UMR IRISA

Activity Report 2025

Team LOGICA

LOgic, Games, Information, Coordination, and Applications

D4 – Language and Software Engineering

Université de Rennes | rennes | INSA INSTITUT NATIONAL DES SCIENCES APPLIQUÉES RENNES | cnrs | Inria | Inserm | CentraleSupélec | IMT Atlantique Bretagne-Pays de la Loire École Mines-Télécom | Université Bretagne Sud ubs

1 Team composition

Researchers and faculty

François Bodin, PR University of Rennes
Hervé Marchand, CR Inria
Sophie Pinchinat, PR University of Rennes

Research engineers, technical staff

Benjamin de Zordo, Engineer, CDD, University of Rennes
Marius Garenaux-Gruau, Engineer, CDD, University of Rennes
Laurent Morin, Engineer, University of Rennes
Olivier Martineau, Engineer, CDD, University of Rennes
Corentin Val, Engineer, CDD, University of Rennes
Gaëlle Richet, CDD, University of Rennes
Didier Vojtisek, RI Inria

PhD students

Mathis Certenais (University of Rennes)
Victorien Desbois (ENS Rennes / NewLogUp)
Yawa Germaine Renate Nyatsikor (University of Rennes)

Administrative assistant

Alison Rolland

2 Overall objectives

2.1 Overview

The LOGICA team studies theoretical and practical aspects of *multi-agent systems* (MAS). Viewed abstractly, MAS are systems composed of agents that are autonomous entities deciding by themselves which actions to perform in order to meet their objectives. The notion of MAS is finding a wide range of applications: multi-robot systems (e.g. drones), web services, distributed systems, decentralized control, cyber-physical systems, games, etc. Therefore, an agent could be either a physical entity, a computer program, or a human being. Its behaviour can be cooperative, adversarial, or malicious.

Noticeably, in a MAS, agents may not have perfect information about their environment. As a consequence, agents decisions are taken on the basis of the available information, that changes dynamically due to events occurring over time.

Reasoning about MAS requires their formal modeling and the development of theories. Such theories should support their deployment in practice, by providing guarantees and certification of their proper functioning. This can be achieved by various means: verification (model-checking), automated generation (synthesis), and coordination mechanisms between agents (control/orchestration/choreography/communication). The LOGICA group contributes to the foundations of MAS by developing innovative ideas in these lines. A particular research interest concerns the use of logical approaches where both the models for MAS and the languages for the specification of their properties lead to effective methods.

A part of the team, named Logistica, focuses on data logistics, primarily addressing challenges related to data transport, security, and processing from their source to their final use. This research area falls within the domain of collaborative systems-of-systems, addressing questions such as cybersecurity, federation governance, and workflow management.

This theme concretizes itself in various use cases, such as the integration of exascale computing centers with large-scale scientific instruments (e.g., Sentinel satellites) or data collection chains on mobility. Although scales and data nature vary, the underlying scientific problems remain identical.

Methodologically, Logistica favors an experimental approach based on operational deployments in a multidisciplinary context.

Several projects currently support this research activity, including Exa-AToW, which deals with large-scale workflows, and City-Orchestra, which focuses on metropolitan-scale data federation and sharing.

2.2 Pluridisciplinarity approach and Application domains

- Development of a platform for IoT that allows experiments with data logistics.
- Vulnerability analysis of virtualized networks.
- Formal methods and core IA, for Gen IA security.

- Information systems risk analysis via attack generation and attack tree design.
- Scientific application in the domain of geophysics and astrophysics.

2.3 Scientific foundations

The team's activities span both theoretical and applied aspects of computer science.

Some members work on developing a wide spectrum of formal approaches (theoretical results and implemented algorithms), in particular logical approaches, that support (semi-)automated reasoning methods for multi-agents systems (MAS): epistemic reasoning, strategic reasoning, dependencies between strategies, synthesis of correct behavior. In most cases, a careful study of the computational complexity of the exhibited problems is conducted. Main research topics are reasoning under uncertainty in MAS, planning problems, strategic reasoning, foundations of attack trees in risk analysis, and automata techniques for system verification and synthesis. This year, the members of the formal aspects of team have open a line research on the formal analysis of LLM-based systems, namely systems that comprise agents with GenIA features.

The team also addresses large-scale scientific workflows mixing data and compute related tasks to be deployed in the continuum of IT infrastructures. We define large-scale workflows - also called cross-facility or multi-facility workflows - as portable scientific processes designed to operate across distributed and heterogeneous infrastructures, in order to simplify and automate complex data processing and analysis tasks. Large-scale workflows can be seen as a collaborative system-of-systems, an assembly of independent systems that voluntarily interact to achieve shared objectives. One of the known problems in this context is data logistics, which refers to the process of managing the data flow within a federation, including its collection, storage, transmission, analysis, and security.

3 Scientific achievements

3.1 Analysis and control of Discrete Event Systems

3.1.1 Incremental Verification of Inference Observability in Decentralized Discrete-Event Control

Participants: Hervé Marchand.

Joint work with Laurie Ricker (Mount Allison University, Canada).

Inference observability is one of the properties that must be satisfied to synthesize solutions to decentralized supervisory control problems. Current verification strategies require the construction of the complete system model. However, when a system model consists of multiple components, these monolithic approaches may be computationally infeasible due to the state-space explosion problem, a situation that arises when the system's state space increases exponentially with the number of its components. Incremental verification algorithms have been proposed to navigate this issue, where

verification occurs component-wise. Our proposed solution to this issue involves updating an algorithm for the incremental verification of co-observability and extending it to inference observability [4].

3.1.2 Detecting and Resolving Feature Interactions in Cyber-Physical Systems Using Formal Methods

Participants: Hervé Marchand.

Joint work with Laurie Ricker (Mount Allison University, Canada).

We investigate the use of formal methods to detect and resolve feature interactions (FI) in cyber-physical systems (CPS). These systems are often made up of multiple components that may interact with each other in unexpected and unwanted ways, potentially creating a security risk. Specifically, we use supervisory control theory to examine FI in a smart home, an example of a CPS. With the rising adoption of smart home devices, mitigating these interaction threats at the modelling stage is important before they are installed in homes. We present an extended taxonomy of FI threats that affect such a CPS. We demonstrate how one such threat, chaotic device management (Codema), can be detected and resolved in a system comprised of a smart light bulb that supports two disjointed device management channels [3].

3.1.3 Various notions of opacity

Participants: Siméon Laporte , Hervé Marchand, Sophie Pinchinat.

In this work, we investigate the relationships between distinct notions of opacity. Specifically, we reduce standard opacity definitions on transition systems to language-based opacity. This approach provides a unified and generalized framework for these well-established concepts. Furthermore, we establish the computational complexity of these reductions.

3.2 The Formula Synthesis Problem

Logic in Computer Science plays important roles ranging from formal methods to Human-Computer Interaction, including Software and Hardware Engineering, etc. Regarding the former broad application domain of formal methods, a tremendous amount of work concern verification, namely satisfiability checking (for model synthesis) and model checking (for counterexample/witness synthesis). I want to discuss a fairly novel question, called Formula Synthesis Problem, that I believe is extremely natural to address, and yet has not received enough attention in logic. In its most general form, the Formula Synthesis Problem consists in deciding whether some formula in a given set is satisfied by a given model (and output one if any). Obviously, if the input set of formulas is finite, this amounts to model checking. On the contrary, if this set is infinite, say obtained by some tree-grammar for formulas, then the answer becomes extraordinary challenging.

3.2.1 Propositional Dynamic Logic Formula Synthesis and Some Applications

Participants: Sophie Pinchinat.

Joint work with Alan Le Brech (ENS Rennes). Invited talk at the 11th Indian Conference on Logic and its Applications Indian Statistical Institute Kolkata, India, February 3-5, 2025.

The formula-synthesis problem for Propositional Dynamic Logic with Shuffle (PDL ||) has been investigated in [PRS22]. This problem, which generalises the model-checking problem against PDL || is the following: given a finite transition system and a regular term-grammar that generates (possibly infinitely many) PDL || formulas, find a formula generated by the grammar that is true in the structure (or return that there is none). We prove that the problem is undecidable in general, but add certain restrictions on the input structure or on the input grammar to yield decidability. In particular, we prove that (1) if the grammar only generates formulas in PDL (without shuffle), then the problem is EXPTIME-complete, and a further restriction to linear grammars is PSPACE-complete, and a further restriction to non-recursive grammars is NP-complete, and (2) if one restricts the input structure to have only simple paths then the problem is in 2-EXPTIME.

We have continued the original formula synthesis problem for PDL || of [PRS22] and established, even if the test operator of PDL programs is discarded, the synthesis problem remains undecidable, while for DAGS it becomes EXPTIME. We also have extended all the results to a larger class of regular term grammars, namely to sets of terms that can be defined by finite-tree automata with constraints between brothers. This latter result allows one to design a generic algorithm for the synthesis of attack trees, a widely used graphical model in security.

3.2.2 Higher order languages

Participants: Sophie Pinchinat.

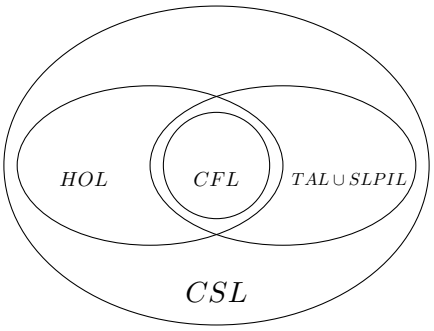
Joint work with Aloys Paupe (Bachelor student at ENS Rennes). In the line of The Formula Synthesis Problem studied by the LogicA team, a subsidiary question regards the ability to define a class of formal languages by means of a formal term grammar that generates formal expression whose semantics are languages. As a first step, we have considered context-free grammar that generate regular expression, yielding what we call the class HOL (Higher Order Languages), and studied the location of this class inside the Chomsky hierarchy. We have shown that HOL:

- subsumes the class of context-free languages CFL (Type 2 in Chomsky hierarchy);
- is contained in the class of context-sensitive languages CSL (Type 1 in Chomsky hierarchy)

[PRS22] S. Pinchinat, S. Rubin, F. Schwarzentruber, "Formula Synthesis in Propositional Dynamic Logic with Shuffle", *Proceedings of the AAAI Conference on Artificial Intelligence 36*, 9, Jun. 2022, p. 9902–9909.

- is neither comparable with the class of Tree-Adjoined Languages, nor with class of languages whose Parikh image is semi-linear.

The overall picture is therefore as follows.



We also proved that HOL does not contain the class of Indexed Languages, and we conjecture it a subclass of the latter.

3.3 Logical approaches for pursuit evasion games on infinite arenas

3.3.1 Cat Herding Game Played on Infinite Trees

Participants: Sophie Pinchinat.

Joint work with Rylo Ashmore, Memorial University of Newfoundland, St. John's, Canada. This work is the outcome of a three-month collaboration supported by the "Mobilité internationale entrante des doctorants Campagne 2024 1" program of the University of Rennes,

The game of Cat Herding is played on a graph between two players, the cat and the herder. The game setup consists of the cat choosing a starting vertex for their cat token. Then, both players alternate turns, beginning with the herder: they delete (any) one edge, called a cut, and the cat moves along a path to a new vertex. While this game has been studied on finite graph arenas regarding how optimally herder wins, we shift our attention to an infinite version of the game where the cat may now survive indefinitely. We show that cat winning positions in an infinite tree can be characterized by a second-order monadic statement, also amounting to having a complete infinite binary tree minor, or having uncountably many distinct rays. We take advantage of the logical characterization of cat winning positions to generalize a measure known as the cat number, to ordinals. See [1] for the full paper.

4 Software development

4.1 Risk analysis in information systems: ATSyRA platform

Participants: Sophie Pinchinat, Didier Vojtisek.

We still keep on with the ATSyRA platform development (`http://atsyra2.irisa.fr/`) that offers risk analysis of information systems, on top of previous analysis tools for

physical systems.

Most of our research code is being made available through `http://atsyra2.irisa.fr/`. The software functionalities are essentially:

- a system specification language ABS (for "Asset-Based Systems) relying on a meta-model – thus systems with physical, digital and organizational features can be specified;
- a reachability analysis with scenario synthesis;
- an attack tree design assistant tool with correctness criteria checking of the specified attack trees via model checking techniques;
- an under-work implementation of algorithms arising from the theoretical work on the Formula Synthesis Problem that will offer attack tree synthesis.

5 Contracts and collaborations

5.1 National Initiatives

5.1.1 RagARenn

Participants: Laurent Morin, François Bodin, Corentin Val, Benjamin de Zordo.

Since March 2024, the University of Rennes has launched an experimentation with generative AI called "RAGaRenn", with the goal of co-constructing a framework for the use of this technology with all of the university's staff. Our team LOGICA has been at the core of the technical design and implementation of the infrastructure supporting this initiative. We have also supported its deployment on the trusted local infrastructure Eskemm Data, the university's datacenter in Brittany dedicated to the ESR. The aim is to precisely dimension the necessary resources, estimate its direct carbon impact, and better understand the specific and relevant uses in a professional context.

The experimentation is still ongoing for a second year at `https://ragarenn.eskemm-numerique.fr/` and after having gained a national visibility, it has undergo a massive increase in usage (over 4000 subscribers in January 2026). During the last period, the experiment has continued its technical extension in collaboration with the University's IT services (DSI) in order to first, engage an initial integration, and second, intiate a partial take-over. A partial integration is currently in production via the support of a Single-Sign-On (SSO) mechanism with Renater, and a first delegation of a basic compute resource is operational on DSI's ressources. The 2026's plannification includes a major take-over of cloud ressources.

In addition to the transmission of the RAGaRenn experiment to the DSI's infrastructure, the experiement is deeply integrated in the Ilaas project (`https://www.ilaas.fr/`). This new federation of higher education institutions (University of Lille, Reims Champagne Ardennes, Paris-I Panthéon-Sorbonne, Rennes, and CentraleSupélec) aims to move towards more digital sobriety. A second phase of the project has formally extended the federation to more than 19 partners, and informaly to more than 30 public

institutions. The team is leading the technical working group focusing in the deployement of an industrial grade compute infrastructure in the federation for sharing Large Language Models (LLM) computing resource at the national level. This project received funding for the first phase from the DGRI (Direction Générale de la Recherche et de l'Innovation).

5.1.2 PEPR Numpex/Exa-AToW Architectures and Tools for Large-Scale Workflows

Participants: François Bodin, Mathis Certenais, Marius Garenaux, Olivier Martineau, Laurent Morin, Gaëlle Richet, Germaine Nyatsikor.

- Project type: PEPR
- Dates: 2022–2028
- PI institution: University of Rennes
- Other partners: CEA, CNRS, Inria

The deployment of exascale supercomputers meets the increasing demand for computational capacity in numerical models. Concurrently, there's an exponential growth in data volume from large scientific instruments, the Internet of Things (IoT), and numerical simulations (e.g., CMIP 6). In this scenario, designing scientific applications necessitates the consideration of distributed processing chains across data centers, processing/computation infrastructures, and scientists' labs (e.g., through large-scale workflows).

These infrastructures are often managed by different administrative authorities and are technically heterogeneous. This poses a challenge in implementing data logistics and orchestrating processing/computation at such a scale. Data logistics must adhere to several constraints:

1. Comply with the infrastructure's storage limitations.
2. Account for the capabilities (including topology, latency, and transfer protocols) of communication networks and computing infrastructures.
3. Maintain overarching security.
4. Reduce energy consumption.
5. Streamline the writing, deployment, and debugging of applications.

Thus, the implementation of these logistics is a multi-criteria optimization challenge within collaborative systems-of-systems. Key aspects of these logistics include the traceability of operations and adherence to the FAIR policy for all scientific data. Incorporating metadata - related to data or processes - in analyzing constraints and logistical solutions is crucial.

More at `https://numpex.org/`

In order to implement the FAIR principle in Exa-AToW we have set up two plateforms:

Documentation: `https://exatow.fenix.rudi-univ-rennes1.fr/`

Codes: `https://gricad-gitlab.univ-grenoble-alpes.fr/exa-atow`

These platforms aim at providing access to Exa-AToW results as well as work in progress.

5.1.3 City Orchestra

Participants: François Bodin, Marius Garenaux, Olivier Martineau, Laurent Morin, Gaëlle Richet.

- Project type: PIA
- Dates: 2022–2026
- PI institution: Rennes Métropole
- Other partners: Brest Métropole, Région Bretagne, Conseil Départemental d'Ille et Vilaine, Ekitia, SIB, Air Breizh, Syndicat Départemental d'énergie des Côtes d'Armor, Université de Rennes, Centre Scientifique et Technique du Bâtiment, Institut Agro, Université de Rennes 2, Kereval, Someware, WI6Labs, AmpliSIM, Alkante, ENGIE.

The climate emergency and the need to ensure a socially just ecological transition of our territories have placed greater expectations on the effectiveness of public policies and their intervention mechanisms, on the reliability of the tools and data needed to track territorial trajectories and anticipate future developments, on the guarantee of easy access to multi-source, up-to-date and reliable data.

Building on a trajectory during which they have developed a palette of tools and competencies for data management in support of public policies, Rennes Métropole and its partners propose to lead a territorial project, City Orchestra, based on four pillars and bringing together Breton collectivities (Region Brittany, Brest Métropole, Ille-et-Vilaine Departmental Council, Côtes d'Armor Departmental Energy Syndicate) and local data actors (expert companies, research laboratories and GIPs) around a shared project in support of ecological transition.

In this project, Logistica is involved in the Orchestration workpackage regarding the data logistics aspects.

5.1.4 Extreme Computing Lab for Astronomical Telescopes (ECLAT)

Participants: François Bodin, Mathis Certenais, Laurent Morin.

- Project type: Common Lab
- Dates: 2024–
- PI institution: Rennes Métropole
- Other partners: CNRS, Inria, Eviden, the Observatoire de la Côte d'Azur, the Observatoire de Paris.

ECLAT is a national collaborative laboratory focused on High-Performance Computing (HPC) and Artificial Intelligence (AI) for astronomical tools. As part of France's contribution to the Square Kilometer Array Observatory (SKAO), ECLAT aims to foster strong partnerships and large-scale projects at both national and European levels. It unites the efforts of sixteen labs and teams from CNRS, Inria, Eviden, the Observatoire de la Côte d'Azur, and the Observatoire de Paris, bringing together computer scientists and astrophysicists to co-design and develop future cyber-physical systems for astronomy.

The main contribution of LOGICA team to ECLAT is the study and deployment of the DDF Pipeline, a radio astronomy data processing tool and one of the SKA processing pipeline's precursors, as a use case for data logistics and large-scale workflows deployment.

Main activities :

- study of existing data processing pipelines ;
- experiments on HPC machines ;
- deployment of data logistics framework for cross-facility scientific workflows in the context of PEPR Numpex/Exa-AToW, e.g. Ephemeral Buffers (EB) ;
- rewriting of existing pipelines into workflow representation such as, but not restricted to, the Common Workflow Language (CWL) ;
- workflow simulation and optimization methods to improve the orchestration of multiple processing pipelines on distributed architectures.

More at `https://eclat-lab.fr/en/`

5.1.5 Advanced FR-SRC Tasks and Resource Allocation (ASTRA)

Participants: François Bodin, Mathis Certenais, Laurent Morin.

- Project type: ANR (LPENS, UMR 8023)
- Dates: 2026–2029
- PI institution: ENS
- Other partners: CEA, University of Rennes.

This research project addresses the critical transformation underway in radio astronomy, driven by next-generation observatories such as LOFAR2.0 and the SKA. These instruments are producing massive, heterogeneous datasets distributed across multiple sites, which cannot be efficiently handled using legacy data processing approaches. The project aims to overcome these structural bottlenecks by developing a unified, scalable digital platform that federates HPC, cloud, and object storage resources. It will support the execution of complex workflows (including AI-based processing) across heterogeneous infrastructures through modern containerization technologies. Key principles such as data provenance, reproducibility, and energy-aware computing will be integrated to support both interactive and automated scientific workflows.

The scientific use cases — pulsar timing arrays, the Epoch of Reionization, mapping of galactic atomic gas, and wide-field continuum surveys — share common challenges related to data volume, processing complexity, and infrastructure fragmentation. Each use case involves multi-step workflows across geographically distributed computing centers, requiring advanced coordination of resources and tools. Building on previous initiatives (e.g., EXTRACT, Exa-AToW), this project will deliver a generalized orchestration framework to optimize resource usage (e.g., HPC vs. cloud), enhance cross-site data visibility, and streamline scientific output tracking. Ultimately, it will serve as the technological foundation for the French SKA Regional Centre (FR-SRC), aligning national capabilities with international standards and significantly reducing the technical barriers to large-scale data-driven science in the SKA era.

5.2 International Initiatives

5.2.1 Collaboration with Anna University, Chennai, India

Participants: Sophie Pinchinat.

Weekly remote meeting. *Currently, informal collaboration*

Date: 2025-

Collaborators:

- *Bama Srinivasan (IA), Department of Information Science and Technology, Anna University, Chennai, India*
- *Sangeetha Dhamodharan (Cybersucrity), Madras Institue of Technology, Anna University, Chennai, India*

We have applied to a Cefipra PROWIS call 2025 (Indo-French Programme for Women in Science) and still awaiting for the notification. The collaboration targets the construction of a formal toolbox for attack trees (modelling, analysis, synthesis, etc.), a standard graphical model used by security experts to reason in a hierarchical manner about system vulnerabilities and threats, and to design adequate countermeasures. Up to now, attack trees are mostly designed manually because the required information to build a tree is stored in mostly textual databases, such as the Common Attack Pattern Enumerations and Classifications (CAPEC https://capec.mitre.org/) that classifies attack patterns. The Relationships field in CAPEC describes connections between nodes using relations such as parentOf, childOf, peerOf, precedes, and follows. These relationships play a vital role in identifying attack patterns in real-time scenarios.

The hierarchical features of the attack tree model and the ones displayed in the CAPEC database are closely related. Indeed, attack patterns described in CAPEC are precious elements to generating attack trees that reveal attacker profile, as well as decomposability and explanation of observed and/or hypothetical attacks. As advocated in recent theoretical pieces of work, a formal CAPEC-like content may yield effective methods to automate the generation of attack trees, thus avoiding their error-prune manual construction. It is currently hopeless to struggle with the textual nature of the database and with the vagueness of its ontologies, that give rise to core inconsistencies, as our analysis reveals that these relationships are often vague and inconsistent. For

example, CAPEC ID 67 (String Format Overflow in syslog()) lists two parent nodes: 100 (Buffer Overflow) and 135 (Format String Injection), which are inconsistent because it becomes unclear which attack pattern should be prioritized for detection or mitigation in a real-time setting.

Provided that CAPEC entries and relations are mainly based on textual information, we aim at defining its formal semantics and at exploiting the semantics to identify inconsistencies in the database, to repair those, and mostly to design an algorithmic solution for transforming the CAPEC database into a standard relational database. Because of the textual features inherent to CAPEC, we may resort to dedicated LLMs tools.

5.2.2 Machine Learning based software systems SEcurity ANalysis

Participants: Sophie Pinchinat.

MLSEAN project funded by UUKi UK - France Science, Innovation and Technology researcher mobility scheme. Date: year 2025 Collaborators from Heriot-Watt:

- *Michael Lones (GenIA), Professor.*
- *Manuel Maarek (formal and developer-centric approaches in security and safety of software systems), Associate Professor.*
- *Sasa Radomirovic (formal verification of security protocols and threat modelling), Professor.*

The project focused on two of the key priority areas: research security (primary), and artificial intelligence (secondary). The goal of this mobility project was to prepare a Horizon Europe Cluster 4 2025-2027 research proposal to develop novel formal methods for the secure analysis of machine learning in software engineering processes, as well as a research project for the Academic International Chair 2026 of the Cluster SequoIA - 'Security, Trust, AI'. The objectives were as follows. (1) Consider within the formal method approach all steps of the process of constructing and embedding machine learning models within software engineering. This includes the construction and maintenance of models (data sets, testing, verification). (2) Elaborate abstractions based on attack trees to represent the security properties and attributes of these steps and formalise the mechanisms of verification of these security properties. (3) Elaborate these solutions to be compliant, ethically sound and user-centric by design. (4) Prototype automations to equip the security analysis, including by fabricating adequate machine learning models to assist with the analysis. (5) Evaluate the approaches designed on concrete industry-relevant scenarios of use.

6 Dissemination

6.1 Promoting scientific activities

Steering Committees

- Hervé Marchand:

  - is President of the Steering Committee of MSR (conférence sur la modélisation des systèmes réactifs);
  - is associate editor of wodes'2026 (International Workshop on Discrete Event Systems))

- Sophie Pinchinat is part of the Steering Committee of the International Symposium on Temporal Representation and Reasoning (TIME).

6.1.1 Scientific Events Selection

Member of Conference Program Committees

- Hervé Marchand: MSR 2025, Wodes'2026.
- Sophie Pinchinat: FSTTCS 2025 `https://www.fsttcs.org.in/2025/`, TIME 2025 `https://time2025conf.github.io/`, RADICAL 2025 `https://sites.google.com/site/radicalconcur/`.

6.1.2 Reviewer

- Hervé Marchand was reviewer for Wodes'2026, CDC'2025, ACC'2025, ECC'2025

6.1.3 Journal

Member of the Editorial Boards

- Hervé Marchand is Associate Editor of the Journal Discrete event dynamical systems - Theory and applications.

Reviewer - Reviewing Activities

- Hervé Marchand was reviewer for Discrete event dynamical systems - Theory and applications, IEEE Transaction Automatic and Control, Automatica.

6.1.4 Invited Talks

Sophie Pinchinat has been invited talk to the 11th Indian Conference on Logic and its Applications Indian Statistical Institute Kolkata, India February 3-5, 2025.

6.1.5 Scientific Expertise

- François Bodin is a member of the GAIA Data Expert Committee `https://www.gaia-data.org/`.
- Sophie Pinchinat was a jury member of the CRCN-ISFP 2025 recruitement of the Inria Rennes Center at Université de Rennes.

- Sophie Pinchinat was a jury member of recruitment committees of several French universities:
  - Employment 253002 PR27 FST-LIM, Université de La Réunion.
  - Employment 253001 PR25/27, Université de La Réunion.
  - Employment 27PR1042, LIRMM, Université de Montpellier.

6.1.6 Research Administration

Sophie Pinchinat is active in maintaining the Women in Logic database that gathers female experts in Logic and in Category Theory `https://womeninlogic.org/#about-us`

6.2 Teaching, supervision

6.2.1 Teaching

For researchers, all activities are given. For professors and assistant professors, only courses at the M. Sc. level are listed.

- Sophie Pinchinat Méthodes et Vérification Formelle par Automates, 24h, M1 SIF (Science Informatique), ISTIC, Université de Rennes 1/ENS Rennes, France.

6.2.2 Supervision

- PhD in progress: Mathis Certenais co-supervised by François Bodin on the topic "Collaborative System of Systems for Scientific Data Logistics".
- Sophie Pinchinat Aloys Paupe (M1, ENS Rennes): Logical approach to solve the pursuit-evasion game of Firefighters (one scholar year).
- Sophie Pinchinat: Yuwen Liu (L3, Université de Rennes): Exploration d'outils pour la manipulation d'automates (2 months)
- Sophie Pinchinat Théo Hourmand (L3, Université de Rennes): Higher-Order Languages (8 weeks).
- Sophie Pinchinat Nora Camp (L3, Université de Rennes): Dynamic Epistemic Structures as First-order Interpretations (8 weeks).
- Hervé Marchand: Mathieu Huc (L3, Université Rennes): Opacity property for system confidentiality: focus on various state-based definitions and their unification in a setting of formal language.

6.2.3 Juries

Sophie Pinchinat:

- PhD: Alessandro Burigana, Free University of Bozen-Bolzano, April 7, 2025. Supervised by Prof. Marco Montalli from Free University of Bozen-Bolzano and co-supervised by Prof. Thomas Bolander from DTU Copenhagen.

6.3 Popularization

Sophie Pinchinat is appointed as the leader of the theme Responsable du thème "Algorithmique et Complexité" of the Encyclopédie Science, ISTE.

7 Bibliography

Publications in Conferences and Workshops

[1] R. Ashmore, S. Pinchinat, "Cat Herding Game Played on Infinite Trees", *in : 45th IARCS Annual Conference on Foundations of Software Technology and Theoretical Computer Science, FSTTCS 2025, BITS Pilani, K Birla Goa Campus, India, December 17-19, 2025*, C. Aiswarya, R. Mehta, S. Roy (editors), *LIPIcs*, *360*, Schloss Dagstuhl - Leibniz-Zentrum für Informatik, p. 10:1–10:15, 2025, https://doi.org/10.4230/LIPIcs.FSTTCS.2025.10.

[2] S. Pinchinat, "Propositional Dynamic Logic Formula Synthesis and Some Applications (Invited talk)", *in : Indian Conference on Logic and Its Applications*, Springer, p. 38–49, 2025.

[3] H. D. Walker, S. L. Ricker, H. Marchand, "Detecting and Resolving Feature Interactions in Cyber-Physical Systems Using Formal Methods", *in : 2025 IEEE 19th International Conference on Control and Automation (ICCA)*, p. 274–279, 2025.

[4] S. Yoon, S. Ricker, H. Marchand, "Incremental Verification of Inference Observability in Decentralized Discrete-Event Control", *in : 2025 IEEE 19th International Conference on Control and Automation (ICCA)*, p. 262–267, 2025.

Miscellaneous

[5] M. Certenais, F. Bodin, L. Morin, "A description of the radio astronomy data processing tool DDF Pipeline", 2025, https://arxiv.org/abs/2509.03075.

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