

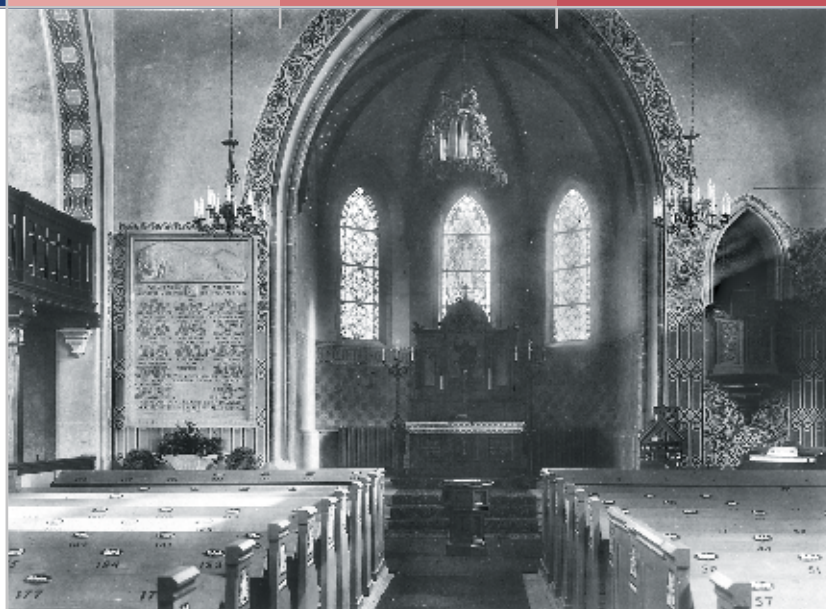
Photogrammetric Evaluation of Historic Captures

fokus
GmbH Leipzig

Klein Wanzleben, Saint John's Church
Reconstruction of the wall decoration,
2014.

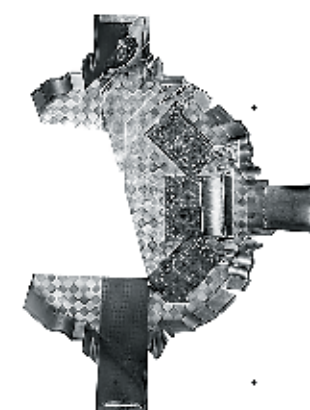
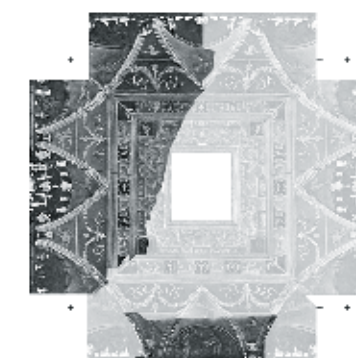
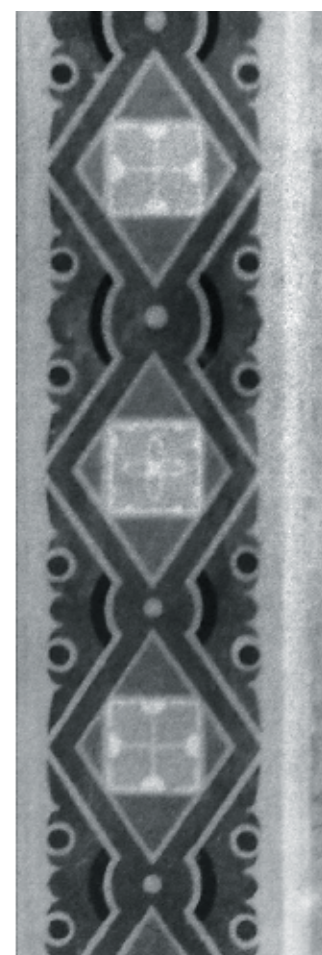
► *Choir, view, 1925 (municipal archives).*

▼ *Mural painting, photomap rectification
and unwrapping 1:5 (details).*



**Dresden,
Residential Castle, Tower Room**
Reconstruction of the wall decoration,
2009.

► *Room view, 1930 (Deutsche Fotothek).*



▲▲ *Reconstruction ceiling view,
photomap 1:10. Montage of the
unwrapping of the coves and the ortho-
graphic projection of the ceiling vault.*

▲ *Floor, photomap 1:10.*

◀ *Wall view south, photomap 1:10.*



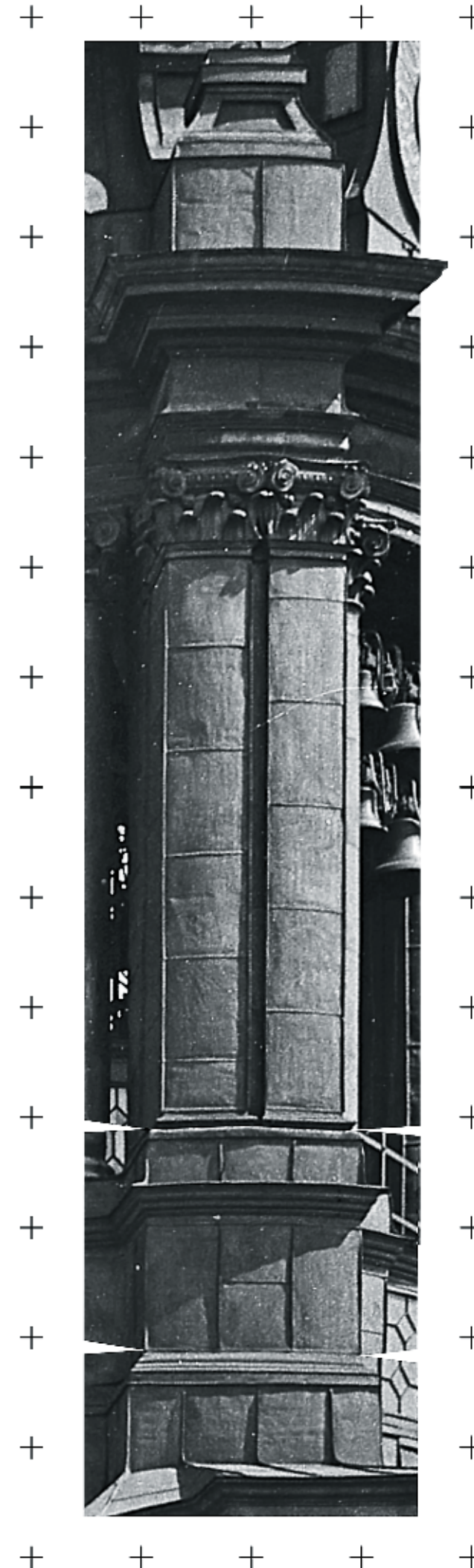
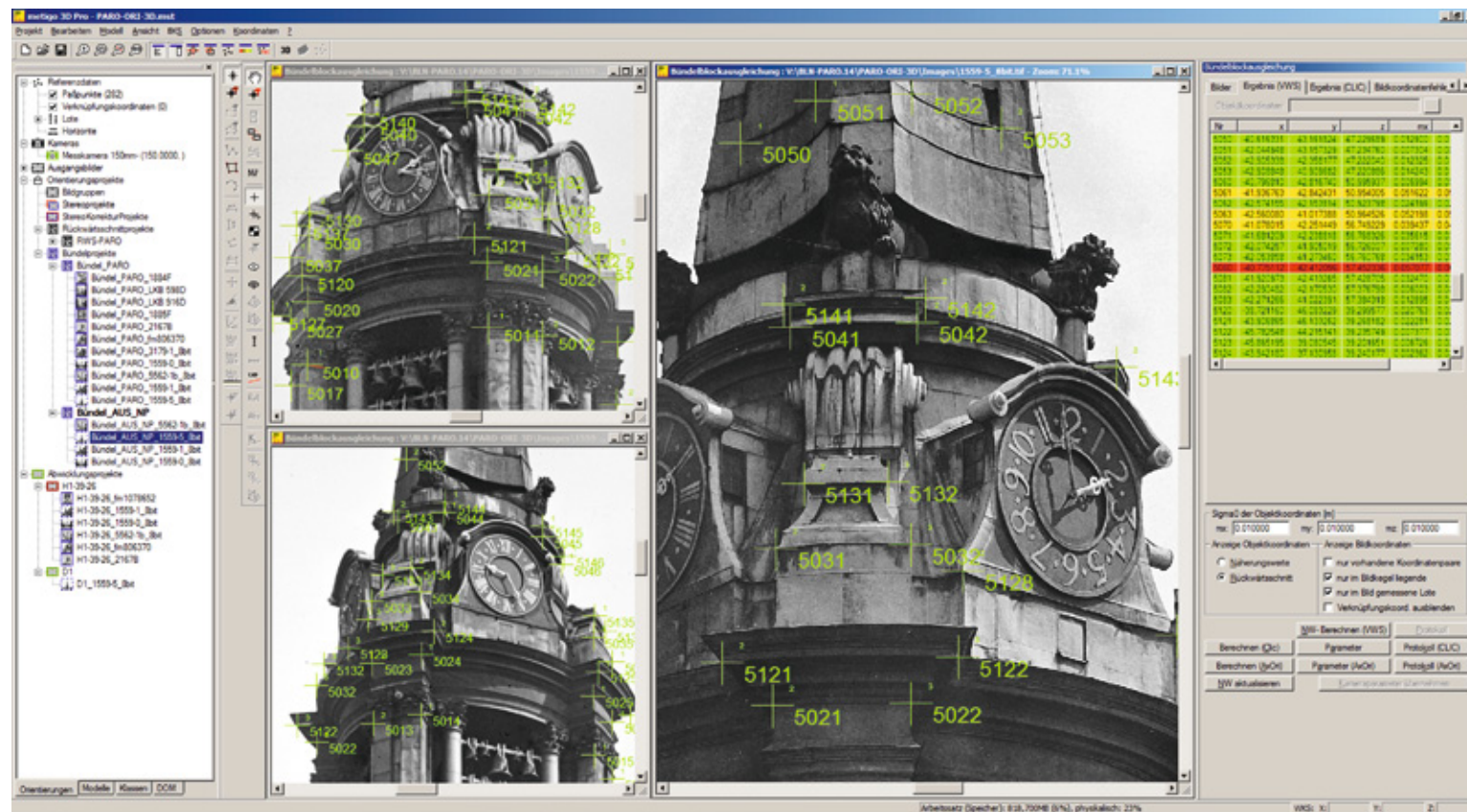
Berlin, Parochialkirche
Reconstruction steeple, 2014.

◀ View 2006 (Achim Raschka/CC-BY-SA-3.0).

▶ Pilasters, photomap 1:20.

▼ Photogrammetric bundle adjustment
in **metigo3D**.

▼▼ Image by Albrecht Meydenbauer, 1910
(measuring screens archiv of BLDAM).



During the renovation of a historic building
the scale reconstruction of lost building parts from historical images may be of interest. If there are just individual images at hand, 2D layers can be reconstructed and dimensionally evaluated. However, if there are several images from different directions available, these can be three dimensionally and photogrammetrically evaluated. The procedure described below is independent of the nature or size of the object (cornice profile, chandeliers, floors, façades, building components).

For the image search, there are different sources to choose from; for example, the Albrecht Meydenbauer Archive of Survey Photographs, the Deutsche Fotothek and Bildarchiv Foto Marburg, the image archives of the state offices for historical monuments and various archives for foundations and city offices. Preferably, the glass plates or contact sheets (on film directly from the original) are scanned with a precision scanner of high resolution. This is followed by the adjustment of tonal values and contrast and the sharpening of the digital images.

In order to have a true-to-scale evaluation of the image, reference measurements of the object required. This is preferably done by tachymetric measurements of points on the object and the surrounding buildings, which can be identified as identical points in the older images. If this is not possible because the object is lost, existing drawings or scale drawings can be used.

The images are first individually oriented by tachymetrically measured or construed 3D-coordinates using photogrammetric resection. In the second step, all the images in an image mosaic are balanced and photogrammetrically oriented (bundle adjustment). For this purpose, in all the images link points and geometry information (such as plumb lines on the façade or the room edges) are measured and introduced as additional observations to stabilize the image mosaic. Statements about the achievable photogrammetric evaluation accuracy may be presented in the result of the bundle adjustment. This depends largely on the quality of the reference measurements on the object, the configuration of the existing images, the material of the film (glass, film, paper print), the photographic resolution and the lens characteristics (focal length, distortion).

Because the achievable accuracy cannot be estimated before the start of the evaluation, a consultation with the client is done once the results are known concerning the quality of the bundle adjustment, to determine to what extent subsequent evaluations are to be carried out.

After the following image orientation, points, which can be measured in multiple images, can be determined as 3D-coordinates. Using the error log of the bundle adjustment, it is possible to get statements about the evaluation accuracy and reliability of object dimensions. These coordinates are used to determine discrete heights, the 2D image rectification or the orientation of spatial scales. The layers can be used for parametric image rectification.

If individual images have a higher resolution, they can also be utilised for large-scale image rectification that are done from architectural details.