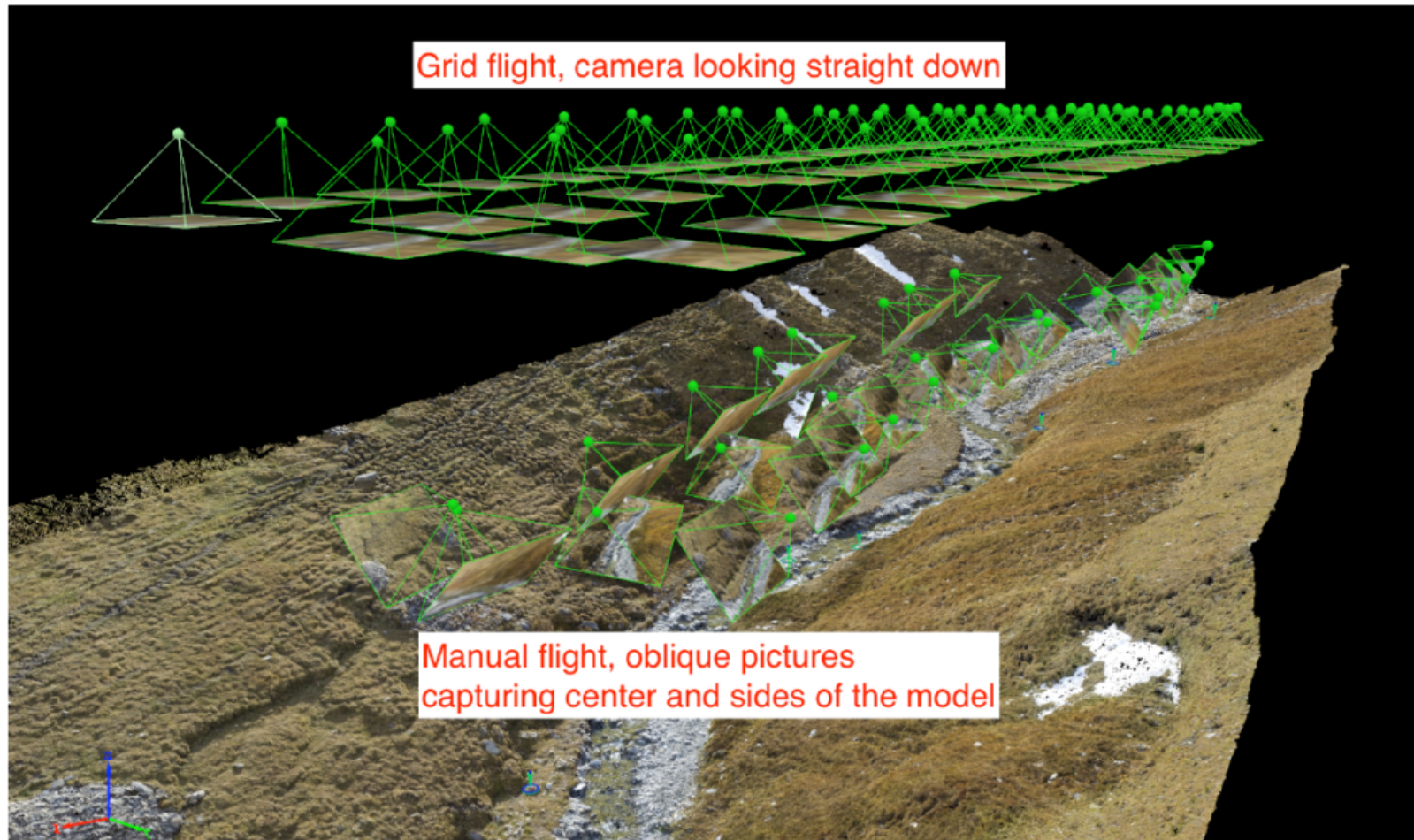- Some digital cameras can stitch their photos internally.

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- **Aerial photo techniques**

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Grid flight, camera looking straight down

Manual flight, oblique pictures capturing center and sides of the model
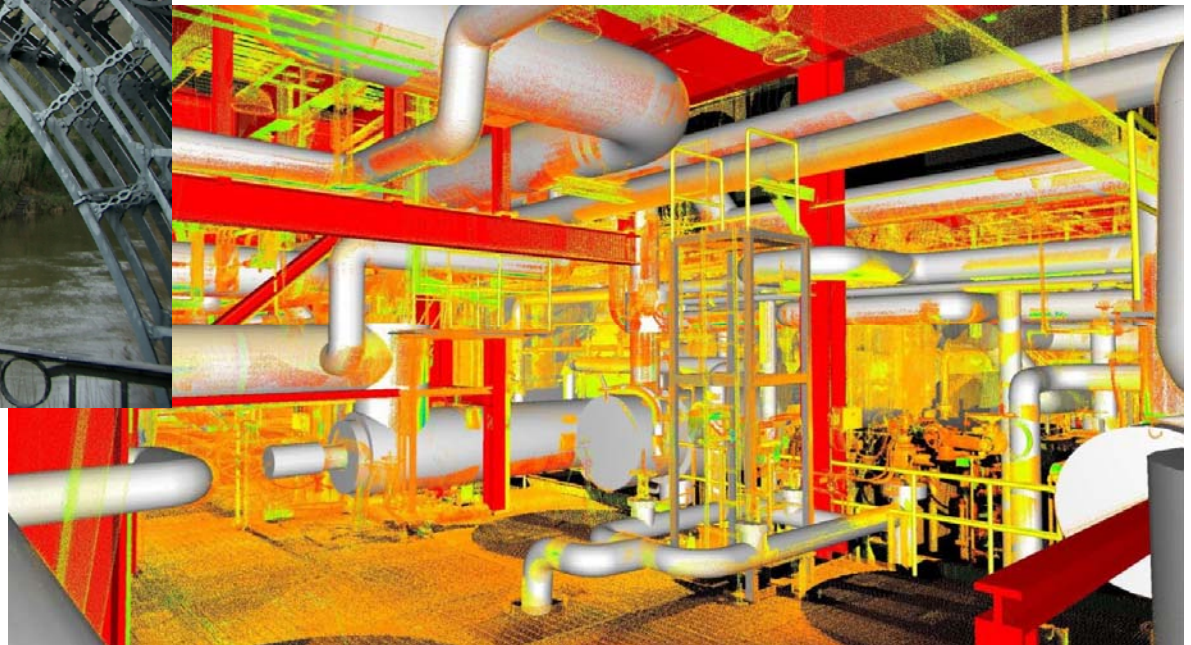
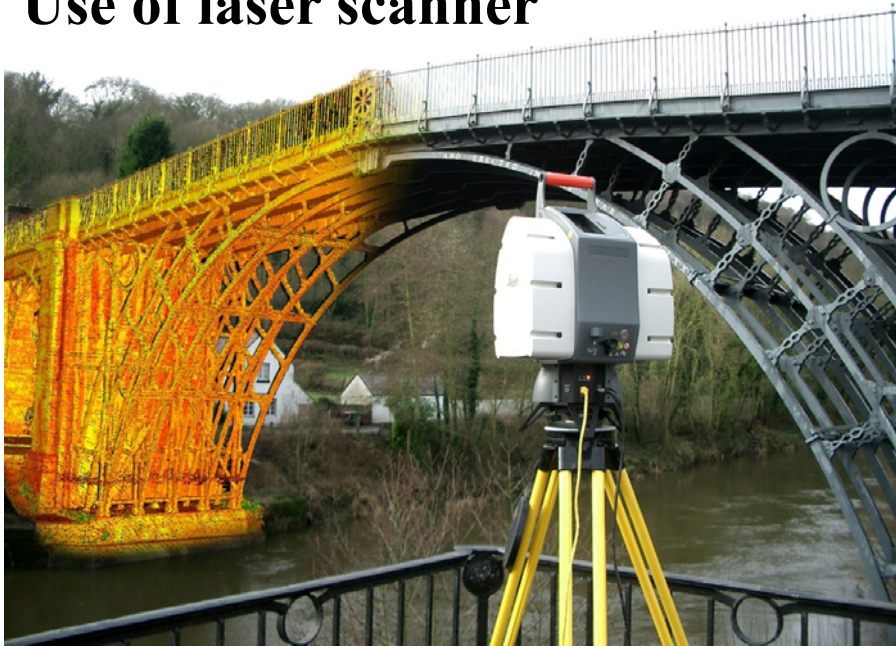# Scan to BIM for Manager

Use of photogrammetry

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Use of laser scanner

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Models of laser scanner

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- Create accurate 3D models with reality capture
- Use Autodesk ReCap reality capture software to convert reality into a 3D model or 2D drawing that's ready for further design.
- Context Capture is more precise and productive than computer-assisted 3D modeling and more versatile than 3D scanning
- Pix4D is a Swiss company that develops a suite of software products that use photogrammetry and computer vision algorithms to transform RGB, thermal and multispectral images into 3D maps and models.
- This software is developed and supplied by the company Pix4D SA (EPFL) Computer Vision Lab in Switzerland.
- Pix4D suite of products include Pix4Dmapper, Pix4Dfields, Pix4Dbim, Pix4Dmodel and Pix4Dcapture.

Questions?

What to learn?