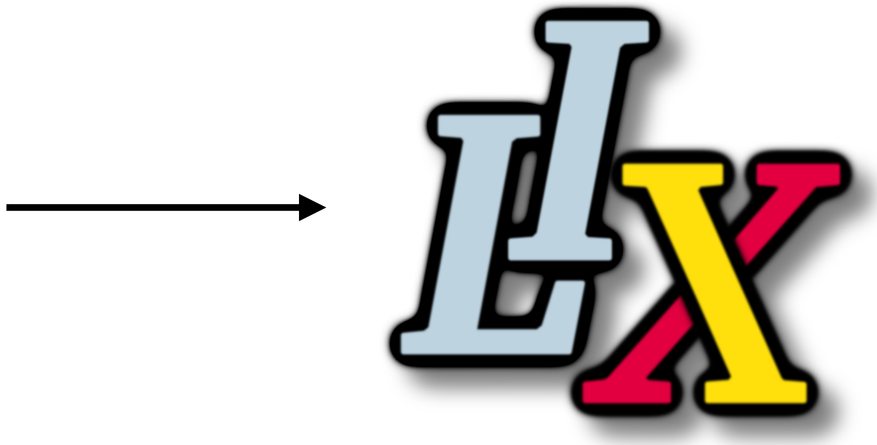
Presentation of the LIX partner & WP2: Geometry and topology of higher-dimensional automata.

Jérémy Dubut (responsable scientifique LIX&WP2)
LIX, École Polytechnique
Chaire Architecture des Systèmes Complexes
ANR CHAAT kickoff
19 October 2026

The LIX partner





Cosynus

concurrent and numerical systems

Partout

principles of deductive and computational formalisms

Permanent members



Jérémy Dubut
(responsable scientifique)
directed algebraic topology
true concurrency
formal methods for CPSs



Éric Goubault
directed algebraic topology
true concurrency
formal methods for CPSs and AI
numerical verification



Emmanuel Haucourt
directed algebraic topology
true concurrency



Samuel Mimram
(homotopy) type theory
higher categories
true concurrency



Noam Zeilberger
program, proof, type
combinatorics
automata and language

PhD students and postdocs



Augustin Albert
PhD student with JD & EG
directed algebraic topology
distributed protocols



Yorgo Chamoun
PhD student with EH & SM
directed algebraic topology
categorical automata theory



Aloÿs Dufour
Postdoc with JD on the ANR
logic and λ-calculus
combinatorics
algebraic topology



Louise Leclerc
PhD student with SM
homotopy type theory

WP2 participants

All of LIX partner +

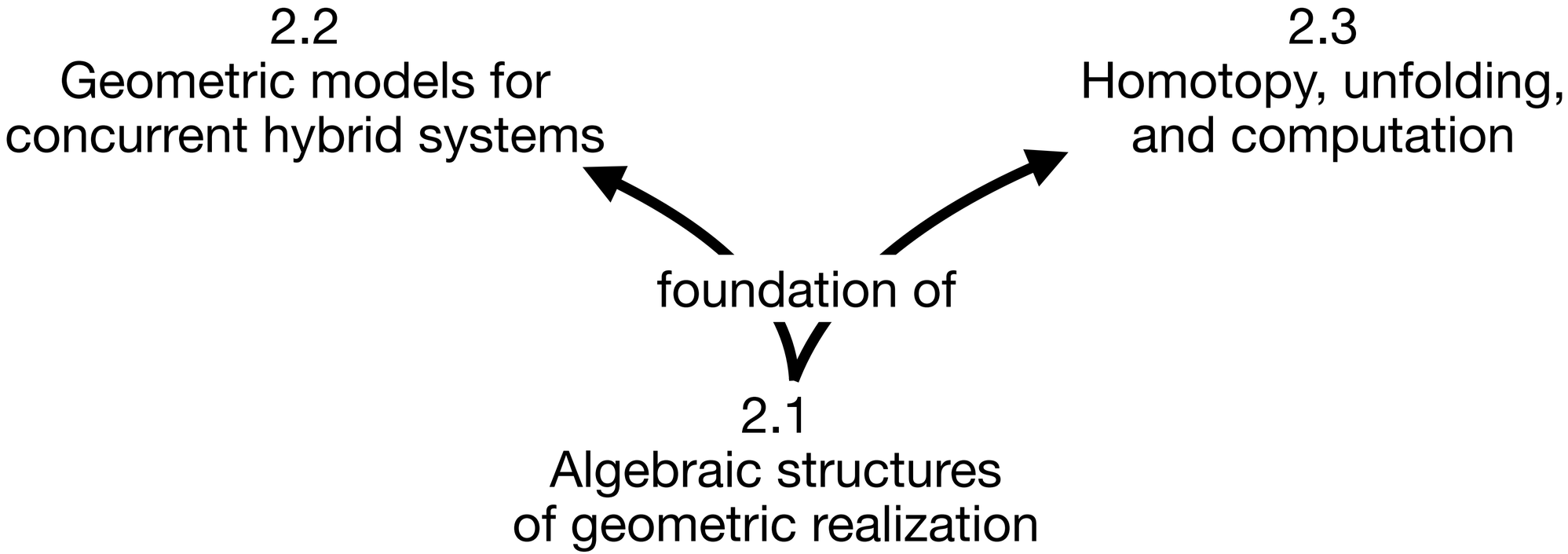


Uli Fahrenberg
(everyone knows him)

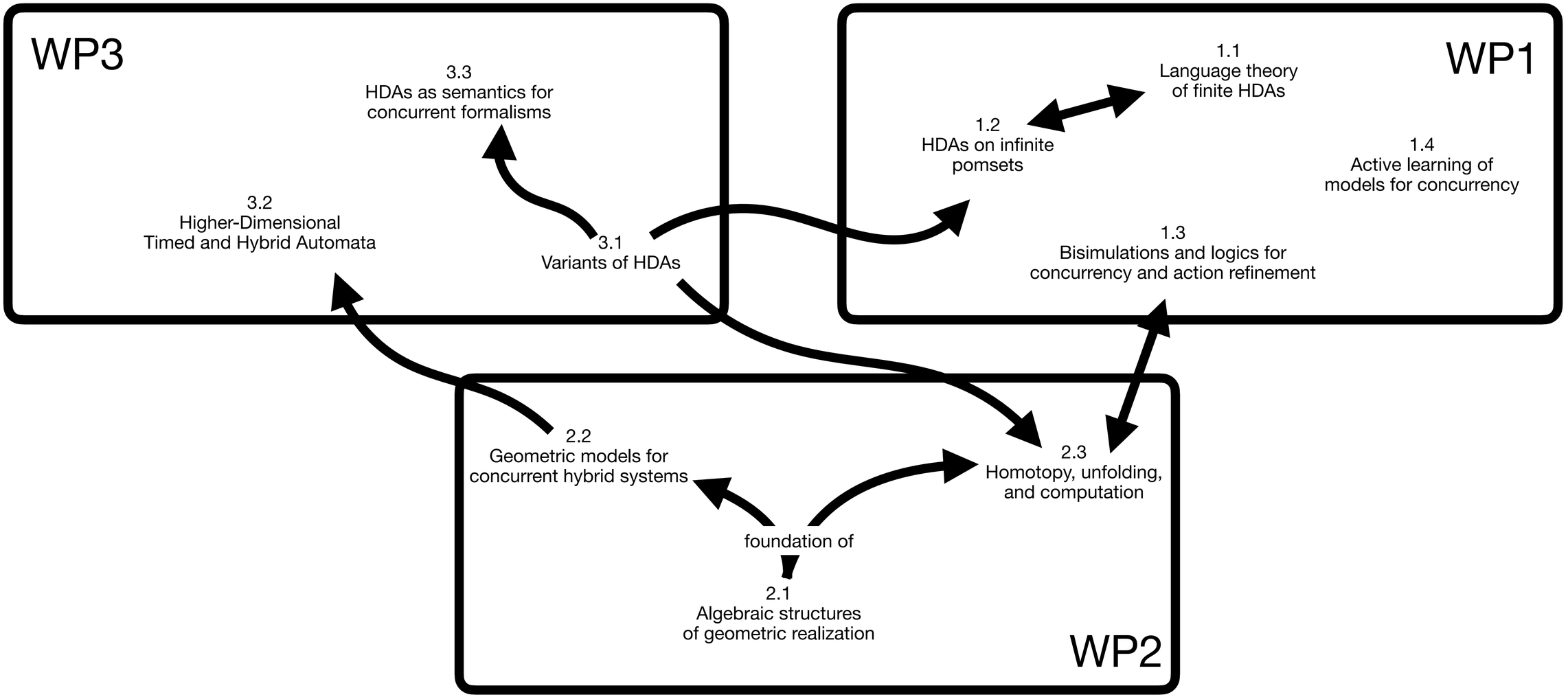


Thibaut Benjamin
(LMF)
Semantics at large
Homotopy Type Theory
Proof assistants

WP2: Categories and topology for HDAs

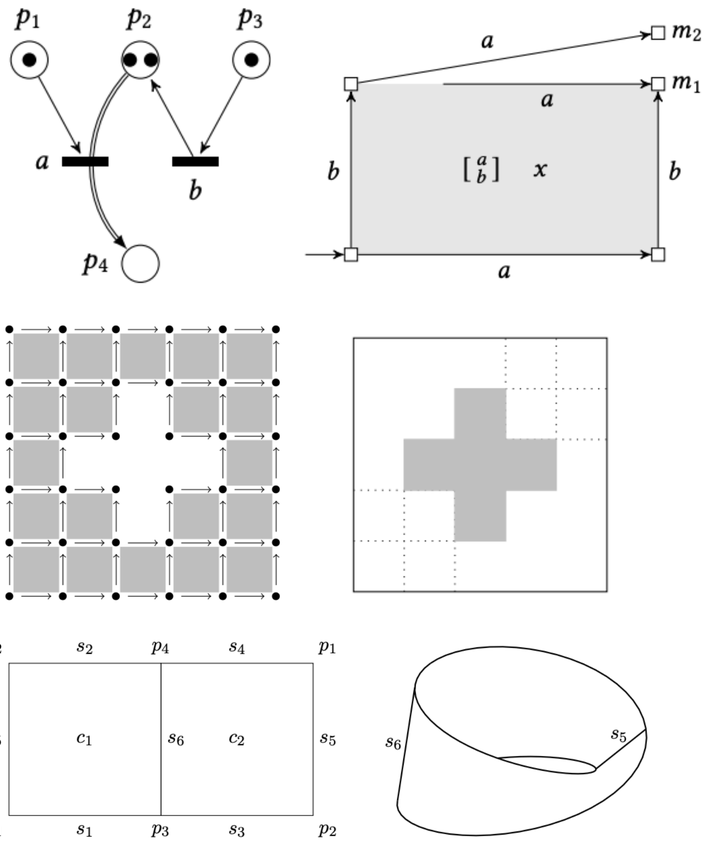


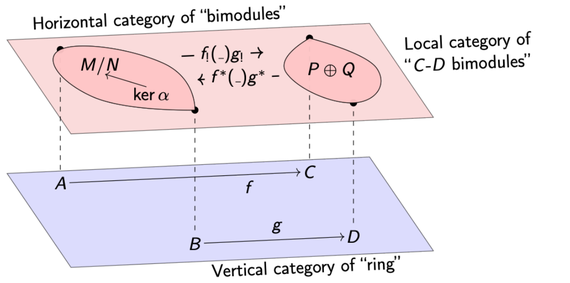
WP2: Categories and topology for HDAs

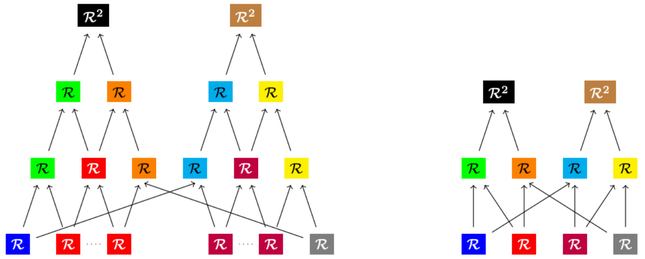


2.1: Algebraic structures of geometric realization

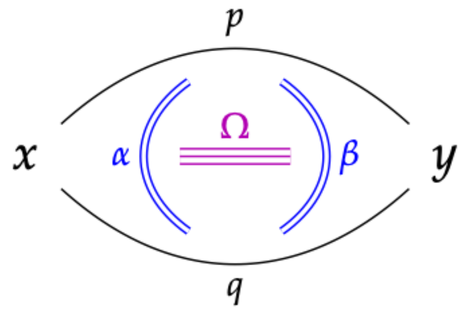
Summary: directed algebraic topology and directed homotopy type theory







Directed (co)homology



∞-categories

Maronnier:

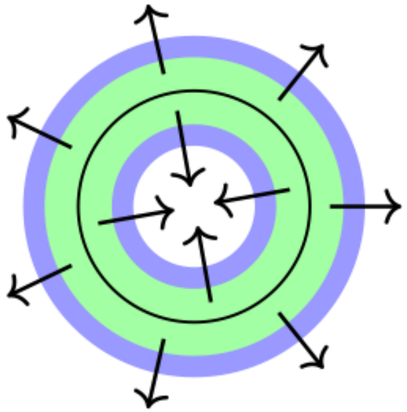
Model structure
for directed topology
or concurrency

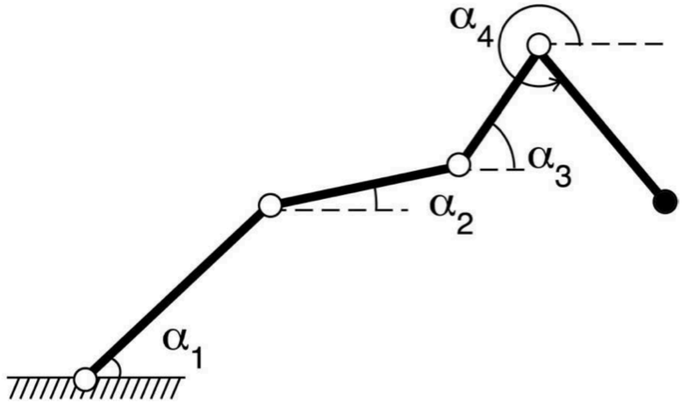
Topic of Augustin's and Louise's PhDs, participants: AA, LL, JD, EG, SM, EH, TB

2.2: Geometric models for concurrent hybrid systems

Summary: Applications towards hybrid and dynamic systems

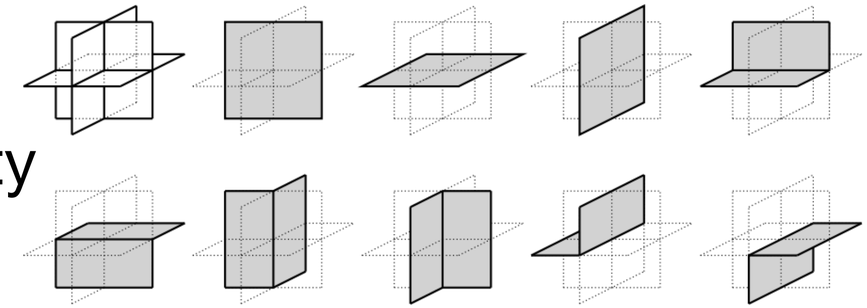
Conley theory

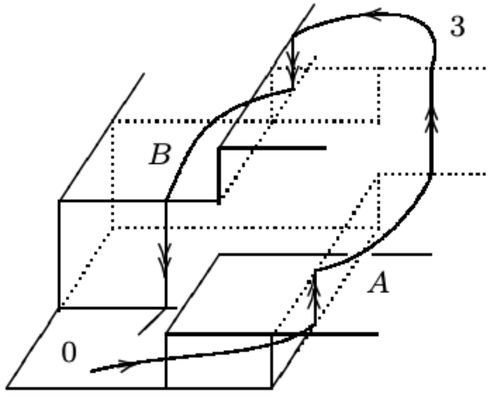




Topological complexity

Relativity





Critical processes

Topic of Yorgo's PhD, participants: YC, EH, EG, JD, AA

2.3: Homotopy, unfolding, and computation

Summary: unfolding of HDAs and all that

Systems	Spaces
Unfolding	Universal coverings
Unique path property	Unique path property modulo homotopy
Trees	Simply connected spaces
Path lifting property	Homotopy lifting property

HDAs?

How to deal with homotopies in HDAs?	Can we obtain computability results like in Petri nets?

Topic of Aloÿs' postdoc on the ANR, participants: AD, JD, NZ, UF, SM