Activity Report 2017

Team LOGICA

Logic and Applications

D4 – Language and Software Engineering

1 Team composition

Researchers and faculty
Sophie Pinchinat, CNRS
François Schwarzentruber, Assistant professor

Associate members none

Research engineers, techical staff
Didier Vojtisek, Engineer, INRIA (20%)

PhD students
Maxime Audinot
Tristan Charrier
Sébastien Lê Cong

Administrative assistant
Tifenn Donguy

2 Overall objectives

2.1 Overview

Many of our activities which were in the past performed in the physical world and in interaction with other humans, are nowadays carried out in a digital world in interaction with both human and non-human 'agents': classic examples are e-commerce, e-voting, e-banking, e-government, etc. This transposition of some of our activities into the digital world already plays an important role in our everyday life. This transposition is expected to develop in the future, which is certainly desirable in order to harmonize the rate at which our society evolves. This large picture exhibits an urgent need for both taming already existing e-activities and assisting the birth of new ones.

Existing e-activities, such as e-voting, e-commerce, e-banking, e-government etc. rely on a combination of numerous technologies either at the physical/hardware level or at the digital/software one. The nature of interaction between different services that form the whole application is very complex and leads to critical issues regarding its quality that the research community together with industry try to resolve.

Among the main issues, we can mention privacy, legal process, correction of the functionalities. Also, the growing development of applications to support e-activities urges the designers to elaborate methodologies that would allow them to exploit adaptability or re-usability of existing services. Whichever issue can be picked, rigorous settings are required in order to make evidence of the correctness, the quality, the robustness, etc. of the existing products. Moreover, some sectors of activity are currently far from being computerized or even computer-assisted: typically, legal processes, abilities to remote control some domestic processes such as closing roller blinds when a storm is forecast, and so on.

All in all, not only existing e-activities need to be coupled with meticulous development methodologies, but also accurate approaches need being set up to design new e-activities that support underdeveloped domains currently operated by hand. To that end, important efforts are required to bring out the capabilities to rigorously analyze or design the functionalities[1] of services in e-activities.

The LogicA project aims at contributing to this will, by focusing on interaction issues in e-activities with a logical-based perspective. The project will develop foundations, transfer to practical applications, and convey the tight coupling between research and education.

One of the most challenging feature in e-activities analysis is the ability to "predict/control" the interaction between the numerous involved entities. These entities can be artificial (software agents, distributed systems components) or human (users). As a first step, the project will focus on artificial entities, which are, ideally, designed to act *autonomously* on the behalf of users, e.g. for negotiating in an e-commerce activity. These entities are called *software agents*, and they gather into *multi-agent system (MAS)*.

[1] in terms of what an application offers to its users

Since MAS are central objects, they need to be preliminary well understood at a mathematical level. The theories that will support their use in practical applications should give rise to different techniques, ranging from the ability to guarantee and certify before their deployment that they will behave properly (verification) to the ability of automatically generating skeletons of MAS (synthesis) or of coordination mechanisms between MAS (control/orchestration/choregraphy/communication).

Whereas successful logic-based techniques in computer science already exist for verification, synthesis and control, it is not clear yet how to transfer this know-how to the paradigm of MAS where interaction is central. Investigations to formally *reason about* and *infer properties of* interacting agents is currently a very active topic in computer science, which actually originates with, e.g. artificial intelligence and game theory. The LogicA project aims at cross-fertilizing logic-based techniques from verification in computer science, synthesis in discrete-event control theory, agency in artificial intelligence, concepts and solution concepts in game theory, and interaction concepts in philosophy. In particular, what typically differentiates the MAS framework from its pairs is the inherent information change/exchange in its dynamics, which gives evidence of, e.g. epistemic, strategic and normative features to be taken into account.

2.2 Scientific foundations

The LogicA project follows three main research lines.

Epistemic logics and logics of information change When agent interaction issues are concerned, ability to reason about knowledge is central. To this aim, epistemic logic has been extensively studied [FHMV95], and recent extensions that take dynamics into account draw the attention of a growing community of logicians and computer scientists (see for instance the very much cited book [vvK08] and the recent ERC grant on epistemic protocols coordinated by Hans van Ditmarsch (DR CNRS, LORIA). The LogicA project explores variants of epistemic logic that can easily mix with time, in order to reason about information change along time. As mixing knowledge and time easily yields to high complexity and even undecidability [HV89], the challenge is to identify settings where the formalism would enjoy good computational features while being expressive enough to capture useful properties.

Strategic reasoning and automata-theoretic approaches Modeling strategic abilities is central for reasoning about MAS. We plan to carry on with logical formalism that were already proved or are currently foreseen as powerful approaches in many exciting domains, including software tools for information system security, robot teams with sophisticated adaptive strategies, and automatic players capable of beating expert human adversary, just to cite a few. All these examples share the challenge of developing novel theories and tools for agent-based reasoning that take into account the likely behavior of "adversaries".

[FHMV95] R. Fagin, J. Halpern, Y. Moses, M. Vardi, *Reasoning about knowledge*, MIT Press, 1995.

[vvK08] H. van Ditmarsch, W. van der Hoek, B. Kooi, *Dynamic Epistemic Logic*, Springer, Dordecht, 2008.

[HV89] J. Y. Halpern, M. Y. Vardi, "The complexity of reasoning about knowledge and time. 1. Lower bounds", *Journal of Computer and System Sciences 38*, 1, 1989, p. 195–237.

The natural setting for strategic reasoning is not surprisingly the one of multi-player games with imperfect information. Although discouraging results from the literature shows that three-player games with safety objectives are undecidable [PRA01], there are however promising results which show that some classes may be manageable. Basically, undecidability comes from the ability for some players to form a coalition: the resulting binary indistinguishability relation of the coalition would correspond to the intersection of the relations of its respective members. Now, it is well-known that intersection of binary relations yields more complex relations that may exit decidable classes (e.g. for membership or emptiness), like e.g., rational relations. Note that such phenomenon cannot arise in two-player games where safety objectives can be solved by a simple (although costly) power-set construction [Rei84]. Also, undecidability becomes even "stronger" when dealing with more realistic objectives for epistemic properties, such as seeking a strategy of agent A such eventuallty "agent B does know Property P until agent C knows it".

The LogicA group contributes in the development of logics that make a trade-off between expressiveness and decidability/tractability.

Formal approaches for the design of attack trees Whether it is physical security, environmental security, or information technology environments, ensuring security requires preliminary investigations to identify and evaluate risks that threaten the system under consideration. This is what the *risk analysis* [ISO05,ISO13,Sch07] discipline is about.

While many approaches to risk assessment and analysis exist, and the methodologies differ from country to country, from industry to academia, and from organization to organization, some security modelling approaches applied in risk analysis are being adopted across these boundaries. For example, the 2008 NATO Improving Common Security Risk Analysis report [RR08] and the 2013 OWASP CISO Application Security Guide [OWA13] recommend the use of *attack trees* to handle the threat assessment task. DARPA has applied attack trees in their Information Assurance live experiments [Lev03,

[PRA01] G. Peterson, J. Reif, S. Azhar, "Lower bounds for multiplayer noncooperative games of incomplete information", *Computers & Mathematics with Applications 41*, 7, 2001, p. 957–992.

[Rei84] J. H. Reif, "The complexity of two-player games of incomplete information", *Journal of computer and system sciences 29*, 2, 1984, p. 274–301.

[ISO05] ISO, Geneva, Switzerland, *Norm ISO/IEC 27002 - Information Technology - Security Techniques - Code of Practice for Information Security Management*, edition ISO/IEC 27002:2005, 2005, Section 9.

[ISO13] ISO, Geneva, Switzerland, *Norm ISO/IEC 27002 2013 - Information Technology - Security Techniques - Code of Practice for Information Security Management*, edition ISO/IEC 27002:2013, 2013, Section 11 "Physical Security Management".

[Sch07] E. E. Schultz, "Risks due to the Convergence of Physical Security and Information Technology Environments", *Inf. Secur. Tech. Rep. 12*, 2007, p. 80–84.

[RR08] N. Research, T. O. (RTO), "Improving Common Security Risk Analysis", *research report number AC/323(ISP-049)TP/193*, North Atlantic Treaty Organisation, University of California, Berkeley, 2008.

[OWA13] OWASP, "CISO AppSec Guide: Criteria for Managing Application Security Risks", 2013.

[Lev03] D. Levin, "Lessons Learned in Using Live Red Teams in IA Experiments", *in : 3rd DARPA Information Survivability Conference and Exposition (DISCEX-III 2003)*, p. 110–119, 2003.

[KB01]. Recently, an excellent state-of-art survey by Kordy et al. [KPCS14] has shown that attack trees have been extensively studied by the scientific community and are widely accepted within the industry.

Indeed, attack trees [Sch99] provide a systematic way of describing the vulnerability of a system, taking various types of attacks into account. Strengths of attack trees combine two aspects: first, an *intuitive representation of possible attacks* and second, *formal mathematical frameworks for analyzing them* in a qualitative or a quantitative manner [MO06,KMRS14].

This research line contributes to the development of mathematical foundations for attack trees and of a tool to assist security experts in their design.

2.3 Application domains

Security: assisted design of attack trees

Participants: Maxime Audinot, Sophie Pinchinat, Sébastine Lê Cong, Florence Wacheux, Didier Vojtsek and Barbara Kordy.

Risk Analysis is a discipline consisting in identifying and evaluating risks that threaten a given system in order to reduce or annihilate them by defining actions to engage (risk management). Such analysis is central when the aim is to ensure the security of an information system means guaranteeing data availability, integrity and confidentiality.

Current methods follow mostly a common methodology: one decomposes the system to analyze into subsystems and produces a model, then one draws up a list of feared events, and finally determines the potential reasons of their emergence.

For the particular case of risk analysis in physical security, these steps are mostly processed by hand, based on knowledge and experiences of analysts and technicians. In order to match the standards of experts in risk analysis, the whole process is conducted in two steps:

Step 1 One produces an *attack/defense tree*, that is a tree-like structure where one easily reads the attacker's abilities to achieve her attack and the weaknesses of the defender's capabilities to counter them. The attack/defense tree levels describe

[KB01] D. L. Kewley, J. F. Bouchard, "DARPA Information Assurance Program dynamic defense experiment summary", *Systems, Man and Cybernetics, Part A: Systems and Humans, IEEE Transactions on 31*, 4, 2001, p. 331–336.

[KPCS14] B. Kordy, L. Piètre-Cambacédès, P. Schweitzer, "DAG-Based Attack and Defense Modeling: Don't Miss the Forest for the Attack Trees", *Computer Science Review*, 2014, DOI: 10.1016/j.cosrev.2014.07.001.

[Sch99] B. Schneier, "Attack Trees", *Dr. Dobb's Journal of Software Tools 24*, 12, 1999, p. 21–29, `http://www.ddj.com/security/184414879`.

[MO06] S. Mauw, M. Oostdijk, "Foundations of Attack Trees", *in : ICISC'05*, D. Won, S. Kim (editors), *LNCS*, *3935*, Springer, p. 186–198, 2006, `http://citeseerx.ist.psu.edu/viewdoc/summary?doi=10.1.1.97.1056`.

[KMRS14] B. Kordy, S. Mauw, S. Radomirović, P. Schweitzer, "Attack–Defense Trees", *Journal of Logic and Computation 24*, 1, 2014, p. 55–87.

successful attacks at different level of abstraction. The attack/defense tree is meant to describe all successful attacks, independently of their realism due to intrinsic cost of their application.

Step 2 The attack/defense tree obtained in Step 1 is reworked to incorporate cost features on actions and then exploited to reveal the more realistic scenarios.

We develop an entire tool-supported methodology to help security experts in prototyping secure sites on the basis of attack/defense trees (see Software developement section).

3 Scientific achievements

3.1 Attack trees for Risk Analysis

Participants: Maxime Audinot, Sophie Pinchinat, Barbara Kordy.

Presented at ESORICS 2017.

Attack trees are a popular way to represent and evaluate potential security threats on systems or infrastructures. The goal of this work is to provide a framework allowing to express and check whether an attack tree is consistent with the analyzed system. We model real systems using transition systems and introduce attack trees with formally specified node labels. We formulate the correctness properties of an attack tree with respect to a system and study the complexity of the corresponding decision problems. The proposed framework can be used in practice to assist security experts in manual creation of attack trees and enhance development of tools for automated generation of attack trees.

3.2 Logic and games

3.2.1 The Ceteris Paribus Structure of Logics of Game Forms (Extended Abstract)

Participants: Davide Grossi, Emiliano Lorini, François Schwarzentruber.

Presented at IJCAI 2017.

We presented a simple Ceteris Paribus Logic (CP) and study its relationship with existing logics that deal with the representation of choice and power in games in normal form including atemporal STIT, Coalition Logic of Propositional Control (CL-PC) and Dynamic Logic of Propositional Assignments (DL-PA). Thanks to the polynomial reduction of the satisfiability problem for atemporal STIT in the satisfiability problem for CP, we obtain a complexity result for the latter problem.

3.2.2 A Path in the Jungle of Logics for Multi-agent System: On the Relation between General Game-playing Logics and Seeing-to-it-that Logics

Participants: Emiliano Lorini, François Schwarzentruber.

Presented at AAMAS 2017.

In the recent years, several concurrent logical systems for reasoning about agency and social interaction and for representing game properties have been proposed. The aim of the present paper is to put some order in this 'jungle' of logics by studying the relationship between the dynamic logic of agency DLA and the game description language GDL. The former has been proposed as a variant of the logic of agency STIT by Belnap et al. in which agents' action are named, while the latter has been introduced in AI as a formal language for reasoning about general game-playing. The paper provides complexity results for the satisfiability problems of both DLALogic and GDL as well as a polynomial embedding of GDL into DLA.

3.3 Synthesis of public announcements

3.3.1 Belief Manipulation Through Propositional Announcements

Participants: Aaron Hunter, François Schwarzentruber, Eric Tsang.

Presented at IJCAI 2017.

Public announcements cause each agent in a group to modify their beliefs to incorporate some new piece of information, while simultaneously being aware that all other agents are doing the same. Given a set of agents and a set of epistemic goals, it is natural to ask if there is a single announcement that will make each agent believe the corresponding goal. This problem is known to be undecidable in a general modal setting, where the presence of nested beliefs can lead to complex dynamics. In this paper, we consider not necessarily truthful public announcements in the setting of AGM belief revision. We prove that announcement finding in this setting is not only decidable, but that it is simpler than the corresponding problem in the most simplified modal logics. We then describe AnnB, an implemented tool that uses announcement finding as the basis for controlling robot behaviour through belief manipulation.

3.3.2 Model Checking Against Arbitrary Public Announcement Logic: A First-Order-Logic Prover Approach for the Existential Fragment.

Participants: Tristan Charrier, Sophie Pinchinat, François Schwarzentruber.

Presented at DALI@TABLEAUX 2017.

We investigate the model checking problem of symbolic models against epistemic logic with arbitrary public announcements and group announcements. We reduce this problem to the satisfiability of Monadic Monadic Second Order Logic (MMSO), the fragment

of monadic-second order logic restricted to monadic predicates. In particular, for the case of epistemic formulas in which all arbitrary and group announcements are existential, the proposed reduction lands in monadic first-order logic. We take advantage of this situation to report on few experiments we made with first-order provers.

3.4 Reasoning about knowledge

3.4.1 The modal logic of copy and remove

Participants: Carlos Areces, Hans van Ditmarsch, Raul Fervari, François Schwarzentruber.

Published in Information and Computation, Volume 255.

We propose a logic with the dynamic modal operators copy and remove. The copy operator replicates a given model, and the remove operator removes paths in a given model. We show that the product update by an action model in dynamic epistemic logic decomposes in copy and remove operations, when we consider action models with Boolean pre-conditions and no post-condition. We also show that copy and remove operators with paths of length 1 can be expressed by action models with post-conditions. We investigate the expressive power of the logic with copy and remove operations, together with the complexity of the satisfiability problem of some of its syntactic fragments.

3.4.2 Epistemic protocols for dynamic gossip

Participants: Hans van Ditmarsch, Jan van Eijck, Pere Pardo, Rahim Ramezanian, François Schwarzentruber.

Published in Journal of Applied Logic, Volume 20

A gossip protocol is a procedure for spreading secrets among a group of agents, using a connection graph. In each call between a pair of connected agents, the two agents share all the secrets they have learnt. In dynamic gossip problems, dynamic connection graphs are enabled by permitting agents to spread as well the telephone numbers of other agents they know. This paper characterizes different distributed epistemic protocols in terms of the (largest) class of graphs where each protocol is successful, i.e. where the protocol necessarily ends up with all agents knowing all secrets.

3.4.3 A Succinct Language for Dynamic Epistemic Logic

Participants: Tristan Charrier, François Schwarzentruber.

Presented at AAMAS 2017.

Dynamic epistemic logic (DEL) is an extension of modal multi-agent epistemic logic with dynamic operators. We propose a succinct version of DEL where Kripke models and event models are described succinctly. Our proposal relies on Dynamic logic of propositional assignments (DLPA): epistemic relations are described with so-called

accessibility programs written in DLPA. We give examples of models that are exponentially more succinct in our framework. Interestingly, the model checking of DEL is PSPACE-complete and we show that it remains in PSPACE for the succinct version.

4 Software development

4.1 ATSyRA

Participants: Maxime Audinot, Sophie Pinchinat, Didier Vojtisek and Florence Wacheux.

ATSyRA, or Attack Tree Synthesis for Risk Analysis, is a software that provides tools for security risk analysis of buildings. The software allows to define buildings, in order to look for potential flaws leading to feasible attacks. ATSyRA also provides tools to design and analyze attack trees that help understand the possible threats. See `http://atsyra2.irisa.fr/` for more details and for downloading the plateform.

4.2 Hintikka's world

Participants: François Schwarzentruber, Eva Soulier.

Hintikka's world shows intelligent artificial agents reasoning about higher-order knowledge (a knows that b knows that...). It enables to explore mental states of the agents by clicking on them. It contains many classical AI examples. It is a tribute to Jaakko Hintikka. This tool can be used for:

- learning modal logic, model checking and satisfiability problem;
- learning models of dynamic epistemic logic;
- having fun with epistemic puzzles.

See `http://hintikkasworld.irisa.fr` for more details.

5 Contracts and collaborations

5.1 National Initiatives

DELOREL

Participants: Tristan Charrier, François Schwarzentruber, Eva Soulier.

- Project type: "Défi Infinity CNRS 2017" project
- Dates: 2017
- PI: François Schwarzentruber

- PI institution: ENS Rennes
- DELOREL (Dynamic epistemic logic in real-life)

The project consists in applying algorithms of epistemic planning in real-life scenarios, especially in robotics. We applied planning techniques to a cooperation problem of UAVs: the problem was to generate strategies for individual UAVs so that they can cover an entire area with the constraint of being connected altogether during all their mission. The project enables us to have Eva Soulier as an intern in our team. It also helped us to organise the workshop Robolog 2017.

5.2 Regional Initiatives

- Fabrice Lamarche, MCF ESIR, MimeTIC team at IRISA. Collaboration on the topic "Sécurité de Bâtiments : Assistance au Proptotypage (SeBAPro)" funded by the "Défis émergents" of University of Rennes 1.

5.3 Bilateral industry grants

Sophie Pinchinat collaborates with the DGA (French Defense Ministry) on Physical Security, supervising the PhD student Maxime Audinot with Pôle d'Excellence Cyber grant fundings. In this context, she collaborates with:

- Yann Thierry-Mieg, LIP6 laboratory in Paris, as a partner in the development of the ATSyRA plate-form (see the section on software), and
- Lionel van Aertryck, DGA Maîtrise de l'inforation, Bruz.

5.4 Collaborations

5.4.1 Non-contractual collaborations

Sophie Pinchinat:

- Yann Thierry-Mieg, MCF LIP6 Paris. Collaboration on the development of the model checker used in the ATSyRA plate-form.
- Sjouke Mauw (Professor, University Luxembourg), Marielle Stoelinga (Professor, University of Twente), Jan Kretinsky (Professor TU, Munich). Collaboration on formal methods for attack trees.
- Aniello Murano (professor University of Naples "Federico II") on strategic reasoning.
- Bastien Maubert (Marie Curie Fellow at University of Naples "Federico II") on imperfect information games.

François Schwarzentruber:

- Hans van Ditmarsch, LORIA, CNRS, Nancy. Collaboration on logics for reasoning about knowledge and epistemic gossip.
- Emiliano Lorini, IRIT, CNRS, Toulouse. Collaboration and logics and games.

5.4.2 Visiting scientists

- Christophe Chareton (30 January - 18 February), postdoctoral research at LORIA CNRS
- Thomas Bolander (3-7 April), Assistant professor at Technical University of Denmark
- Sasha Rubin (9-12 December), Postdoctoral researcher in computer science ASTREA laboratory (automated strategic reasoning) University of Naples "Federico II"

6 Dissemination

6.1 Promoting scientific activities

6.1.1 Scientific Events Organisation

General Chair, Scientific Chair Rachid Alami (CNRS, LAAS, Toulouse), Sophie Pinchinat and François Schwarzentruber co-chaired the workshop ROBOLOG 2017 (28-29 June) `http://people.irisa.fr/Francois.Schwarzentruber/robolog2017/`. The aim of this workshop is to present recent work and discuss potential links and cross-fertilising challenges between researchers in logic and those developing decisional processes for multi-robot cooperation and for cognitive and interactive robots that act and interact with humans.

Member of the Organizing Committees Rachid Alami (CNRS, LAAS, Toulouse), Sophie Pinchinat and François Schwarzentruber co-organised the workshop ROBOLOG 2017 (28-29 June) `http://people.irisa.fr/Francois.Schwarzentruber/robolog2017/`.

6.1.2 Scientific Events Selection

Member of Conference Program Committees

Sophie Pinchinat:

- CSL, GraMSec

François Schwarzentruber:

- AAMAS, IJCAI, PRIMA, RJCIA

Reviewer

Sophie Pinchinat:

- CSL, STACS, Gandalf

François Schwarzentruber:

- AAMAS, IJCAI, PRIMA, RJFIA, SR, FCT, RSL

6.1.3 Journal

Member of the Editorial Boards

Sophie Pinchinat:

- Dynamical Discrete-Event System, IfCoLog Journal of Logics and their Applications (Vol. 4)

François Schwarzentruber:

- IfCoLog Journal of Logics and their Applications (Vol. 4)

Reviewer - Reviewing Activities

Sophie Pinchinat:

- IEEE Transactions on Control Systems Technology
- Expert Systems With Applications

François Schwarzentruber:

- Artificial Intelligence Journal
- Theoretical Computer Science
- Fondamenta informaticae
- JLLI

6.1.4 Invited Talks

Sophie Pinchinat:

- Relating plays in game arenas. Dagstuhl Seminar 17111, "Game Theory in AI, Logic, and Algorithms"
- Second-order quantification: a unifying approach for logic-based strategic reasoning. FMAI 2017 (1st Workshop on Formal Methods in Artificial Intelligence, Naples).

- Relating paths in transition systems: the fall of the modal mu-calculus. Université d'Evry.

François Schwarzentruber:

- Hintikka's World. Bochum, 16 December 2017. Doxastic Agency and Epistemic Logic.
- IME (Institut médico-éducatif) Le 3 Mâts, Betton, 23 January 2017. Discussion for a potential software for children.
- Intelligent artificial agents that detect and produce lies Lorentz center workshop. The Invention of Lying: Language, Logic and Cognition from 9 Jan 2017 through 13 January 2017.
- Complexity results in Dynamic Epistemic Logic. FMAI 2017 (1st Workshop on Formal Methods in Artificial Intelligence, Naples).

6.1.5 Leadership within the Scientific Community

6.1.6 Scientific Expertise

Sophie Pinchinat is the scientific consultant for the IRISA international affairs.

6.1.7 Research Administration

Sophie Pinchinat:

- 2 "Comités de Suivi Individuel du Doctorant" for the Doctoral School Mathstic at University of Rennes 1.
- Appointed by the director of IRISA directeur as the PhD student mediator.

François Schwarzentruber:

- Scientific council at ENS Rennes (2014-)

6.2 Teaching, supervision

6.2.1 Teaching

Sophie Pinchinat:

- EASSS 2017, Gdansk, Poland: Dynamic epistemic logic and its applications to plan/protocol synthesis, 3.5h
- Model Checking, 20h, M1, ISTIC Rennes, France
- Advanced Algorithmic, 30h, M1, ISTIC Rennes, France
- Mathematical writing, 30h, M1, ENS Rennes, France

François Schwarzentruber:

- EASSS 2017, Gdansk, Poland: Dynamic epistemic logic and its applications to plan/protocol synthesis, 3.5h
- Complexity theory (M1), 24h
- Computability, complexity and logic (agregation), 24h
- In charge of preparation of the computer science option of the agregation of mathematics
- In charge of the 'prelab' academic year in the computer science department at ENS Rennes

6.2.2 Supervision

- PhD in progress: Maxime Audinot (November 2015-October 2018), *Assisted design and analysis of attack trees*, supervised by Sophie Pinchinat
- PhD in progress: Tristan Charrier (September 2015-August 2018), *Theoretical complexity of reasoning in dynamic epistemic logic and study of a symbolic approach*, supervised by Sophie Pinchinat and François Schwarzentruber
- PhD in progress: Sébastien Lê Cong (October 2017-September 2020), *Game theory and logic for robustness and vulnerabilities in multi-agent systems. Applications in security.* supervised by Sophie Pinchinat and François Schwarzentruber
- M1 Summer internship: Eva Soulier, student at INSA Rennes. Model checking for generating strategies for UAVs, supervised by Tristan Charrier and François Schwarzentruber
- M1 Summer internship: Florence Wacheux, student at ISTIC Rennes. Sécurité de Bâtiments : Assistance au Proptotypage (SeBAPro), co-supervised by Sophie Pinchinat and Fabrice Lamarche (MCF ESIR, MimeTIC team at IRISA).

6.2.3 Juries

- Sophie Pinchinat: 2 PhD juries, 2 HDR juries, 1 mock oral exam for "Agrégation de mathématiques".
- François Schwarzentruber: 2 mock oral exams for "Agrégation de mathématiques".

7 Bibliography

Major publications by the team in recent years

[1] C. Areces, H. van Ditmarsch, R. Fervari, F. Schwarzentruber, "The modal logic of copy and remove", *Inf. Comput. 255*, 2017, p. 243–261, https://doi.org/10.1016/j.ic.2017.01.004.

[2] M. Audinot, S. Pinchinat, B. Kordy, "Is My Attack Tree Correct?", *in : Computer Security - ESORICS 2017 - 22nd European Symposium on Research in Computer Security, Oslo, Norway, September 11-15, 2017, Proceedings, Part I*, p. 83–102, 2017, https://doi.org/10.1007/978-3-319-66402-6_7.

[3] T. Charrier, S. Pinchinat, F. Schwarzentruber, "Model Checking Against Arbitrary Public Announcement Logic: A First-Order-Logic Prover Approach for the Existential Fragment", *in : Dynamic Logic. New Trends and Applications - First International Workshop, DALI 2017, Brasilia, Brazil, September 23-24, 2017, Proceedings*, p. 133–152, 2017, https://doi.org/10.1007/978-3-319-73579-5_9.

[4] T. Charrier, F. Schwarzentruber, "A Succinct Language for Dynamic Epistemic Logic", *in : Proceedings of the 16th Conference on Autonomous Agents and MultiAgent Systems, AAMAS 2017, São Paulo, Brazil, May 8-12, 2017*, p. 123–131, 2017, http://dl.acm.org/citation.cfm?id=3091148.

[5] D. Grossi, E. Lorini, F. Schwarzentruber, "The Ceteris Paribus Structure of Logics of Game Forms (Extended Abstract)", *in : Proceedings of the Twenty-Sixth International Joint Conference on Artificial Intelligence, IJCAI 2017, Melbourne, Australia, August 19-25, 2017*, p. 5000–5004, 2017, https://doi.org/10.24963/ijcai.2017/710.

[6] A. Hunter, F. Schwarzentruber, E. Tsang, "Belief Manipulation Through Propositional Announcements", *in : Proceedings of the Twenty-Sixth International Joint Conference on Artificial Intelligence, IJCAI 2017, Melbourne, Australia, August 19-25, 2017*, p. 1109–1115, 2017, https://doi.org/10.24963/ijcai.2017/154.

[7] E. Lorini, F. Schwarzentruber, "A Path in the Jungle of Logics for Multi-agent System: On the Relation between General Game-playing Logics and Seeing-to-it-that Logics", *in : Proceedings of the 16th Conference on Autonomous Agents and MultiAgent Systems, AAMAS 2017, São Paulo, Brazil, May 8-12, 2017*, p. 687–695, 2017, http://dl.acm.org/citation.cfm?id=3091224.

[8] S. Pinchinat, F. Schwarzentruber (editors), *Special Issue: Tools for Teaching Logic.*, *4*, 1, IfCoLog Journal of Logics and their Applications, College Publications, 2017.

[9] H. van Ditmarsch, J. van Eijck, P. Pardo, R. Ramezanian, F. Schwarzentruber, "Epistemic protocols for dynamic gossip", *J. Applied Logic 20*, 2017, p. 1–31, http://dx.doi.org/10.1016/j.jal.2016.12.001.