

# Bernoulli-Euler Online (BEOL)

Integrating Editions in a Virtual  
Research Environment

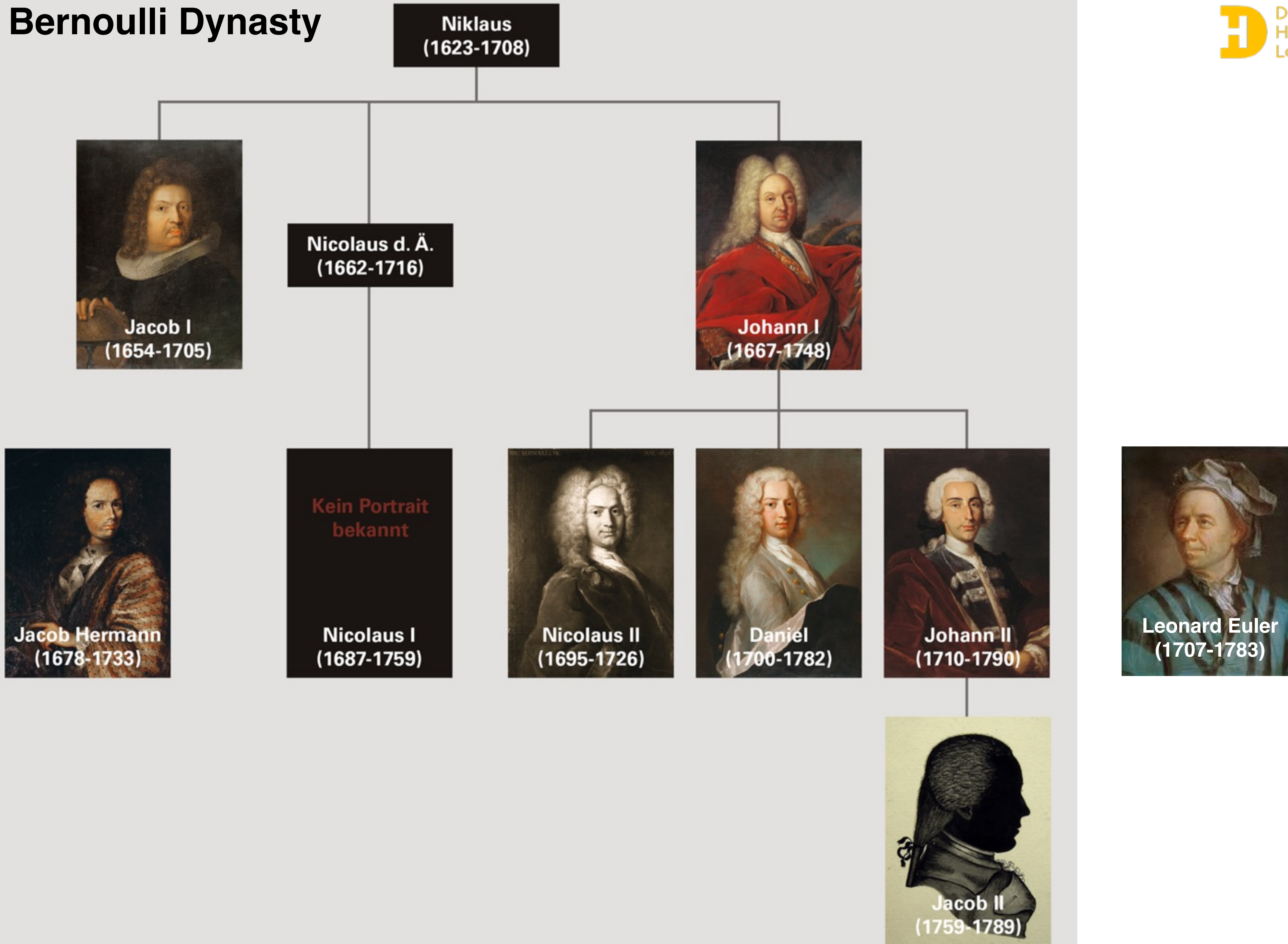
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**Fribourg.Nov.2016**

# BEOL Project

- Swiss National Science Foundation Project
- Digital Humanities Lab & Bernoulli Euler Zentrum
- **Focus:** Mathematics of 8 members of Bernoulli dynasty and Leonard Euler
- **Integration of Three Editions:** LEOO, BEBB, Meditatio
- **Based on Knora/SALSAH and SIPI:** Virtual Research Environment

# Bernoulli Dynasty





# Goals of BEOL

- Integrating three main edition projects into one online platform
- Presenting the material to the user 🖱️ Allow query and add to content, annotation, versioning, sharing
- Interoperability with other RDF-based digital platforms
- Generic methodological development

# Edition Projects

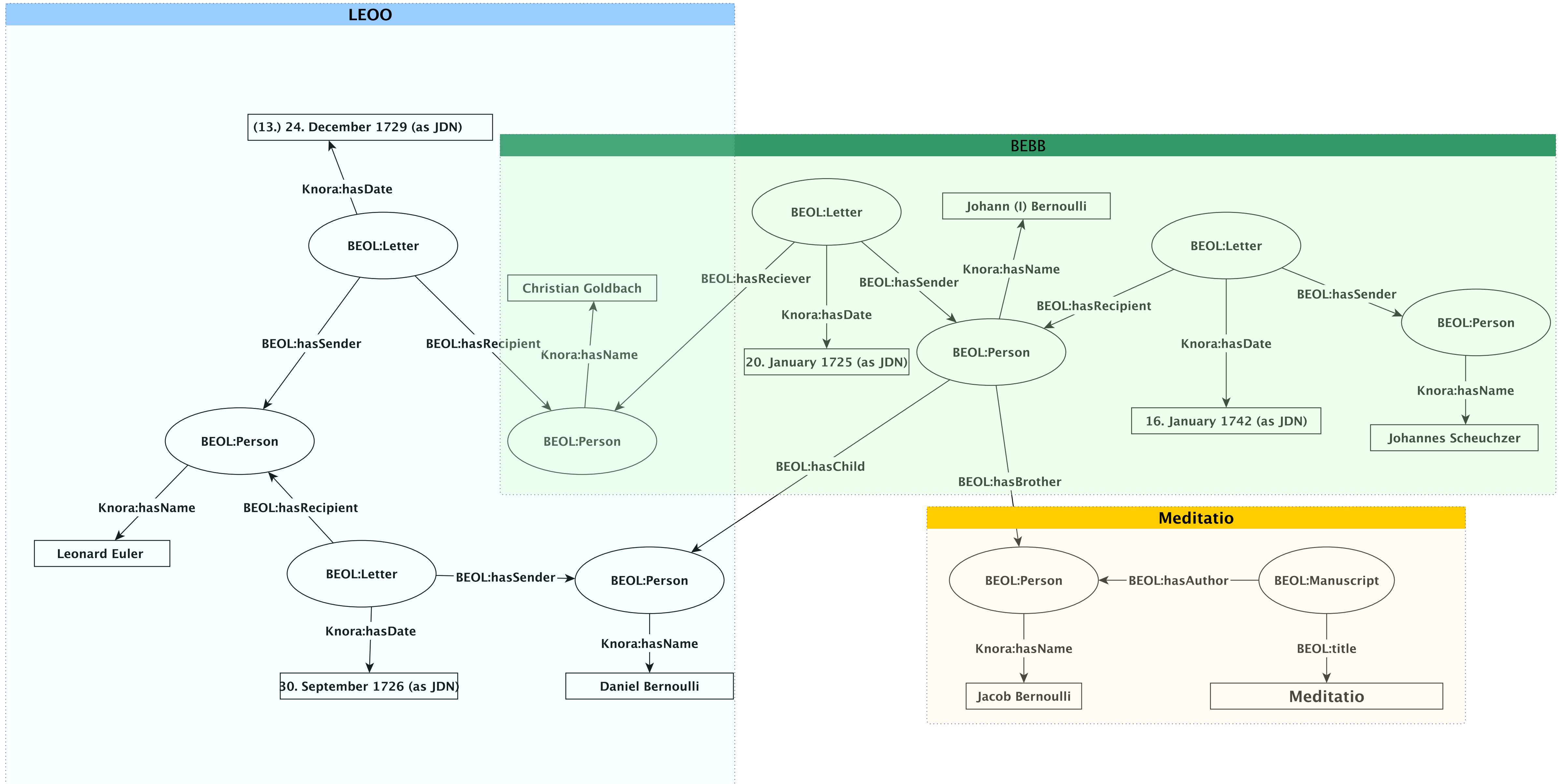
Technically Incompatible

- Three main edition projects:
  - ▶ **BEBB:** Basler Edition der Bernoulli-Briefwechsel
  - ▶ **LEOO:** Leonardi Euleri Opera Omnia , (Goldbach volume)
  - ▶ **Meditatio:** Jacob (I) Bernoulli's scientific notebook


# Integration: homogenizing

- **BEBB:** Media Wiki  $\xrightarrow{\text{Media Wiki Parser}}$  XML
- **LEOO:** LATEX  $\xrightarrow{\text{LateXML}}$  XML
- **Meditatio:** XML Based Transcription

**Mathematical Formulas**  **MathJax, MathML**

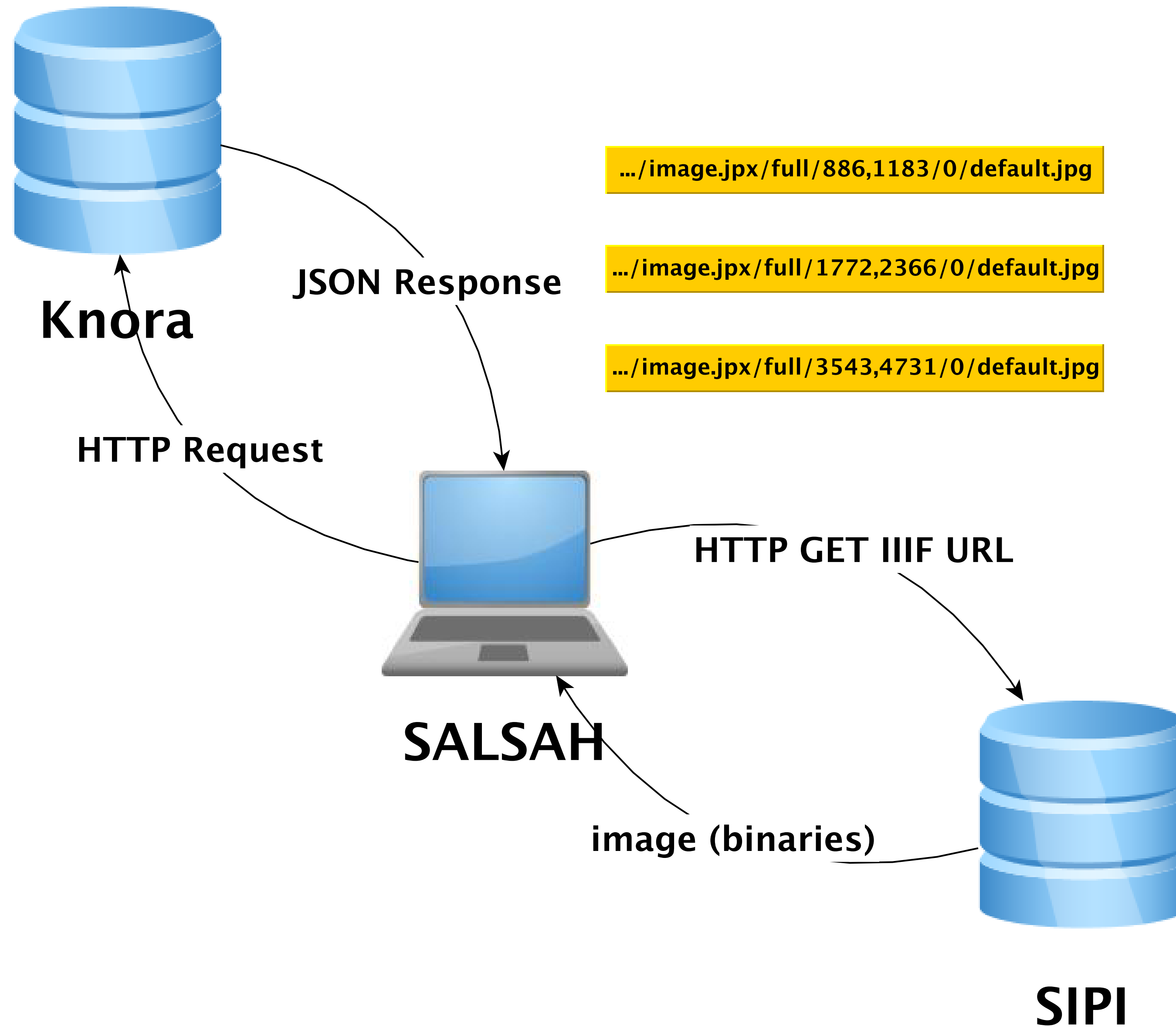


# Knora/SALSAH

- generic Virtual Research Environment for the humanities
- **Knora** (Knowledge Organization, Representation, and Annotation): RDF-Triplestore and RESTful API, Knora-Base Ontology
- **SALSAH** (System for Annotation and Linkage of Sources in Art and Humanities): web-based GUI for Knora allowing for viewing and annotating resources
- **SIPI**: (**S**imple **I**mage **P**resentation **I**nterface)  *an extended implementation of a IIIF-server (high efficient stand-alone server written in C++)*



# Knora/SALSAH, SIPI Interaction





Meditationes
3546x4502

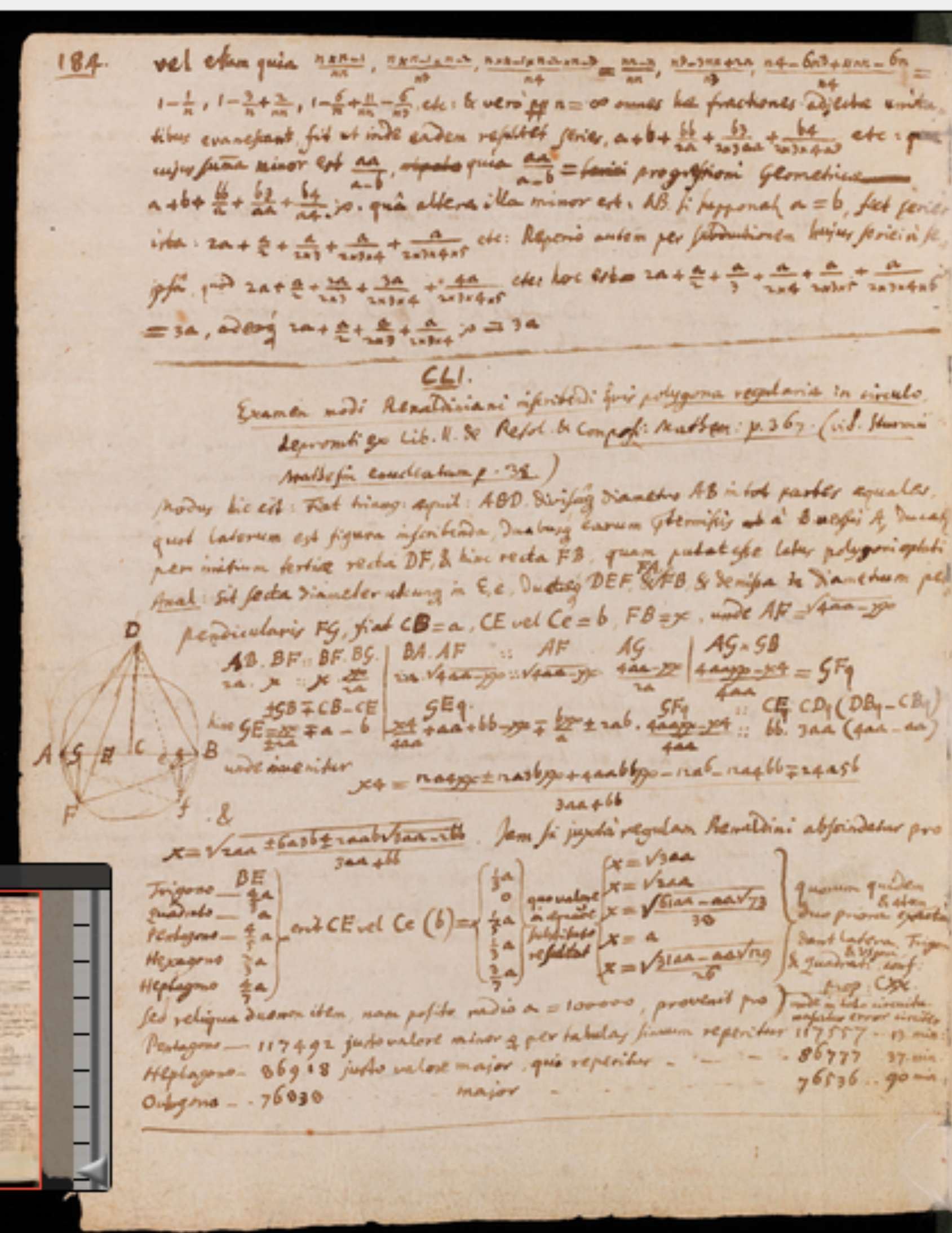
3546x4502

443x563

887x1126

1773x2251

3546x4502



Manuscript
Page

**Manuscript:**

Descriptive Metadata

**has Representation :**

**Sequence number :**

**Title :**

Meditationes, Annotationes, Animadversiones Theologicae & Philosophicae

**Datum der Entstehung :**

1677 - 1705 (Gregorian)

**Creator :**

Jakob Bernoulli

**Location :**

UB Basel L Ia 3

Annotations

References to other objects

Other objects referencing this object

Med Ms n01



# Defining Regions

M151-01-TT

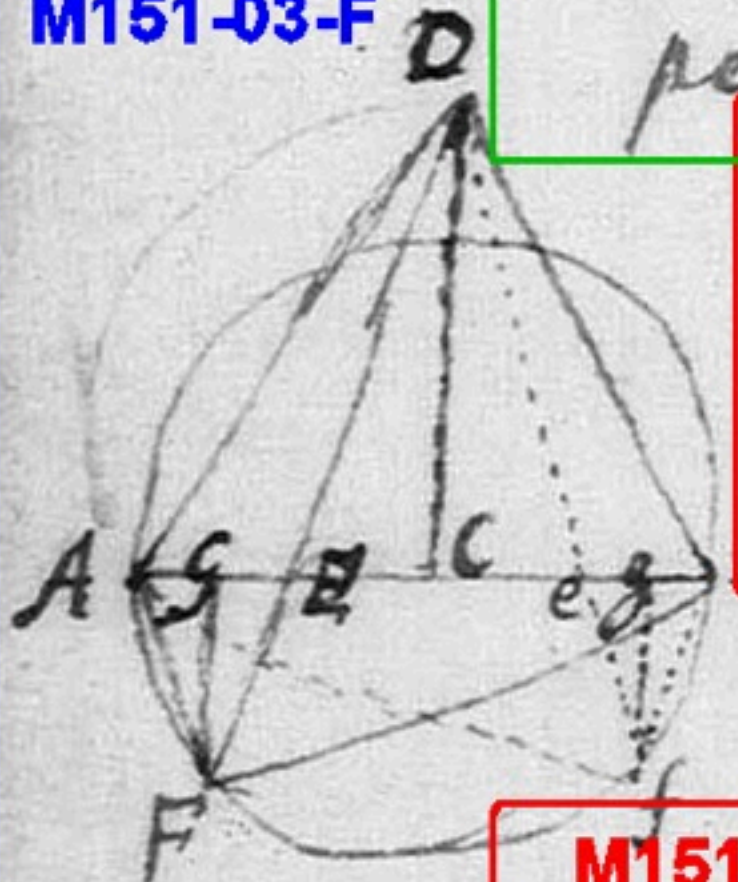
CLL.

Examen modi Renaldiniani inscribendi quibus polygona regularia in circulo  
depromti ex Lib. II. de Resol. & Compofi: Mathem: p. 367. (vid. Sturmii  
Mathem. eucl. p. 38.)

M151-02-T

Modus hic est: Fiat triang: equil: ABD. Dividat diametru AB in tot partes equales  
quot laterum est figura inscribenda, duabusq; earum ptermis ab a' B versis A, ducat  
per initium tertie recta DF, & hinc recta FB, quam putate esse later polygoni optati  
Anal: sit secta diameter utcumq; in E, e. Ductisq; DEF, & FB, & demissa in diametrum pe-

M151-03-F



M151-04-M

$$AB : DF :: DF : BG$$

$$2a \cdot x :: x \cdot \frac{2x}{2a}$$

$$\pm GB = CB - CE$$

$$\text{hinc } GE = \frac{2x}{2a} \mp a - b$$

M151-05-M

$$BA \cdot AF :: AF \cdot AG$$

$$2a \cdot \sqrt{4aa - xx} :: \sqrt{4aa - xx} \cdot \frac{4aa - xx}{2a}$$

$$\frac{4aa - xx}{2a} \mid \frac{4aa - xx}{4aa} = GFq$$

$$GEq. \frac{GFq}{4aa} :: CEq. CDq (DBq - CBq)$$

$$\frac{4aa - xx}{4aa} \mp \frac{bx}{a} \pm 2ab \cdot \frac{4aa - xx}{4aa} :: bb \cdot 3aa (4aa - aa)$$

M151-06-M

unde aueritur

$$x^4 = \frac{12a^4xx \pm 12a^3bxx + 4aabbxx - 12ab - 12a^4bb \mp 24a^5b}{3aa + bb}$$

M151-07-M

$$x = \sqrt{2aa \pm \frac{6a^3b \pm 2aabb \sqrt{3aa - 2bb}}{3aa + bb}}$$

BE

USW.

Jam si juxta regulam Renaldini absindatur pro  
 $\left[ \begin{array}{l} x = \sqrt{3aa} \\ x = \sqrt{2aa} \end{array} \right]$



# Diplomatic Transcription

CLI.

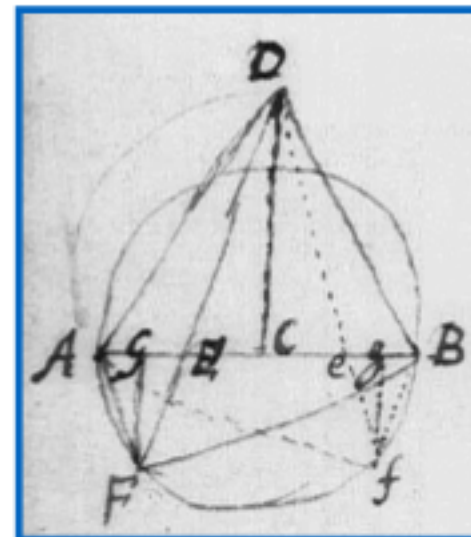
Examen modi Renaldiniani inscribendi quavis polygona regularia in circulo, depromti ex Lib. II. de Resol. & Composi: Mathem: p. 367. (vid. Sturmii Mathesin enucleatam p. 38.)

M151-01-TT

Modus hic est: Fiat triang: æquil:  $ABD$ , divisâq̄ diametro  $AB$  in tot partes æquales, quot laterum est figura inscribenda, duabusq̄ earum p̄termissis et à  $B$  versùs  $A$ , ducaq̄ per initium tertiæ recta  $DF$ , & hinc recta  $FB$ , quam putat esse latus polygoni optati  
Anal: Sit secta diameter utcunq̄ in  $E$ ,  $e$ , ductæq̄  $DEF$ ,  $\{FA\}$  &  $FB$  & demissa in diametrum perpendicularis  $FG$ , fiat  $CB = a$ ,  $CE$  vel  $Ce = b$ ,  $FB = x$ , unde  $AF = \sqrt{4aa - xx}$

M151-02-T

M151-04-M



M151-03-F

$$AB \cdot BF :: BF \cdot BG.$$

$$2a \cdot x :: x \cdot \frac{xx}{2a}$$

$$\pm GB \mp CB - CE$$

hinc

$$GE = \pm \frac{xx}{2a} \mp a - b$$

$$BA \cdot AF :: AF \cdot AG$$

$$2a \cdot \sqrt{4aa - xx} :: \sqrt{4aa - xx} \cdot \frac{4aa - xx}{2a}$$

$$\frac{AG \times GB}{4aa} = GFq$$

$$GEq \cdot GFq :: CEq \cdot CDq \quad (DBq - CBq)$$

$$\frac{x^4}{4aa} + aa + bb - xx \mp \frac{bxx}{a} \pm 2ab \cdot \frac{4aa - xx}{4aa} :: bb \cdot 3aa \quad (4aa - aa)$$

M151-05-M

unde invenitur

$$x^4 = \frac{12a^4xx \pm 12a^3bxx + 4aabbxx - 12a^6 - 12a^4bb \mp 24a^5b}{3aa + bb}$$

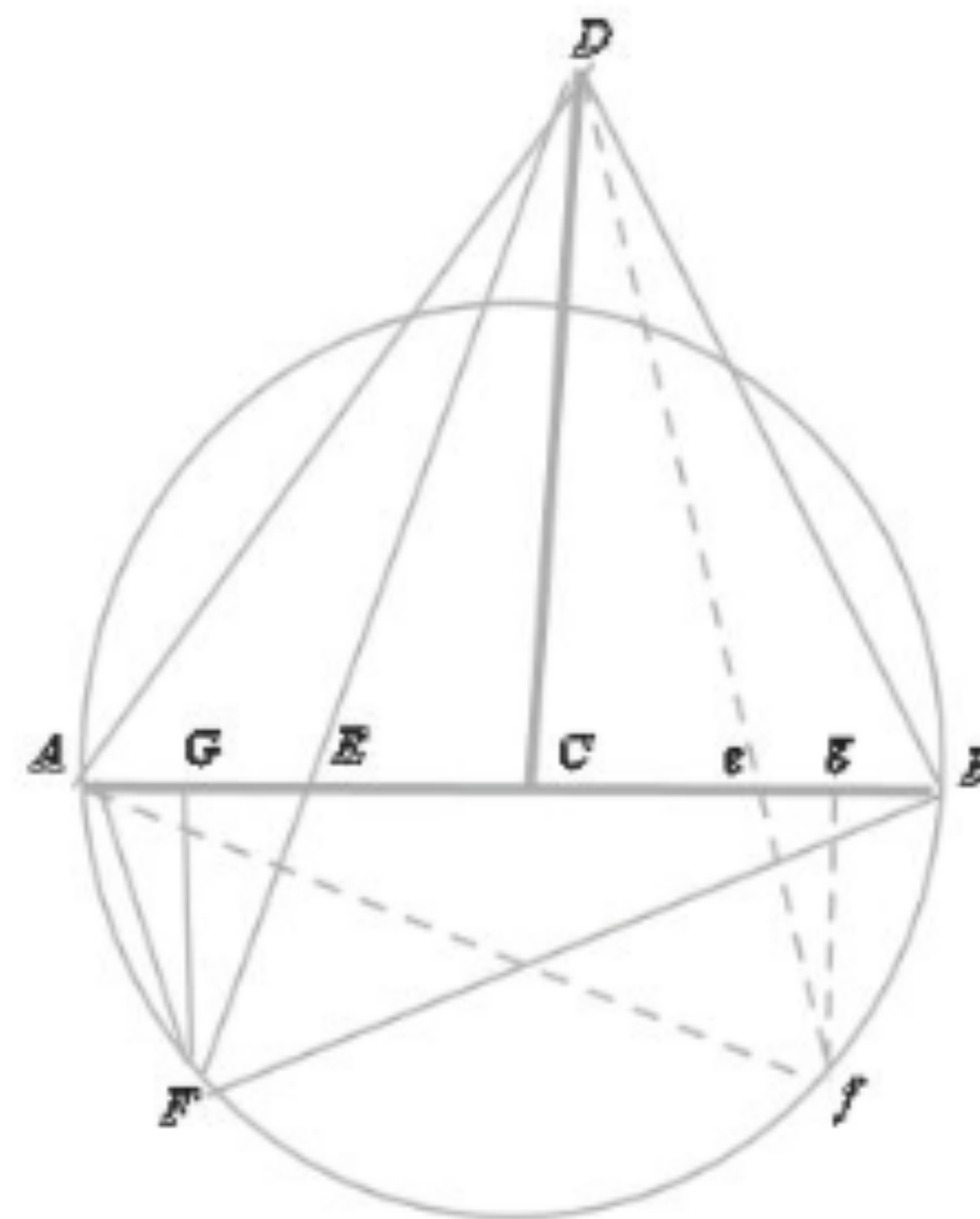
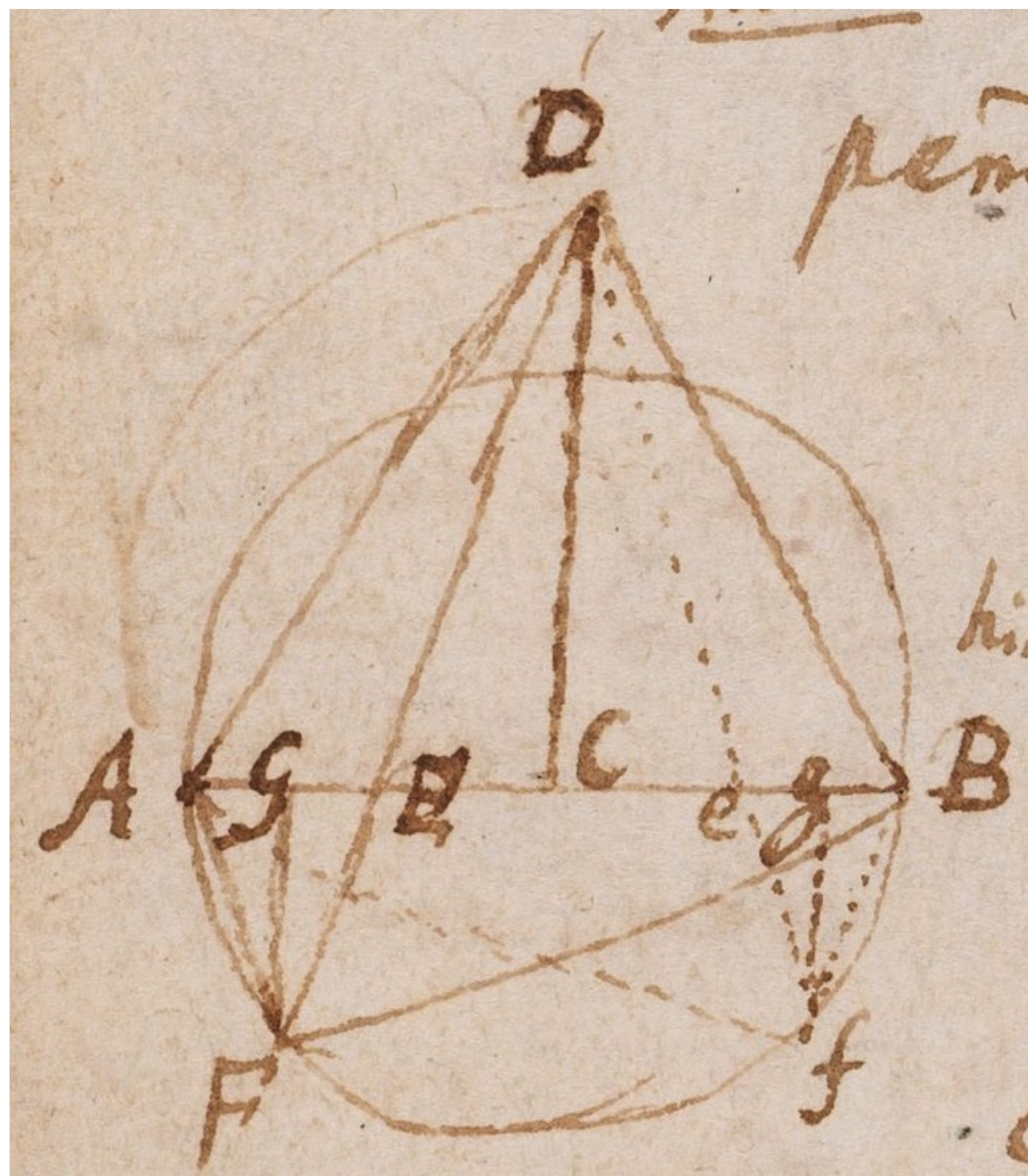
M151-06-M

$$\& x = \sqrt{2aa \frac{\pm 6a^3b \pm 2aab\sqrt{3aa - 2bb}}{3aa + bb}}$$

M151-07-M



# Image Recognition Challenge



# Thanks For Your Attention

## Questions?