interactive computing laboratory

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ECOLE NATIONALE DE L'AVIATION CIVILE

# ENAC : the French civil aviation university

pilots, controllers, electronical engineers, aeronautical engineers

# 1. ENAC's interactive computing lab

- Part of the computer science and mathematics department
- Created in 2006-2007

- Faculty and adjunct faculty
  - Stéphane Chatty (ex-CENA)
  - Stéphane Conversy (ex-CENA)
  - Catherine Letondal
  - Mathieu Magnaudet
  - Daniel Prun
  - Benjamin Tissoires
  - Yannick Jestin (ex-CENA)
  - Hélène Gaspard-Boulinc (ex-CENA)
  - Christophe Hurter (ex-CENA)
  - Jean-Luc Vinot (ex-CENA)
- Research affiliates
  - Jean-Paul Imbert (ex-CENA)

Our academic research domains
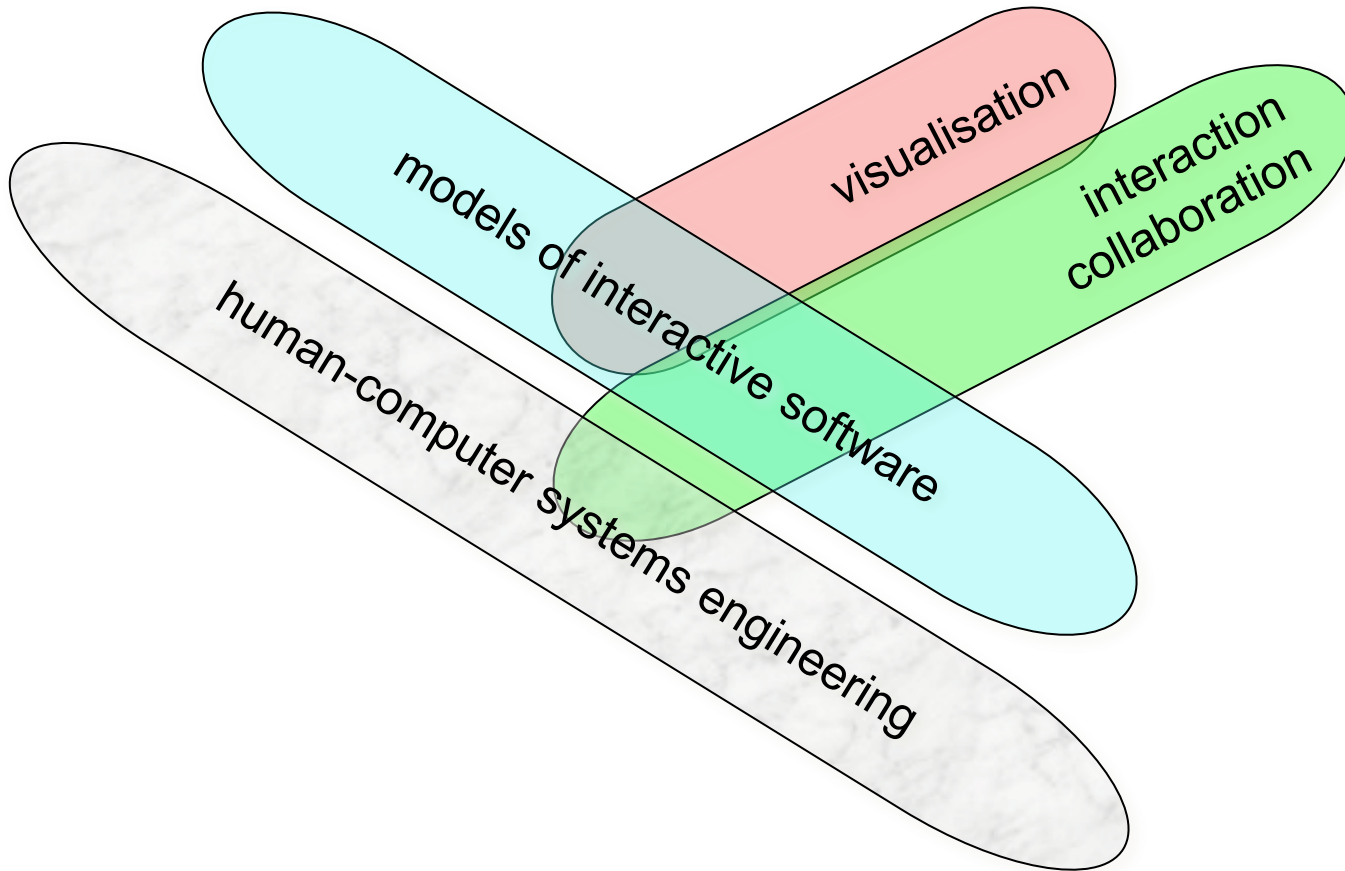
Fundamental issues in the engineering of complex human-computer systems

Area #1: Information visualisation
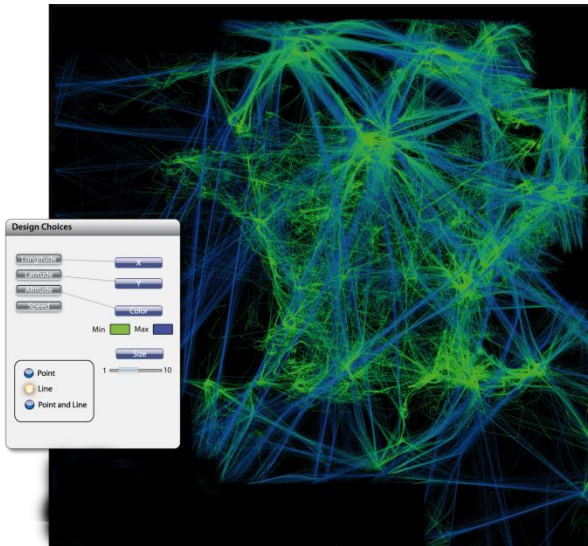
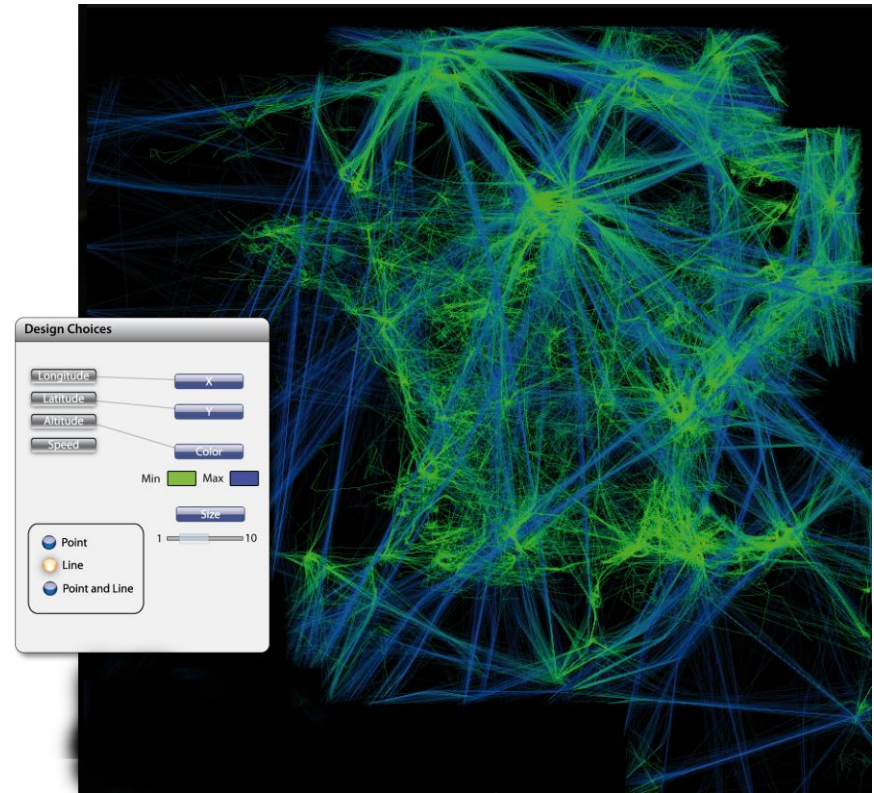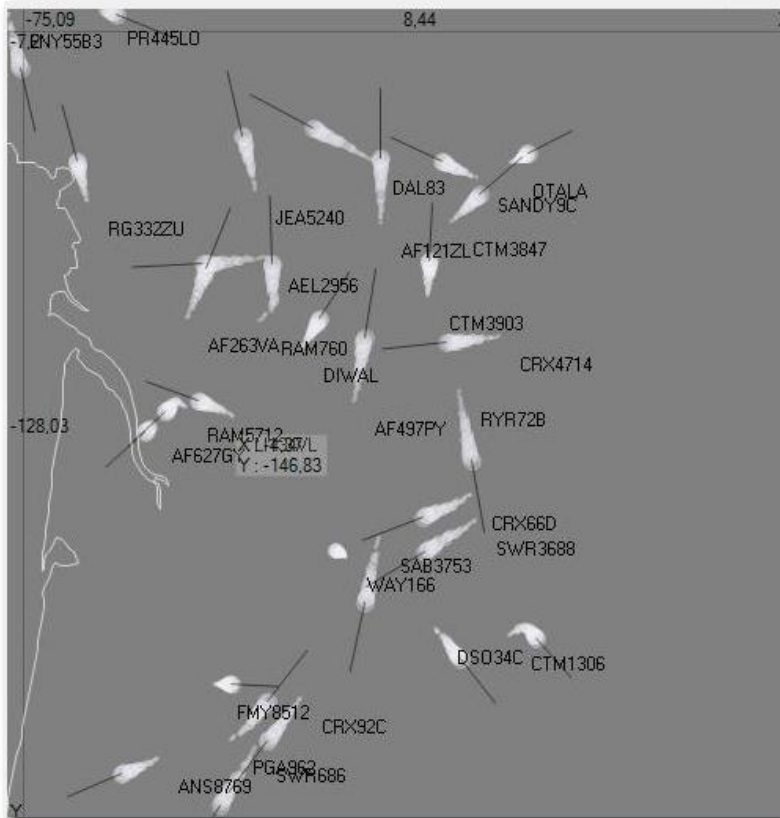Design and implement efficient representations

perception - design - HCI - computing

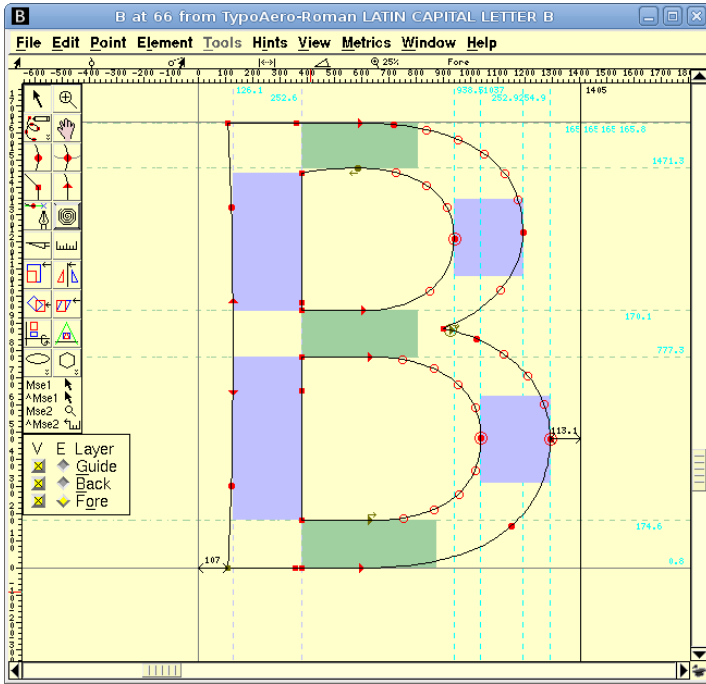alarms, readability, information coding, software validation

Example: project FromDady

- Funding: ENAC + DGAC/DTI
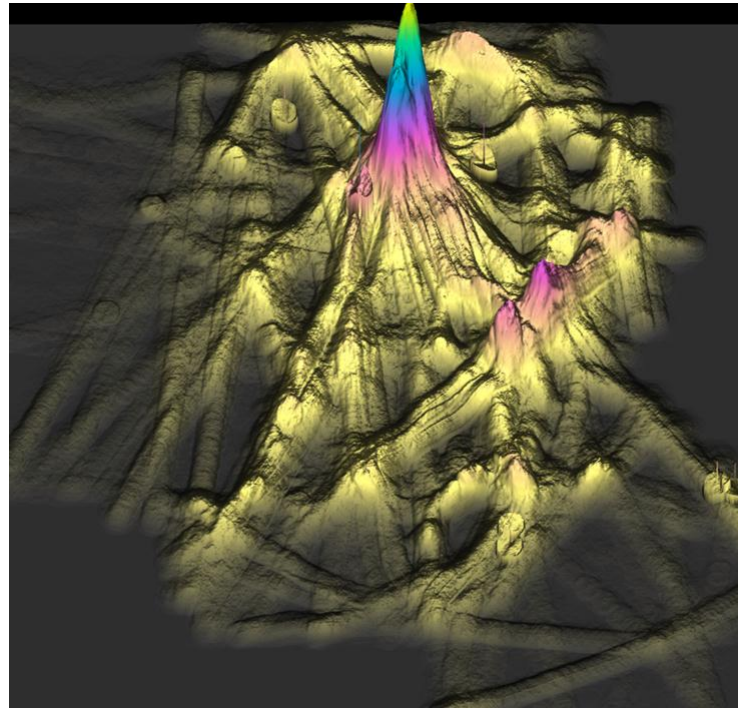- Aim: help engineers or users invent new representations

Example: fonts for Airbus cockpits

- ENAC + Intactile + Airbus
- Design readable texts for cockpits

Case study

Data exploration

Design configuration
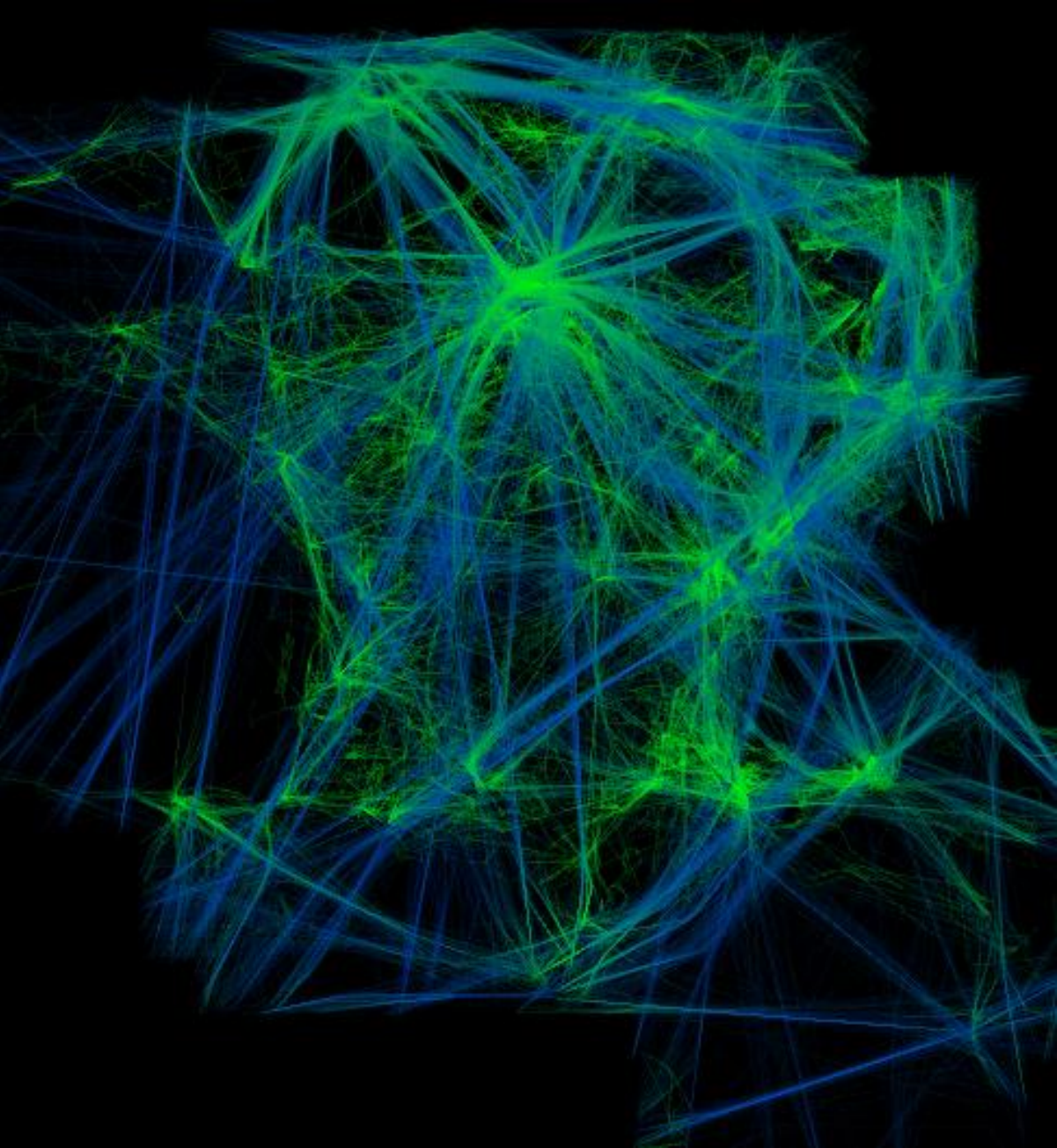
« Pick and Drop »

and

Spreading
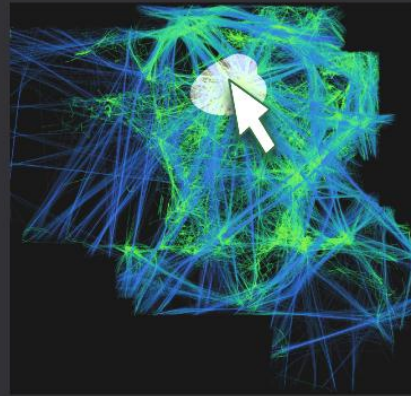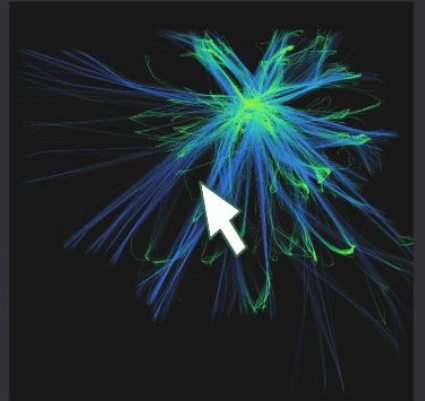
Brushing[1] Technique

"Brushing enables selection through direct manipulation, typically via clicking, lassoing, or "painting" over items of interest."
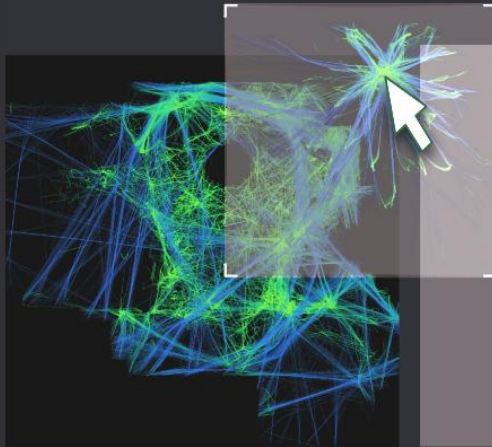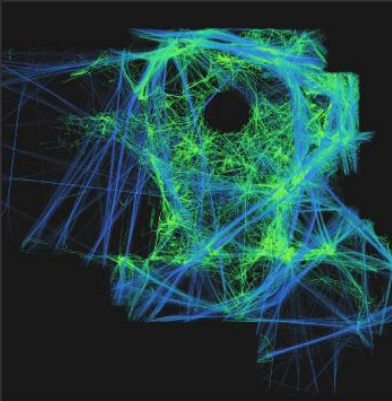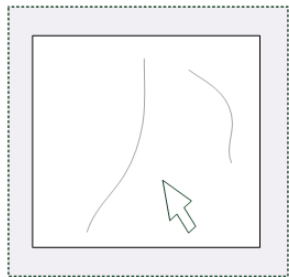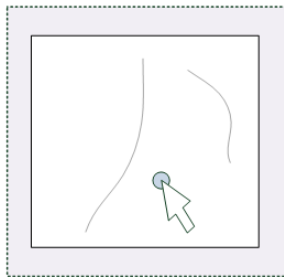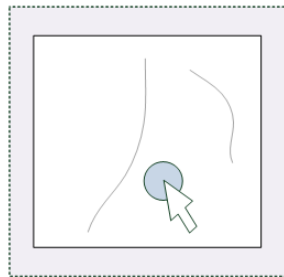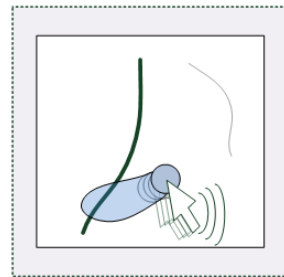

Original Enable Brush Size Change Brush Erase Brush
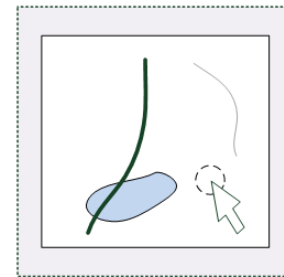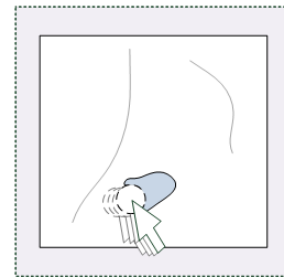
Case study
Digital pens

Digital Pen for ATC

The *Anoto* pattern

Dot diameter 0.15 mm. The displacement of the dots from the grid makes the paper "programmable".

Ordinary paper printed with the *Anoto* pattern.

Communication unit

Battery

Memory

Ink cartridge and force sensor

Camera

Write On!

The full pattern is approx. 60 million km², exceeding the area of Asia and Europe combined.
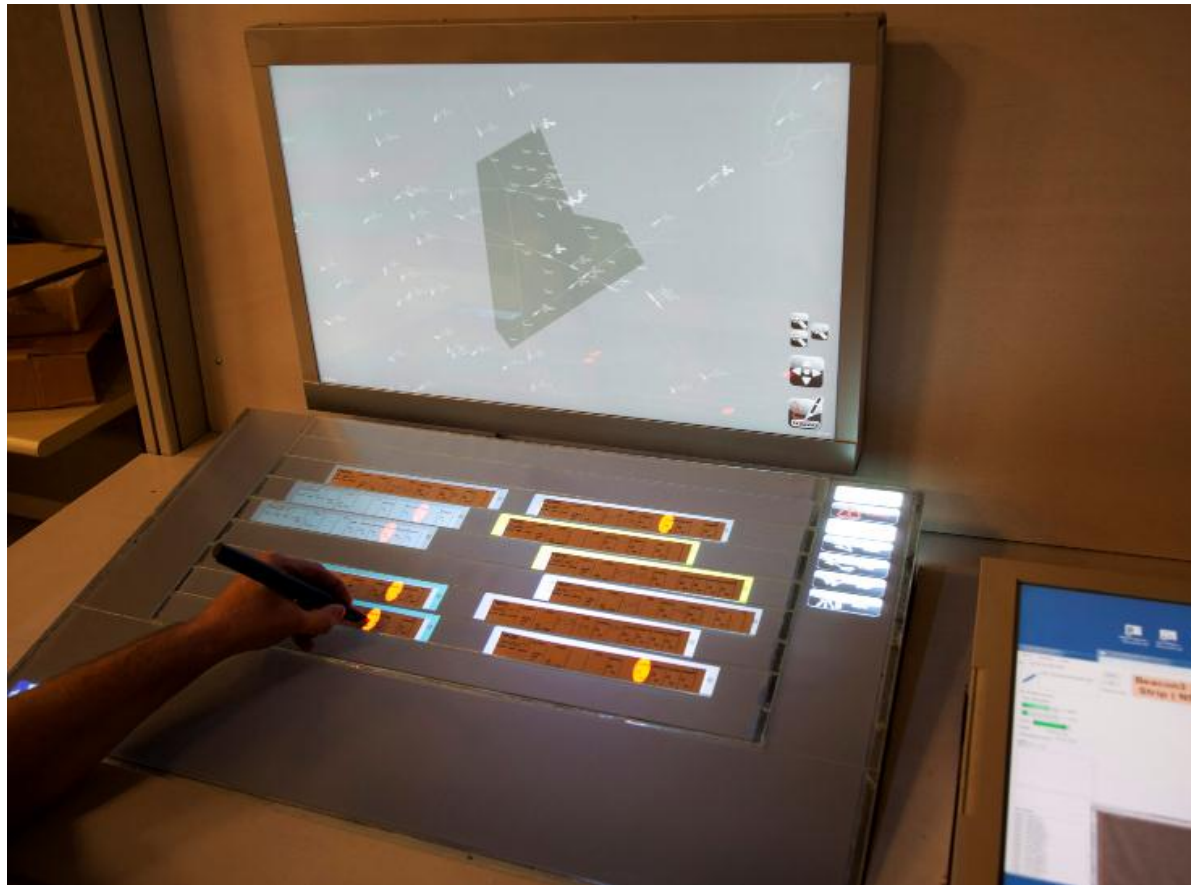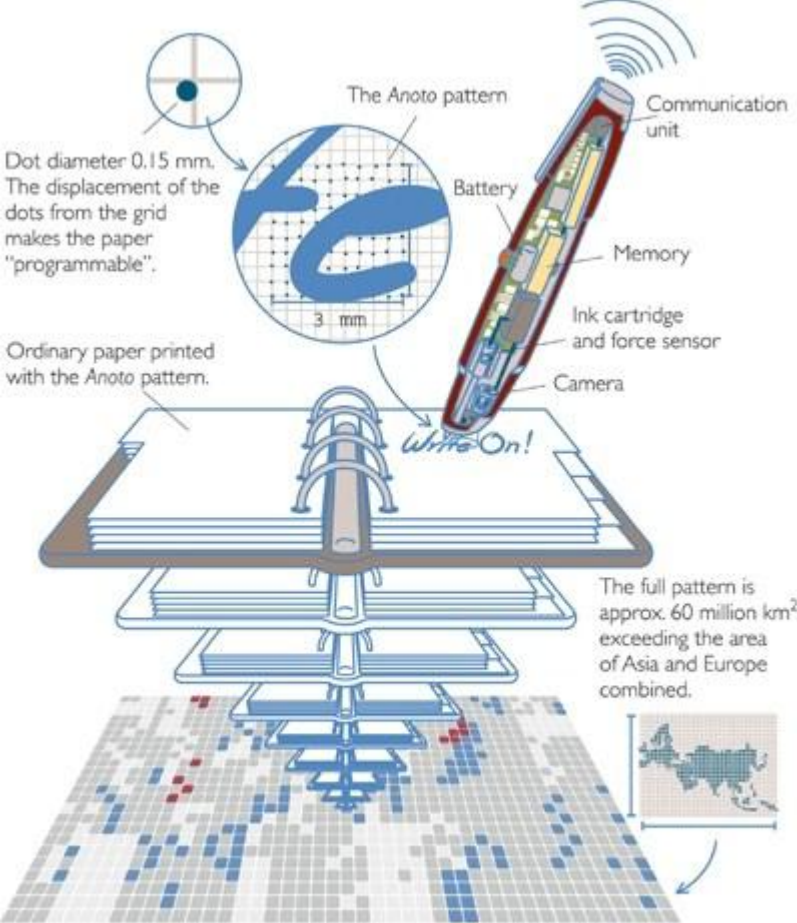
MAREM 1246 280	280			IANSA 365	Z36 Z38 T106 KOLAD TCAS RVR/200	280 200	WL
				A321/M N455 EDDT EDDM			
AGNAV 1247 240	240	KILNU 1256 240	VIZ2382 A0250 A1465		Z32 Z400 KILNU IFPS REROUTING	210 240	WL
			AN12/M N299 LIPY EFHK				

Top Video projector **1**

Anoto radar screens **2**

Anoto stripboard

3

Anoto pen **4**

Webcam **5**

6 Infrared LED

Bottom Video projector

7
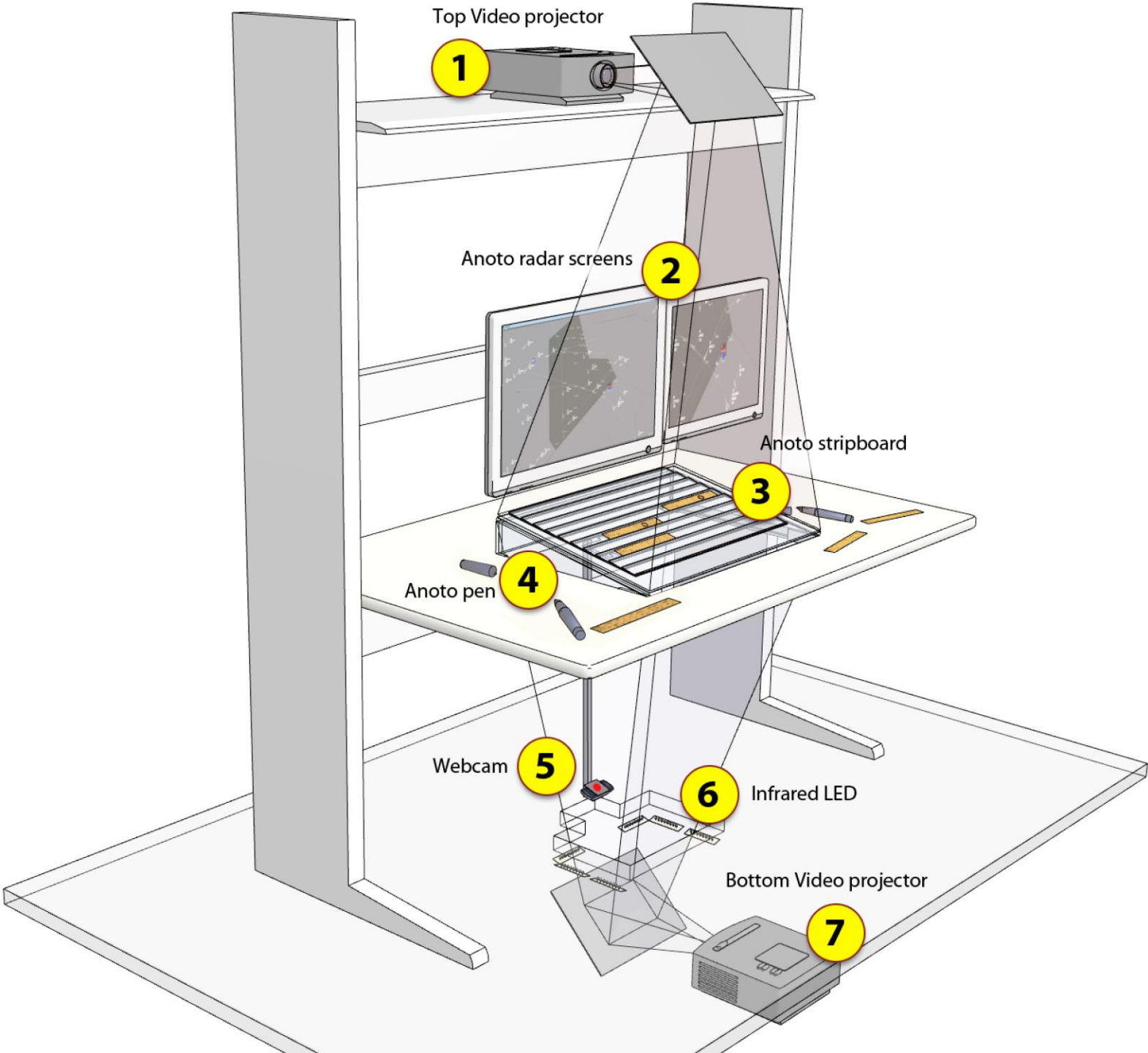
Case study
Bundling
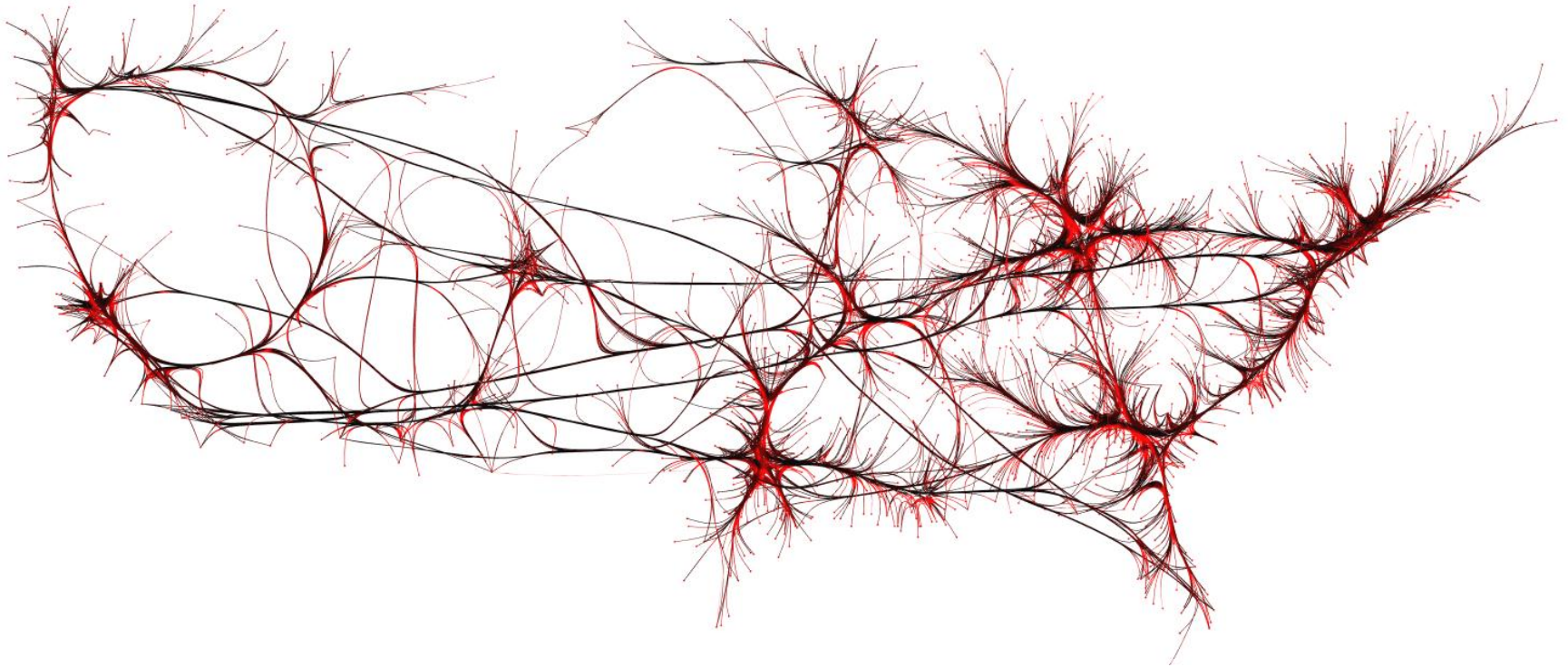
Results

Radial, 1024 nodes, 4021 edges, 94 clusters, 7.4 sec.

Rendering

- We use a 3D cushion profile: bright at the bundle's center, dark at the boundary
- Set the saturation and brightness of edge points based on distances to the skeleton
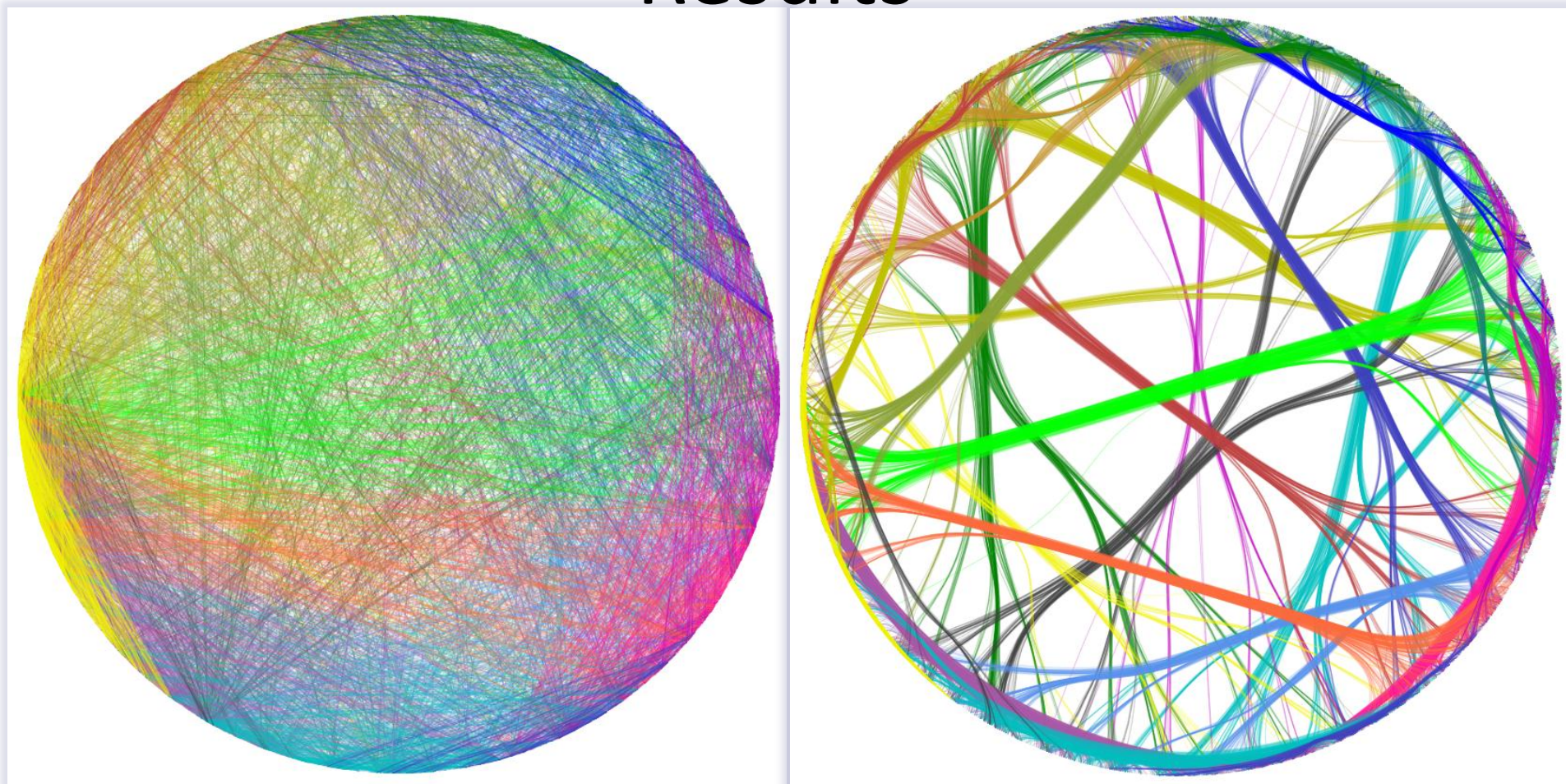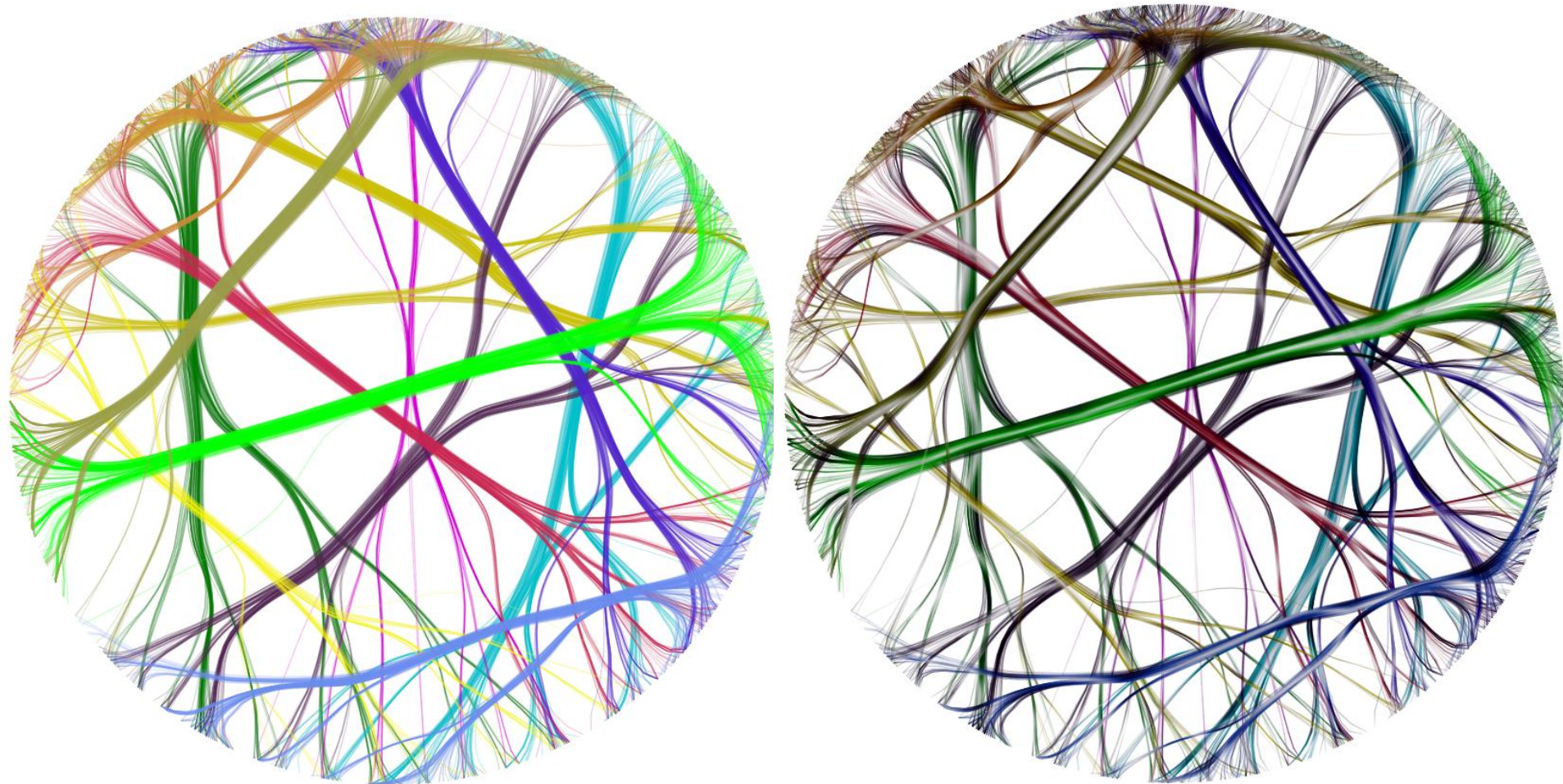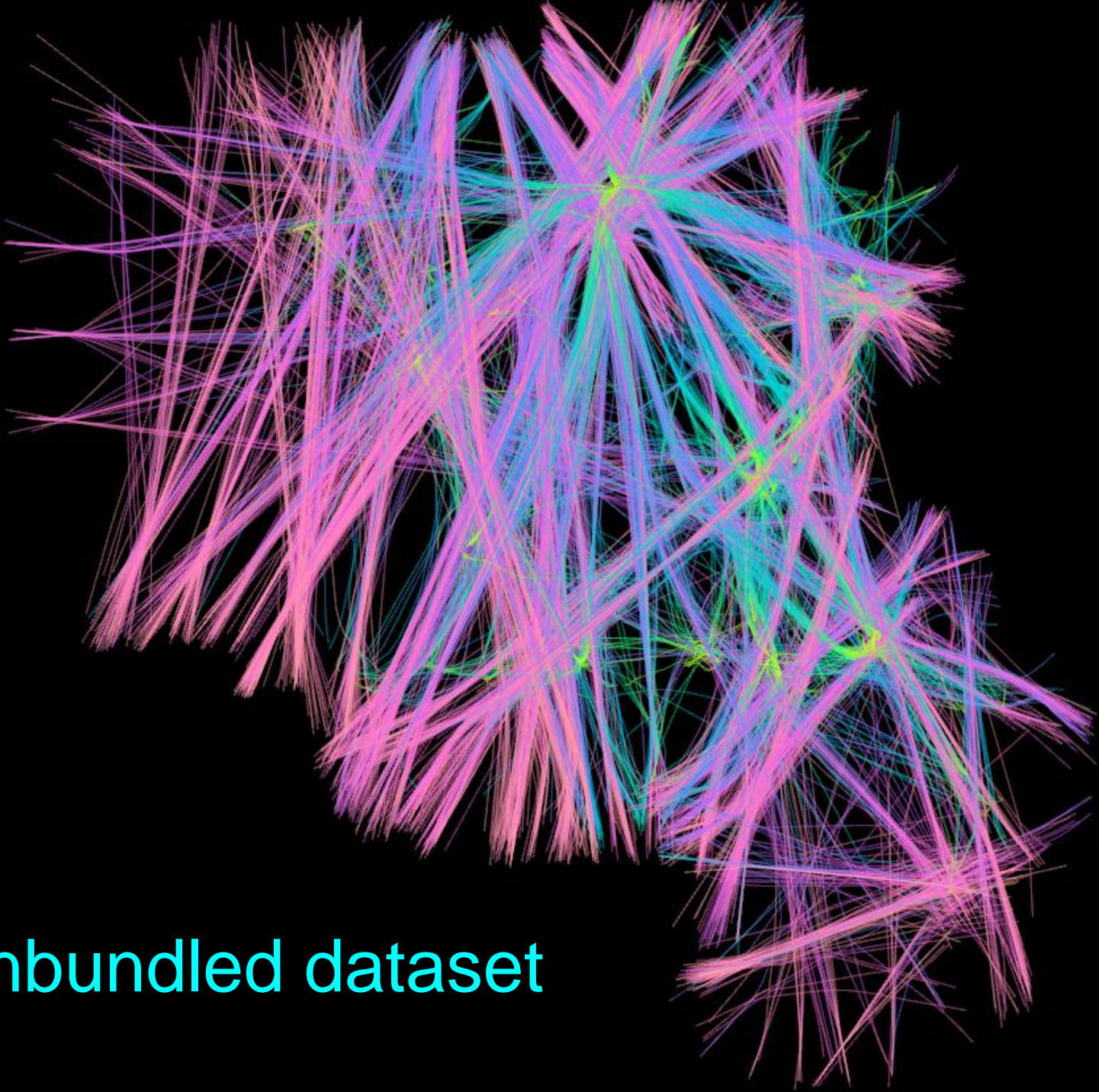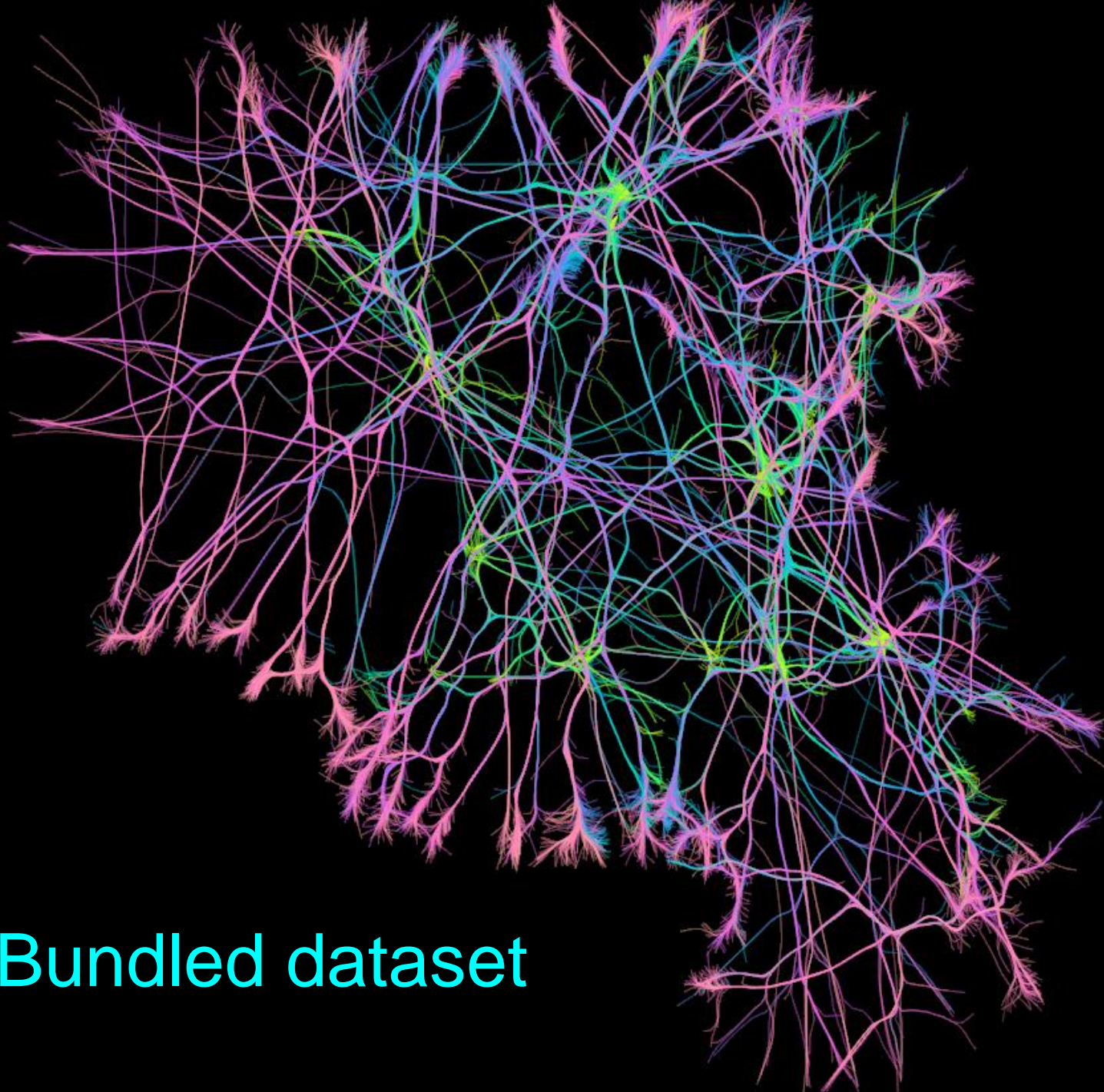
Unbundled dataset

Bundled dataset

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Le Laboratoire d'Informatique Interactive

http://lii-enac.fr/

Références:

Christophe Hurter, Ozan Ersoy and Alexandru Telea. 2011.
MoleView: An Attribute and Structure-Based Semantic Lens for Large Element-Based Plots.
IEEE Transactions on Visualization and Computer Graphics (InfoVis 2011)17, 12 (December 2011), 2600-2609.

Christophe Hurter, Alexandru Telea, and Ozan Ersoy.**Graph Bundling by Kernel Density Estimation.**
EuroVis 2012. Computer Graphics Forum journal.

Hurter, C., Tissoires, B., Conversy, S.
FromDaDy: spreading data across views to support iterative exploration of aircraft trajectories.*In IEEE Transactions on Visualization and Computer Graphics xx(y), (Proceedings of IEEE InfoVis 2009). IEEE Transactions on Visualization and Computer Graphics (TVCG), vol. 15, no. 6, pp. xxviv-xxvv, Nov./Dec. 2009.*

**Laboratoire
d'Informatique
Interactive**

ENAC

IRIT
Institut de Recherche en Informatique de Tou