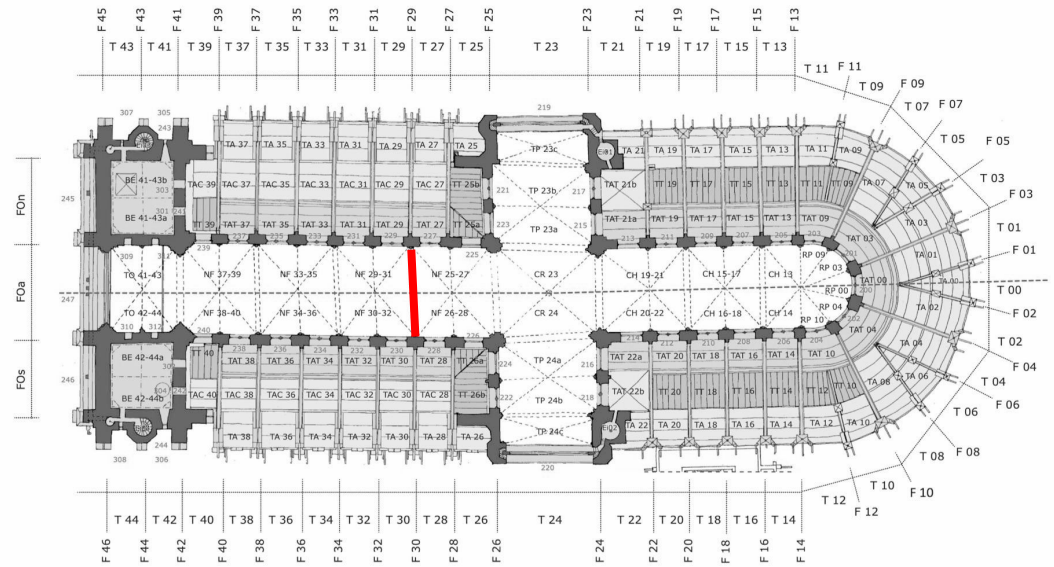


Issue 608

E92-Spacetime Volume, E93-Presence, and related properties  
Example from Notre-Dame collapsed arch

# The case study: the collapsed arch F29-30 in the nave of Notre-Dame de Paris



Fonds de plan : agence Benjamin Mouton, ACMH

BE	Beffroi	FO	Façade ouest	TAC	Terrasse sur combles
CH	Choeur	NF	Nef	TP	Transsept
CR	Croisée	BP	Rond-point	T	Travée
EI	Escalier int.	TA	Terrasse	TT	Toiture
F	File	TAT	Terrasse sur tribune	GD	Vitrux

**CATHÉDRALE NOTRE-DAME DE PARIS**  
NOMENCLATURE DES ESPACES  
Plan des terrasses

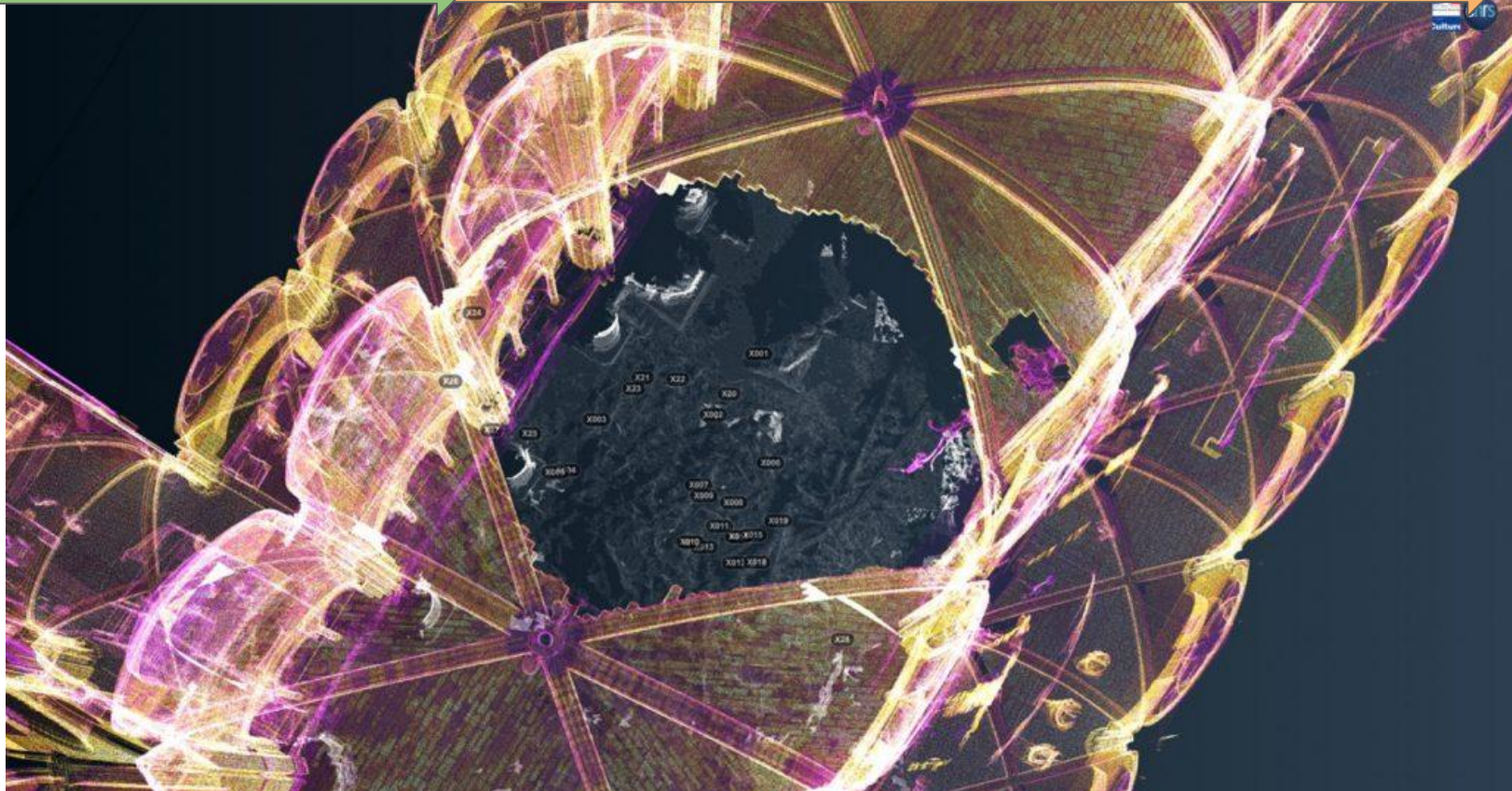
ECHELLE 1/500  
DATE 23.04.2019  
COVALENCE architectes

Collapsed arch (GT Pierre – Bruno Phalip)

# Juxtapositions of 3D Data in Aïoli before/after F29-30 arch collapse

Point cloud  
Tallon 2010  
before fire

Point cloud surveys post  
fire : vaults and nef  
(cleaning operations)



# Data to map

- archaeological data from lapidary study and inventory (voussoirs)
- coordinates of voussoirs after the fall, during the cleaning operations (Aioli tool): tracking of the voussoirs in space and time
- 3D documentation: voussoirs, ie. <http://vcg.isti.cnr.it/~callieri/notredame/>
- arch before the fire (3D scan, Andrew Tallon 2010) - architectural survey
- parametric model for reconstruction (3D model)
- reasoning for the reconstruction: archaeological predicates, LP models

# The physical anastylosis test



Voussoirs from the F29-30 arch

Physical anastylosis  
by LRMH and Stone  
working group  
(Leroux Lise, LRMH)

# Trajectory of a voussoir after its collapse

Voussoirs in the  
remains of the nave



Cleaning operations by  
unmanned machines

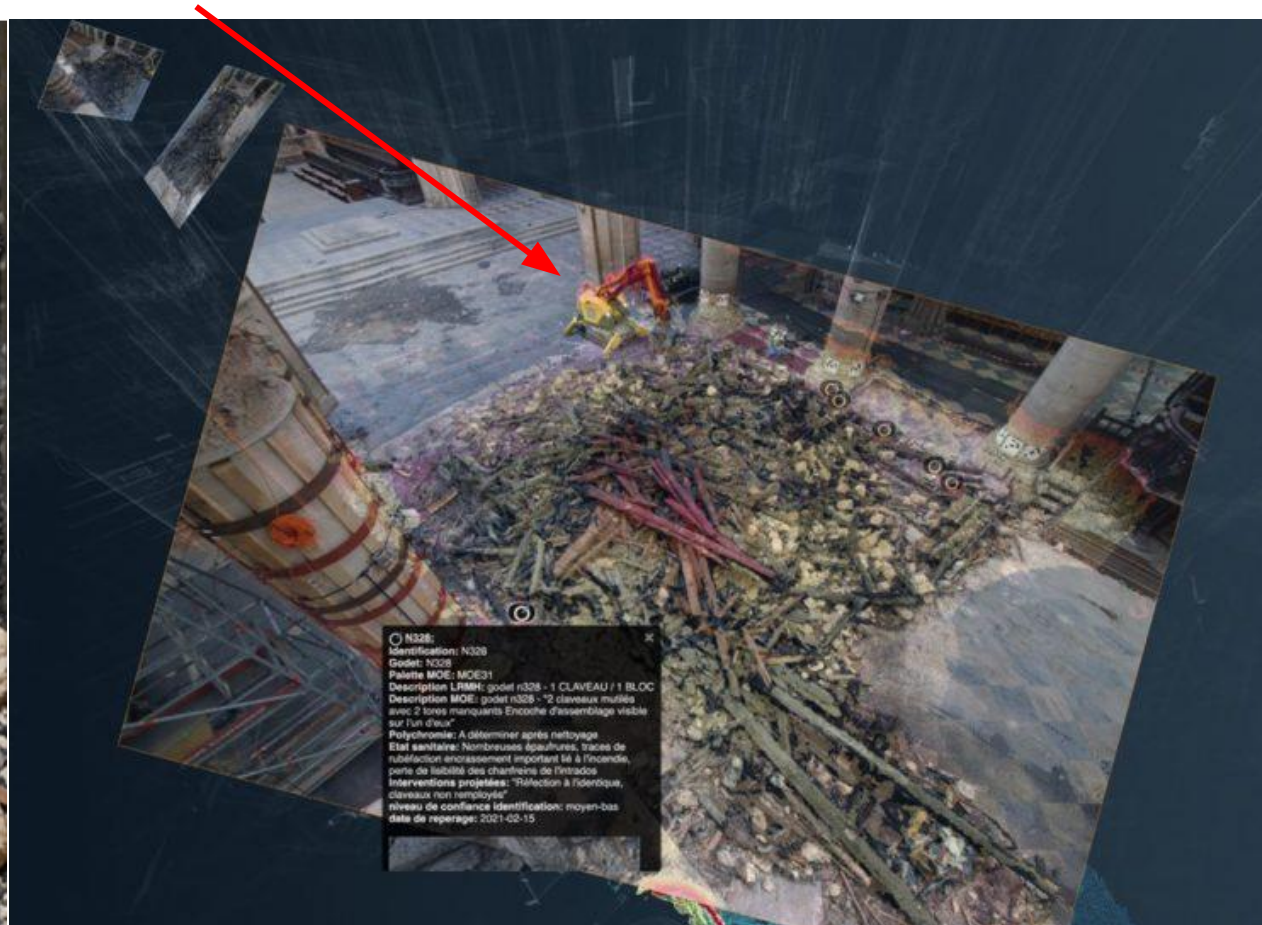


# Positions of voussoirs in the nave

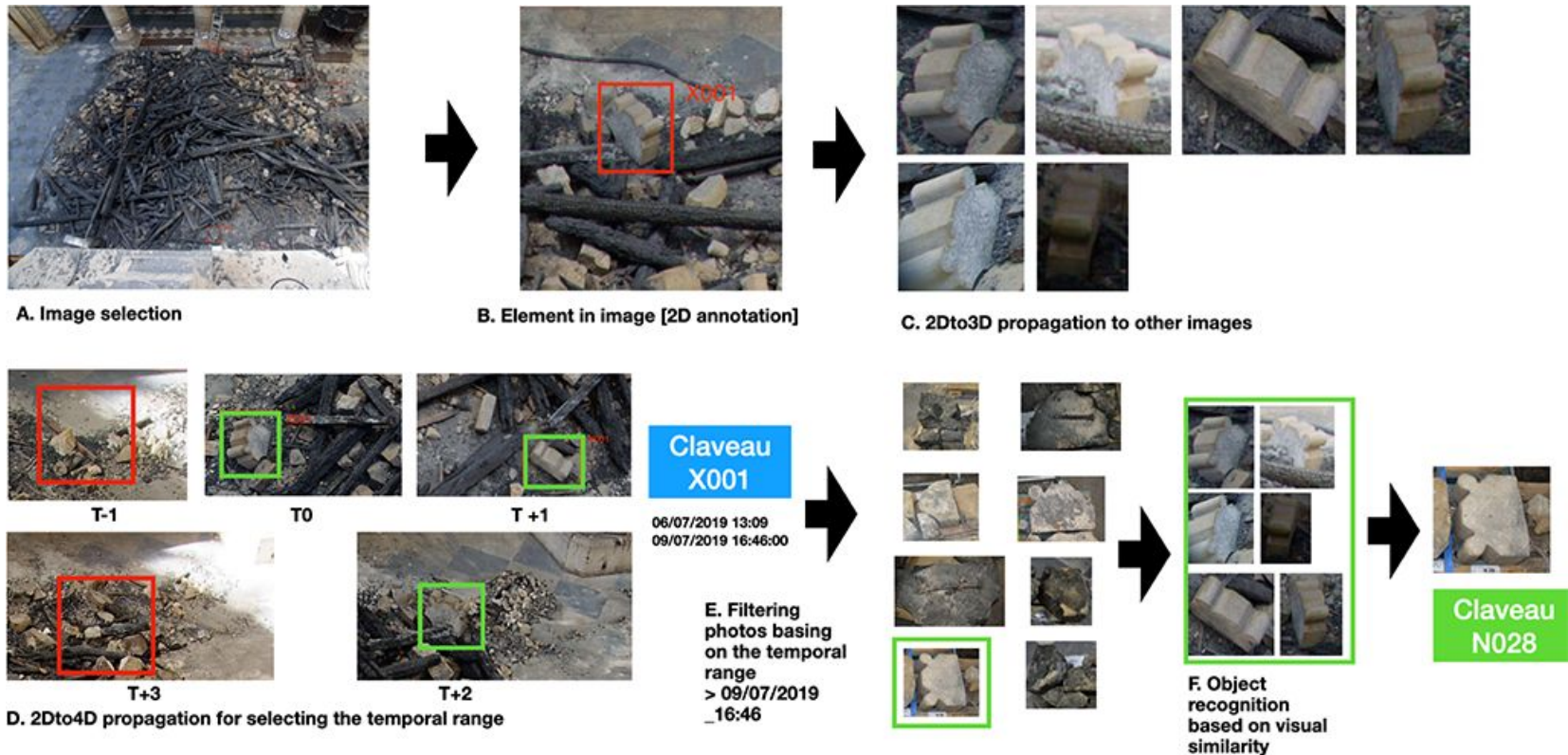
Photo from photogrammetric dataset showing 2 voussoirs in the rubbles



Unmanned machine removing amounts of rubbles (including voussoirs)



# Aïoli for tracking and identifying voussoirs



Use of Aïoli for the spatio-temporal tracking of the voussoirs (De Luca, 2021)