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Prof M. van Kreveld, Research Director
Department of Information and Computing Science
Utrecht University

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Dear Prof van Kreveld,

I am applying for the position of assistant professor.

I am a computer scientist interested in formal methods in artificial intelligence, and since 2015 I have been a Post-doc at the University of Naples "Federico II", mentored by Aniello Murano, with a focus on logics for temporal, epistemic and strategic reasoning in artificial intelligence including multi-agent systems. As this letter will show, formal methods in artificial intelligence informs my research, supervision and teaching since 2014.

Background My PhD thesis, titled "Automatic Structures" (2004), was supervised by Bakhadyr Khoussainov at the University of Auckland, and won the best-doctoral thesis in the faculty of computer science. It was about using automata and logic to describe and reason about infinite mathematical structures. From 2004-2007 I held a prestigious individual postdoctoral fellowship funded by the New Zealand government on the same topic. I then held various postdoctoral and teaching positions until 2014. Feeling the need to work in an area with more relevance to computer scientists, since 2014 I started shifting my research to formal methods in AI. From 2015-2016 I held another individual fellowship, a COFUND Marie Curie fellowship, jointly funded by the European Commission and the Institute for Higher Mathematics (INdAM "F. Severi"). The topic of this fellowship was verification of lightweight multi-agent systems; one of the publications from this work resulted in a best-paper award at PRIMA15.

Integration in the international community Since 2013, I am chair or organiser of 5 events (workshops and conferences), including the First Workshop on Formal Methods in Artificial Intelligence in 2017 with keynote speakers including Hector Geffner and Michael Fisher. I have served as a PC member for AI conferences such as IJCAI17, AAAI17, and ECAI16. Since 2014 I have collaborated with leading experts in Knowledge Representation (Giuseppe De Giacomo), Automated Planning (Hector Geffner and Blai Bonet), Logic in Computer Science (Moshe Vardi and Helmut Veith), and Formal Methods in Multi-agent systems (Michael Wooldridge and Alessio Lomuscio). These collaborations demonstrate my expanding breadth of interest and research.

Teaching I am very interested in good pedagogy. Notably, while at Cornell University 2008-2009 I sought a number of teaching mentors, including Maria Terrell (Department of Mathematics) and David Way (associate director of the Cornell University Centre for Teaching Excellence) to discuss successful teaching strategies, both philosophical and concrete. As a result, according to my student evaluations, I was clear, organised, proactively willing to help, and motivating.

Regarding my approach to curriculum, I believe that computer science curricula should provide students with a rigorous foundation in the reasoning required to design and develop computational systems. Thus, even if there are not many dedicated logic courses, I believe that one can and

should inject computational aspects of logic into existing topics, e.g., Boolean logic and satisfiability in courses on discrete mathematics, unique-readability of logical formulas into courses on parsers, first-order logic in courses on databases, etc. Just as important as learning foundations, is developing creativity in students that will be useful in real-world scenarios. To this end I like to motivate and illustrate with examples from robot and mobile-agent control, as well as to provide concrete algorithms, the simplest of which can be simulated by hand.

I have a strong record of undergraduate supervision: I have supervised 7 undergraduates (all resulting in publications), and I am currently supervising an undergraduate on "Graphical Games".

Regarding graduate-level teaching and supervision, I have co-taught a 10 hour PhD mini-course on "Games on Graphs" at the University of Naples, a 1 semester PhD course on "Logical Definability and Random Graphs" at Cornell University in 2009, and a 5 day advanced course on "Logic and Computation in Finitely Presentable Infinite Structures" at ESSLLI in 2006. I have also worked closely with two PhD students of Prof. Murano at the University of Naples, also resulting in publications.

All this demonstrates I would make a good fit for teaching and supervising students in the Masters in Artificial Intelligence, especially on the topics of Logic and Computation, Multi-agent Systems, Intelligent Agents, and Methods in AI Research. Once my Dutch improves (I have some Afrikaans to use as a foundation) I am also keen to contribute to the undergraduate teaching programme.

Research The quality of my research can be roughly gauged from the venues in which I publish. These include 5 papers in LICS, 4 in IJCAI, 4 in AAMAS, 1 in KR, 1 in CAV, 1 in IJCAR (all of these are ranked A* by the CORE ranking). The researchers in the Department of Information and Computing Science whose interests are closest to mine are John-Jules Ch. Meyer (autonomous-, intelligent-, and multi-agent systems), Mehdi Dastani (verification of normative systems), and Henry Prakken (formal aspects of argumentation). My work on verification of parameterised mobile-systems is based on Courcelle's Theorem, which also forms the basis of much work of Hans Bodlaender (algorithms and complexity).

My "bread-and-butter" work consists of developing and applying formal and logical methods. As indicated, for the past few years I have been motivated by applications in AI. One notable example of this convergence is my recent IJCAI17 work with Blai Bonet, Giuseppe De Giacomo, and Hector Geffner which is at the intersection of formal methods and automated planning in AI. I am also pursuing more speculative questions such as "What is synthesis and how should it be formalised?" (an active topic of investigation with Giuseppe De Giacomo).

Vision for future research My research trajectory is to help bridge two communities, the formal-methods community and the AI community. To that end, I plan to continue my integration in the AI community and bring formal and logical methods to bear on questions of importance to computer scientists and society, e.g., "explainable AI". Concretely, I plan to organise future editions of the "Formal Methods in Artificial Intelligence" workshop, and to expand my work to cover other central aspects of AI such as formal methods for Neural Networks.

Names and emails of two references Giuseppe De Giacomo (degiacomo@dis.uniroma1.it) and Alessio Lomuscio (a.lomuscio@imperial.ac.uk).

Sincerely,

Sasha Rubin