



LaBRI

Évaluation HCERES
2015–2020

Annexe 4

Troisième partie

Annexe 4

Conventions utilisées pour l'annexe 4.

Du fait des conditions sanitaires, il nous a été impossible de mener une réflexion aboutie avec les équipes du laboratoire pour sélectionner les éléments saillants dans cette annexe. Il est en effet difficile de comparer, et donc de sélectionner, les résultats de l'activité scientifique des équipes. Mener cette réflexion aurait demandé un consensus, et donc des discussions supplémentaires avec les équipes.

De plus, nous avons passé un temps conséquent à collecter et à consolider les données, car elles se retrouvent disséminées dans de nombreux systèmes d'information. Cela même a demandé des allers-retours entre la direction et les équipes. Cette difficulté est principalement due à l'absence d'un système d'information centralisé au niveau des tutelles et partenaires, qui recenserait l'ensemble des informations demandées par l'organisme d'évaluation.

Cependant, l'ensemble des informations nécessaires est décrit, de façon détaillée, dans les documents rédigés par les équipes elles-mêmes. La synthèse en est faite dans le fichier « Données du contrat en cours ». Nous avons attaché une attention particulière à l'écriture du bilan qui, à notre avis, contient les éléments pertinents pour le comité. Nous restons à la disposition du comité pour fournir toute information complémentaire.

Guide de lecture de l'annexe 4

Nous avons choisi les conventions suivantes :

- Nous avons décompté les publications Q1 (source Scimago) et A*-A (Core Ranking) pour *l'année de la publication*.
- Nous avons attribué une couleur à chaque équipe : **CombAlgo**, **I&S**, **MF**, **BKB**, **Progress**, **Satanas**. Ce code couleur avait initialement pour but de nous aider à détecter des erreurs dans les publications, à visualiser les publications communes, etc. Nous l'avons finalement conservé pour la version finale de ce rapport.
- dans les listes de publications, les noms des doctorants sont soulignés.
- Nous avons affilié les auteurs de publications de la façon suivante :
 - une publication **en conférence** n'a été déclarée « au LaBRI » que si au moins un auteur était au laboratoire *l'année de la publication* et si cette publication a été avalisée par l'équipe de cet auteur.
 - une publication **en revue** n'a été citée que si au moins un auteur était au laboratoire *l'année de la publication*, **ou celle d'avant** (et si la publication a été avalisée comme appartenant au laboratoire par l'équipe de cet auteur). Autrement dit, un doctorant qui soumet un **article de revue** pendant sa thèse, qu'il finit en **2018**, sera cité comme auteur « LaBRI » même si cet article ne paraît qu'en **2019**. Cela permet de tenir compte du délai de publication en revue. En revanche, si l'article ne paraît qu'en 2020, et même s'il s'agit d'un travail soumis pendant la thèse, le doctorant n'est plus indiqué comme affilié au LaBRI. Ceci explique que certains noms, en particulier de doctorants ou de post-doctorants (dont la mobilité est importante), soient parfois affiliés au laboratoire et parfois non. Trois équipes ont fait remonter le fait que ce mode de comptage exclut certaines publications provenant des thèses, mais il nous fallait bien choisir un critère uniforme.

Combinatoire et Algorithmique

1 Production de connaissances et activités concourant au rayonnement et à l'attractivité scientifique

1.1 Revues

L'équipe Combinatoire et Algorithmique a publié 229 articles en revue.

Revue de l'équipe Combinatoire et Algorithmique		
	Q1	Autres
Nombre	124	105
Pourcentage	54%	46%

Revue, top 20%

- [CA*-J1] Ittai ABRAHAM, Shiri CHECHIK, [Cyril GAVOILLE](#), and David PELEG. "Forbidden-Set Distance Labels for Graphs of Bounded Doubling Dimension." In: *ACM Trans. Algorithms* 12.2 (2016), 22:1–22:17. DOI: 10.1145/2818694.
- [CA*-J2] Ittai ABRAHAM, [Cyril GAVOILLE](#), Anupam GUPTA, Ofer NEIMAN, and Kunal TALWAR. "Cops, Robbers, and Threatening Skeletons: Padded Decomposition for Minor-Free Graphs." In: *SIAM J. Comput.* 48.3 (2019), pp. 1120–1145. DOI: 10.1137/17M1112406.
- [CA*-J3] [Karim ALAMI](#), [Nicolas HANUSSE](#), Patrick Kamnang WANKO, and [Sofian MAABOUT](#). "The negative skycube." In: *Inf. Syst.* 88 (2020). DOI: 10.1016/j.is.2019.101443.
- [CA*-J4] Vesna ANDOVA, [František Kardoš](#), and Riste SKREKOVSKI. "Mathematical aspects of fullerenes." In: *Ars Math. Contemp.* 11.2 (2016), pp. 353–379. DOI: 10.26493/1855-3974.834.b02.

- [CA*-J5] Pierre ARNOUX and Sébastien LABBÉ. “On some symmetric multidimensional continued fraction algorithms.” In: *Ergodic Theory and Dynamical Systems* 38.5 (Aug. 2018), pp. 1601–1626. doi: 10.1017/etds.2016.112.
- [CA*-J6] Jean-Christophe AVAL, François BERGERON, and Adriano M. GARSIA. “Combinatorics of labelled parallelogram polyominoes.” In: *J. Comb. Theory, Ser. A* 132 (2015), pp. 32–57. doi: 10.1016/j.jcta.2014.12.003.
- [CA*-J7] Jean-Christophe AVAL, Valentin FÉRAY, Jean-Christophe NOVELLI, and Jean-Yves THIBON. “Quasi-symmetric functions as polynomial functions on Young diagrams.” In: *Journal of Algebraic Combinatorics* 41.3 (May 2015), pp. 669–706. doi: 10.1007/s10801-014-0549-y.
- [CA*-J8] Jean-Christophe AVAL, Théo KARABOGHOSSIAN, and Adrian TANASA. “The Hopf Monoid of Hypergraphs and its Sub-Monoids: Basic Invariant and Reciprocity Theorem.” In: *Electron. J. Comb.* 27.1 (2020), P1.34. URL: <https://www.combinatorics.org/ojs/index.php/eljc/article/view/v27i1p34>.
- [CA*-J9] Evangelos BAMPAS, Jurek CZYZOWICZ, Leszek GASIENIEC, David ILCINKAS, Ralf KLASING, Tomasz KOCIUMAKA, and Dominik PAJAK. “Linear Search by a Pair of Distinct-Speed Robots.” In: *Algorithmica* 81.1 (2019), pp. 317–342. doi: 10.1007/s00453-018-0447-0.
- [CA*-J10] Evangelos BAMPAS, Leszek GASIENIEC, Nicolas HANUSSE, David ILCINKAS, Ralf KLASING, Adrian KOSOWSKI, and Tomasz RADZIK. “Robustness of the Rotor-Router Mechanism.” In: *Algorithmica* 78.3 (2017), pp. 869–895. doi: 10.1007/s00453-016-0179-y.
- [CA*-J11] Leonid BARENBOIM, Michael ELKIN, and Cyril GAVOILLE. “A fast network-decomposition algorithm and its applications to constant-time distributed computation.” In: *Theor. Comput. Sci.* 751 (2018), pp. 2–23. doi: 10.1016/j.tcs.2016.07.005.
- [CA*-J12] Olivier BAUDON, Jakub PRZYBYLO, Mohammed SENHAJI, Elzbieta SIDOROWICZ, Éric SOPENA, and Mariusz WOZNAK. “The neighbour-sum-distinguishing edge-colouring game.” In: *Discret. Math.* 340.7 (2017), pp. 1564–1572. doi: 10.1016/j.disc.2017.02.019.
- [CA*-J13] Petra BERENBRINK, Ralf KLASING, Adrian KOSOWSKI, Frederik MALLMANN-TRENN, and Przemysław UZNANSKI. “Improved Analysis of Deterministic Load-Balancing Schemes.” In: *ACM Trans. Algorithms* 15.1 (2019), 10:1–10:22. doi: 10.1145/3282435.
- [CA*-J14] Olivier BERNARDI and Mireille BOUSQUET-MÉLOU. “Counting coloured planar maps: differential equations.” In: *Communications in Mathematical Physics* 354.1 (2017), pp. 31–84. URL: <https://hal.archives-ouvertes.fr/hal-01174130>.
- [CA*-J15] Valérie BERTHÉ, Clelia de FELICE, Vincent DELECROIX, Francesco DOLCE, Julien LEROY, Dominique PERRIN, Christophe REUTENAUER, and Giuseppina RINDONE. “Specular sets.” In: *Theor. Comput. Sci.* 684 (2017), pp. 3–28. doi: 10.1016/j.tcs.2017.03.001.
- [CA*-J16] Shweta BHANDARI, Wafa Ben JABALLAH, Vineeta JAIN, Vijay LAXMI, Akka ZEMMARI, Manoj Singh GAUR, Mohamed MOSBAH, and Mauro CONTI. “Android inter-app communication threats and detection techniques.” In: *Comput. Secur.* 70 (2017), pp. 392–421. doi: 10.1016/j.cose.2017.07.002.
- [CA*-J17] Riccardo BIAGIOLI, Mireille BOUSQUET-MÉLOU, Frédéric JOUHET, and Philippe NADEAU. “Length enumeration of fully commutative elements in finite and affine Coxeter groups.” In: *Journal of Algebra* 513 (Nov. 2018), pp. 466–515. doi: 10.1016/j.jalgebra.2018.06.009.

- [CA*-J18] Ahmad BINIAZ, Prosenjit BOSE, Jean-Lou de CARUFEL, Cyril GAVOILLE, Anil MAHESHWARI, and Michiel H. M. SMID. “Towards plane spanners of degree 3.” In: *JoCG* 8.1 (2017), pp. 11–31. DOI: 10.20382/jocg.v8i1a2.
- [CA*-J19] Alexandre BLANCHÉ, Konrad K. DABROWSKI, Matthew JOHNSON, and Daniël PAULUSMA. “Hereditary graph classes: When the complexities of coloring and clique cover coincide.” In: *Journal of Graph Theory* 91.3 (2019), pp. 267–289. DOI: 10.1002/jgt.22431.
- [CA*-J20] Marthe BONAMY, Nicolas BOUSQUET, Carl FEGHALI, and Matthew JOHNSON. “On a conjecture of Mohar concerning Kempe equivalence of regular graphs.” In: *J. Comb. Theory, Ser. B* 135 (2019), pp. 179–199. DOI: 10.1016/j.jctb.2018.08.002.
- [CA*-J21] Marthe BONAMY, Daniel W. CRANSTON, and Luke POSTLE. “Planar graphs of girth at least five are square $(\Delta + 2)$ -choosable.” In: *J. Comb. Theory, Ser. B* 134 (2019), pp. 218–238. DOI: 10.1016/j.jctb.2018.06.005.
- [CA*-J22] Marthe BONAMY, Oscar DEFRAIN, Marc HEINRICH, Michał PILIPCZUK, and Jean-Florent RAYMOND. “Enumerating minimal dominating sets in Kt-free graphs and variants.” In: *ACM Transactions on Algorithms (TALG)* 16.3 (2020), pp. 1–23.
- [CA*-J23] Marthe BONAMY, Natasha MORRISON, and Alex SCOTT. “Partitioning the vertices of a torus into isomorphic subgraphs.” In: *J. Comb. Theory, Ser. A* 174 (2020), p. 105252. DOI: 10.1016/j.jcta.2020.105252.
- [CA*-J24] Nicolas BONICHON, Prosenjit BOSE, Jean-Lou de CARUFEL, Ljubomir PERKOVIC, and André van RENNSSEN. “Upper and Lower Bounds for Online Routing on Delaunay Triangulations.” In: *Discret. Comput. Geom.* 58.2 (2017), pp. 482–504. DOI: 10.1007/s00454-016-9842-y.
- [CA*-J25] Nicolas BONICHON, Mireille BOUSQUET-MÉLOU, Paul DORBEC, and Claire PENNARUN. “On the number of planar Eulerian orientations.” In: *Eur. J. Comb.* 65 (2017), pp. 59–91. DOI: 10.1016/j.ejc.2017.04.009.
- [CA*-J26] Nicolas BONICHON, Iyad A. KANJ, Ljubomir PERKOVIC, and Ge XIA. “There are Plane Spanners of Degree 4 and Moderate Stretch Factor.” In: *Discret. Comput. Geom.* 53.3 (2015), pp. 514–546. DOI: 10.1007/s00454-015-9676-z.
- [CA*-J27] Alin BOSTAN, Mireille BOUSQUET-MÉLOU, and Stephen MELCZER. “Counting walks with large steps in an orthant.” In: *J. Eur. Math. Soc. (JEMS)* 6 (2020). URL: <https://hal.archives-ouvertes.fr/hal-01802706>.
- [CA*-J28] Mireille BOUSQUET-MÉLOU. “An elementary solution of Gessel’s walks in the quadrant.” In: *Advances in Mathematics* 303 (2016), pp. 1171–1189. URL: <https://hal.archives-ouvertes.fr/hal-01136361>.
- [CA*-J29] Mireille BOUSQUET-MÉLOU. “Square lattice walks avoiding a quadrant.” In: *J. Comb. Theory, Ser. A* 144 (2016), pp. 37–79. DOI: 10.1016/j.jcta.2016.06.010.
- [CA*-J30] Mireille BOUSQUET-MÉLOU and Andrew ELVEY PRICE. “The generating function of planar Eulerian orientations.” In: *J. Comb. Theory, Ser. A* 172 (2020), p. 105183. DOI: 10.1016/j.jcta.2019.105183.
- [CA*-J31] Nicolas BROUTIN and Jean-François MARCKERT. “A new encoding of coalescent processes. Applications to the additive and multiplicative cases.” In: *Probability Theory and Related Fields* 166.1 (2016), pp. 515–552. DOI: 10.1007/s00440-015-0665-1.
- [CA*-J32] Claire CAPDEVIELLE, Colette JOHNEN, and Alessia MILANI. “On the complexity of basic abstractions to implement consensus.” In: *Theor. Comput. Sci.* 715 (2018), pp. 86–96. DOI: 10.1016/j.tcs.2017.12.039.

- [CA*-J33] Jérôme CASSE and Jean-François MARCKERT. “Markovianity of the invariant distribution of probabilistic cellular automata on the line.” In: *Stochastic Processes and their Applications* 125.9 (2015), pp. 3458–3483. URL: <https://hal.archives-ouvertes.fr/hal-01433116>.
- [CA*-J34] Arnaud CASTEIGTS, Swan DUBOIS, Franck PETIT, and John Michael ROBSON. “Robustness: A new form of heredity motivated by dynamic networks.” In: *Theor. Comput. Sci.* 806 (2020), pp. 429–445. DOI: 10.1016/j.tcs.2019.08.008.
- [CA*-J35] Arnaud CASTEIGTS, Paola FLOCCHINI, Emmanuel GODARD, Nicola SANTORO, and Masafumi YAMASHITA. “On the expressivity of time-varying graphs.” In: *Theor. Comput. Sci.* 590 (2015), pp. 27–37. DOI: 10.1016/j.tcs.2015.04.004.
- [CA*-J36] Arnaud CASTEIGTS, Yves MÉTIVIER, John Michael ROBSON, and Akka ZEMMARI. “Counting in one-hop beeping networks.” In: *Theor. Comput. Sci.* 780 (2019), pp. 20–28. DOI: 10.1016/j.tcs.2019.02.009.
- [CA*-J37] Arnaud CASTEIGTS, Yves MÉTIVIER, John Michael ROBSON, and Akka ZEMMARI. “Deterministic Leader Election Takes $\Theta(D+\log n)$ Bit Rounds.” In: *Algorithmica* 81.5 (2019), pp. 1901–1920. DOI: 10.1007/s00453-018-0517-3.
- [CA*-J38] Maitri CHAKRABORTY, Alessia MILANI, and Miguel A. MOSTEIRO. “A Faster Exact-Counting Protocol for Anonymous Dynamic Networks.” In: *Algorithmica* 80.11 (2018), pp. 3023–3049. DOI: 10.1007/s00453-017-0367-4.
- [CA*-J39] Li-Hsuan CHEN, Dun-Wei CHENG, Sun-Yuan HSIEH, Ling-Ju HUNG, Ralf KLASING, Chia-Wei LEE, and Bang Ye WU. “Approximability and inapproximability of the star p-hub center problem with parameterized triangle inequality.” In: *J. Comput. Syst. Sci.* 92 (2018), pp. 92–112. DOI: 10.1016/j.jcss.2017.09.012.
- [CA*-J40] Ilkyoo CHOI, Jaehoon KIM, Alexandr V. KOSTOCHKA, and André RASPAUD. “Strong edge-colorings of sparse graphs with large maximum degree.” In: *Eur. J. Comb.* 67 (2018), pp. 21–39. DOI: 10.1016/j.ejc.2017.06.001.
- [CA*-J41] Robert CORI and Yvan LE BORGNE. “On Computation of Baker and Norine’s Rank on Complete Graphs.” In: *Electron. J. Comb.* 23.1 (2016), P1.31. URL: <http://www.combinatorics.org/ojs/index.php/eljc/article/view/v23i1p31>.
- [CA*-J42] Robert CORI, Pasquale PETRULLO, and Domenico SENATO. “Hall-Littlewood symmetric functions via the chip-firing game.” In: *Eur. J. Comb.* 58 (2016), pp. 225–237. DOI: 10.1016/j.ejc.2016.05.008.
- [CA*-J43] Vincent DELECROIX, Carlos MATHEUS, and Carlos Gustavo MOREIRA. “Approximations of the Lagrange and Markov spectra.” In: *Math. Comput.* 89.325 (2020), pp. 2521–2536. DOI: 10.1090/mcom/3513.
- [CA*-J44] Olivier DELMAS, Frédéric HAVET, Mickaël MONTASSIER, and Stéphane PÉRENNES. “Design of fault-tolerant on-board networks with variable switch sizes.” In: *Theor. Comput. Sci.* 562 (2015), pp. 75–89. DOI: 10.1016/j.tcs.2014.09.034.
- [CA*-J45] Stéphane DEVISMES, David ILCINKAS, and Colette JOHNEN. “Self-Stabilizing Disconnected Components Detection and Rooted Shortest-Path Tree Maintenance in Polynomial Steps.” In: *Discret. Math. Theor. Comput. Sci.* 19.3 (2017). URL: <http://dmtcs.episciences.org/4116>.
- [CA*-J46] Paul DORBECH, Gabriel RENAULT, Aaron N. SIEGEL, and Éric SOPENA. “Dicots, and a taxonomic ranking for misère games.” In: *J. Comb. Theory, Ser. A* 130 (2015), pp. 42–63. DOI: 10.1016/j.jcta.2014.10.006.

- [CA*-J47] [Philippe DUCHON](#) and [Romaric DUVIGNAU](#). “Preserving the Number of Cycles of Length k in a Growing Uniform Permutation.” In: *Electron. J. Comb.* 23.4 (2016), P4.22. URL: <http://www.combinatorics.org/ojs/index.php/eljc/article/view/v23i4p22>.
- [CA*-J48] Christopher DUFFY, Gary MACGILLIVRAY, and [Éric SOPENA](#). “Oriented colourings of graphs with maximum degree three and four.” In: *Discret. Math.* 342.4 (2019), pp. 959–974. doi: 10.1016/j.discre.2018.10.008.
- [CA*-J49] Éric FUSY and [Adrian TANASA](#). “Asymptotic Expansion of the Multi-Orientable Random Tensor Model.” In: *Electron. J. Comb.* 22.1 (2015), P1.52. URL: <http://www.combinatorics.org/ojs/index.php/eljc/article/view/v22i1p52>.
- [CA*-J50] Christian GLACET, [Nicolas HANUSSE](#), and [David ILCINKAS](#). “The impact of dynamic events on the number of errors in networks.” In: *Theor. Comput. Sci.* 627 (2016), pp. 1–12. doi: 10.1016/j.tcs.2016.02.012.
- [CA*-J51] [Théo KARABOGHOSSIAN](#) and Michele ZITO. “Easy knapsacks and the complexity of energy allocation problems in the smart grid.” In: *Optim. Lett.* 12.7 (2018), pp. 1553–1568. doi: 10.1007/s11590-017-1209-7.
- [CA*-J52] [František KARDOŠ](#). “A Computer-Assisted Proof of the Barnette-Goodey Conjecture: Not Only Fullerene Graphs Are Hamiltonian.” In: *SIAM J. Discret. Math.* 34.1 (2020), pp. 62–100. doi: 10.1137/140984737.
- [CA*-J53] [František KARDOŠ](#), Daniel KRÁL’, Anita LIEBENAU, and Lukás MACH. “First order convergence of matroids.” In: *Eur. J. Comb.* 59 (2017), pp. 150–168. doi: 10.1016/j.ejc.2016.08.005.
- [CA*-J54] [František KARDOŠ](#), Jozef PÓCS, and Jana PÓCSOVA. “On concept reduction based on some graph properties.” In: *Knowl. Based Syst.* 93 (2016), pp. 67–74. doi: 10.1016/j.knosys.2015.11.003.
- [CA*-J55] [Ralf KLASING](#), Adrian KOSOWSKI, Dominik PAJAK, and Thomas SAUERWALD. “The multi-agent rotor-router on the ring: a deterministic alternative to parallel random walks.” In: *Distributed Comput.* 30.2 (2017), pp. 127–148. doi: 10.1007/s00446-016-0282-y.
- [CA*-J56] [Sébastien LABBÉ](#). “Markov partitions for toral \mathbb{Z}^2 -rotations featuring Jeandel-Rao Wang shift and model sets.” In: *Annales Henri Lebesgue* (Mar. 2019). URL: <https://hal.archives-ouvertes.fr/hal-02109063>.
- [CA*-J57] [Sébastien LABBÉ](#). “Substitutive structure of Jeandel-Rao aperiodic tilings.” In: *Discrete and Computational Geometry* (Dec. 2019). doi: 10.1007/s00454-019-00153-3.
- [CA*-J58] [Sébastien LABBÉ](#), Edita PELANTOVÁ, and Štěpán STAROSTA. “On the Zero Defect Conjecture.” In: *European Journal of Combinatorics* 62 (May 2017), pp. 132–146. doi: 10.1016/j.ejc.2016.12.006.
- [CA*-J59] [Dimitri LAJOU](#). “On the achromatic number of signed graphs.” In: *Theor. Comput. Sci.* 759 (2019), pp. 50–60. doi: 10.1016/j.tcs.2019.01.006.
- [CA*-J60] Luis-Miguel LOPEZ and [Philippe NARBEL](#). “Infinite interval exchange transformations from shifts.” In: *Ergodic Theory and Dynamical Systems* 37.6 (Sept. 2017), pp. 1935–1965. doi: 10.1017/etds.2015.131.
- [CA*-J61] Edita MÁCAJOVÁ, [André RASPAUD](#), and Martin SKOVIERA. “The Chromatic Number of a Signed Graph.” In: *Electron. J. Comb.* 23.1 (2016), P1.14. URL: <http://www.combinatorics.org/ojs/index.php/eljc/article/view/v23i1p14>.
- [CA*-J62] Olya MANDELSHTAM and [Xavier VIENNOT](#). “Rhombic alternative tableaux and assemblées of permutations.” In: *Eur. J. Comb.* 73 (2018), pp. 1–19. doi: 10.1016/j.ejc.2018.05.002.

- [CA*-J63] Olya MANDELSHTAM and Xavier VIENNOT. “Tableaux combinatorics of the two-species PASEP.” In: *J. Comb. Theory, Ser. A* 159 (2018), pp. 215–239. doi: 10.1016/j.jcta.2018.05.006.
- [CA*-J64] Reza NASERASR, Edita ROLLOVÁ, and Éric SOPENA. “Homomorphisms of Signed Graphs.” In: *Journal of Graph Theory* 79.3 (2015), pp. 178–212. doi: 10.1002/jgt.21817.
- [CA*-J65] Reza NASERASR, Éric SOPENA, and Thomas ZASLAVSKY. “Homomorphisms of signed graphs: An update.” In: *European Journal of Combinatorics* (2020). URL: <https://hal.archives-ouvertes.fr/hal-02507307>.

1.2 Ouvrages

Voici les ouvrages, classés par ordre alphabétique des auteurs issus de CombAlgo :

- Adrian Tanasa, *Combinatorial Physics*, à paraître dans Oxford University Press (2020 ou 2021).
- Xavier Viennot, *The Art of Bijective Combinatorics*, qui est un “vidéo-book”, en 4 volumes, 77 vidéos, correspondant à des cours donnés à l’IMSc en Inde en 2016, 2017, 2018 et 2019. Consultable librement à l’adresse www.viennot.org.
- Akka Zemhari et Jenny Benois-Pineau *Deep Learning in Mining of Visual Content*, 2020, Springer.
- N. M. Adrianov, F. Pakovich, Alexandre K. Zvonkine, *Davenport-Zannier Polynomials and Dessins d’Enfants*, AMS Mathematical Surveys and Monographs, vol. 249, 2020.
- Et comme il n’est jamais trop tôt pour commencer à s’intéresser à la science... Alexander Zvonkine, *Mathématiques pour les tout petits*, Moscou, 2019, Editions MCCME (en Russe). 8ème édition, traduit en Espagnol : *Matemáticas de 3 a 7 años : La historia de un Círculo Matemático para niños*, Ediciones SM, 2016.

Éditions d’actes

- [CA-A1] Marek CHROBAK, Antonio Fernández ANTA, Leszek GASIENIEC, and Ralf KLASING, eds. *Algorithms for Sensor Systems - 12th International Symposium on Algorithms and Experiments for Wireless Sensor Networks, ALGOSENSORS 2016, Aarhus, Denmark, August 25-26, 2016, Revised Selected Papers*. Vol. 10050. Lecture Notes in Computer Science. Springer, 2017. ISBN: 978-3-319-53057-4. doi: 10.1007/978-3-319-53058-1.
- [CA-A2] Leszek GASIENIEC, Ralf KLASING, and Tomasz RADZIK, eds. *Combinatorial Algorithms - 31st International Workshop, IWoca 2020, Bordeaux, France, June 8-10, 2020, Proceedings*. Vol. 12126. Lecture Notes in Computer Science. Springer, 2020. ISBN: 978-3-030-48965-6. doi: 10.1007/978-3-030-48966-3.
- [CA-A3] Cyril GAVOILLE and David ILCINKAS, eds. *Distributed Computing - 30th International Symposium, DISC 2016, Paris, France, September 27-29, 2016, Proceedings*. Vol. 9888. Lecture Notes in Computer Science. Springer, 2016. ISBN: 978-3-662-53425-0. doi: 10.1007/978-3-662-53426-7.
- [CA-A4] Sun-Yuan HSIEH, Ralf KLASING, Chunbo LUO, and Shi-Chun TSAI, eds. *Selected Papers from the 14th International Symposium on Pervasive Systems, Algorithms, and Networks (I-SPAN 2017)*. Vol. 35(4). Journal of Information Science and Engineering 4. July 2019. URL: <https://jise.iis.sinica.edu.tw/JISESearch/pages/Customize/DesignatedIssueContent.jsf?TheIssue=169>.

- [CA-A5] Ralf KLASING and Marc ZEITOUN, eds. *Fundamentals of Computation Theory - 21st International Symposium, FCT 2017, Bordeaux, France, September 11-13, 2017, Proceedings*. Vol. 10472. Lecture Notes in Computer Science. Springer, 2017. ISBN: 978-3-662-55750-1. DOI: 10.1007/978-3-662-55751-8.
- [CA-A6] Ralf KLASING and Marc ZEITOUN, eds. *Selected papers of the 21st International Symposium on Fundamentals of Computation Theory, FCT 2017*. Vol. 114. Journal of Computer and System Sciences. Dec. 2020, pp. 105–106. URL: <https://doi.org/10.1016/j.jcss.2020.06.004>.
- [CA-A7] Akka ZEMMARI, Mohamed MOSBAH, Nora CUPPENS-BOULAHIA, and Frédéric CUPPENS, eds. *Risks and Security of Internet and Systems - 13th International Conference, CRiSIS 2018, Arcachon, France, October 16-18, 2018, Revised Selected Papers*. Vol. 11391. Lecture Notes in Computer Science. Springer, 2019. ISBN: 978-3-030-12142-6. DOI: 10.1007/978-3-030-12143-3.

1.3 Production dans des colloques / congrès, séminaires de recherche

L'équipe Combinatoire et Algorithmique a publié 166 articles en conférences. La conférence FPSAC, meilleures conférences de combinatoire énumérative et algébrique a été incluse dans ce tableau, malgré son rang B (dans la classification choisie par le laboratoire).

Conférences de l'équipe Combinatoire et Algorithmique		
	A* et A	Autres
Nombre	33	133
Pourcentage	20%	80%

Conférences, top 20%

- [CA*-C1] Pierre ABOULKER, Marthe BONAMY, Nicolas BOUSQUET, and Louis ESPERET. "Distributed coloring in sparse graphs with fewer colors." In: *Proceedings of the 2018 ACM Symposium on Principles of Distributed Computing (PODC)*. 2018, pp. 419–425.
- [CA*-C2] Stephen ALSTRUP, Cyril GAVOILLE, Esben Bistrup HALVORSEN, and Holger PETERSEN. "Simpler, faster and shorter labels for distances in graphs." In: *Proceedings of the Twenty-Seventh Annual ACM-SIAM Symposium on Discrete Algorithms, SODA 2016, Arlington, VA, USA, January 10-12, 2016*. Ed. by Robert KRAUTHGAMER. SIAM, 2016, pp. 338–350. DOI: 10.1137/1.9781611974331.ch25.
- [CA*-C3] Karine ALTISEN, Stéphane DEVISMES, Anaïs DURAND, Colette JOHNEN, and Franck PETIT. "Brief Announcement: Self-stabilizing Systems in Spite of High Dynamics." In: *PODC '20: ACM Symposium on Principles of Distributed Computing, Virtual Event, Italy, August 3-7, 2020*. Ed. by Yuval EMEK and Christian CACHIN. ACM, 2020, pp. 227–229. DOI: 10.1145/3382734.3404502.
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- [CA*-C5] Nathalie AUBRUN, [Sebastián BARBIERI](#), and Etienne MOUTOT. “The Domino Problem is Undecidable on Surface Groups.” In: *44th International Symposium on Mathematical Foundations of Computer Science, MFCS 2019, August 26-30, 2019, Aachen, Germany*. Ed. by Peter ROSSMANITH, Pinar HEGGERNES, and Joost-Pieter KATOEN. Vol. 138. LIPIcs. Schloss Dagstuhl - Leibniz-Zentrum für Informatik, 2019, 46:1–46:14. DOI: [10.4230/LIPIcs.MFCS.2019.46](#).
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- [CA*-C9] Mirza Ahad BAIG, Danny HENDLER, [Alessia MILANI](#), and [Corentin TRAVERS](#). “Long-Lived Counters with Polylogarithmic Amortized Step Complexity.” In: *33rd International Symposium on Distributed Computing, DISC 2019, October 14-18, 2019, Budapest, Hungary*. Ed. by Jukka SUOMELA. Vol. 146. LIPIcs. Schloss Dagstuhl - Leibniz-Zentrum für Informatik, 2019, 3:1–3:16. DOI: [10.4230/LIPIcs.DISC.2019.3](#).
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1.4 Produits et outils informatiques

La production de logiciels de Combalgo a pour but d’aider à la recherche amont, mais aussi, pour d’autres, d’ouvrir à des applications industrielles.

Logiciels

■ **Bibliothèque JBotSim (Arnaud Casteigts).** Notre équipe développe et maintient la bibliothèque JBOTSIM. Il s’agit une plate-forme de simulation sous licence libre (LGPL) développée en Java, permettant de valider des algorithmes distribués dans les réseaux statiques ou dynamiques (tels que les réseaux de capteurs sans fil, réseaux de drones ou de robots). La spécificité de cet outil est de se situer à un niveau d’abstraction élevé, c’est-à-dire au niveau algorithmique, plutôt que d’être dédié à des technologies spécifiques. Il permet ainsi de prototyper rapidement des solutions algorithmiques dans des contextes variés, comme illustré ci-dessous.

JBotSim est (ou a été) utilisé en recherche et en enseignement dans plusieurs universités, à commencer par les membres du LaBRI, dont Arnaud Casteigts, qui l’utilise à tous niveaux (enseignement, projets, recherche) et a notamment mis au point un cours de Master 2 s’appuyant dessus pour tous les travaux pratiques (*Algorithmique de la Mobilité*, lien plus bas). Elle est également utilisée par Cyril Gavoille (projets étudiants), Alessia Milani (projets

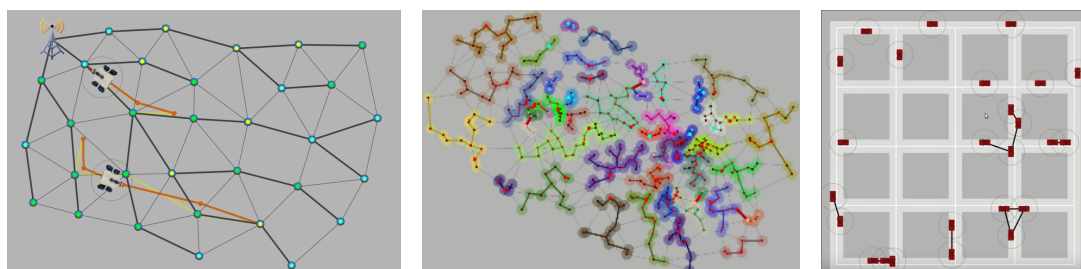


FIGURE 1.1 – De gauche à droite : scénario de recharge de capteurs par des robots ; construction distribuée d'un arbre couvrant de poids minimum ; et réseau véhiculaire dans une grille de type Manhattan.

étudiants), Ema Falomir (recherche) ; à Marseille (Emmanuel Godard et Shantanu Das, voir faits notables plus bas), au LIP6 à Paris (Sébastien Tixeuil, recherche), Strasbourg (Quentin Bramas, enseignement), Ottawa (Giuseppe Di Luna et Paola Flocchini, enseignement), Saint Sébastien (Carlos-Gómez Calzado, Mikel Larrea, recherche) ainsi qu'à l'IRIF (Pierluigi Crescenzi, enseignement).

Plus globalement, le binaire de JBotSim a été téléchargé 150 fois en 2015, 900 en 2016, et 1100 en 2017 (statistiques SourceForge, nous n'avons plus de statistiques depuis la migration du projet sur GitHub).

Cette bibliothèque a fait l'objet d'une publication dans une conférence spécialisée [hal-01472926], d'un exposé invité au LIP6 (invitation Franck Petit en 2015), d'un tutoriel invité à l'école d'été RESCOM 2019 (invitation Enrico Natalizio) et de trois exposés dans le cadre du Séminaire d'Algorithmique Distribuée du LaBRI (deux par Arnaud Casteigts, un par Rémi Laplace). Quelques faits marquants à son sujet :

- L'équipe DALGO du LIF à Marseille développe une bibliothèque d'algorithmes et de modèles de calculs distribués appelée DAVIS et utilisant JBotSim comme noyau. Nous collaborons régulièrement à ce sujet.
- Depuis septembre 2018, ce projet a bénéficié du soutien du cluster d'excellence de Bordeaux dans le cadre du projet Sysnum, via l'octroi d'une bourse de postdoc-ingénieur de 18 mois nous ayant permis de recruter Rémi Laplace, qui était, jusqu'en mars 2020 mainteneur principal de la bibliothèque.
- Pierluigi Crescenzi, Professeur à l'IRIF, a déployé en 2019 le cours *Algorithmique de la Mobilité* en master à l'Université de Paris, dont les travaux pratiques reposent tous sur JBotSim.

Liens utiles :

- site web (jbotsim.io) ; dépôt GitHub (github.com/jbotsim/JBotSim)
- chaîne YouTube dédiée (www.youtube.com/channel/UCRxLymv10MiADCW-TwcfoZA)
- cours *Algorithmique de la Mobilité* ([www.labri.fr/\\$\sim\\$acasteigt/teaching/algomob/](http://www.labri.fr/\simacasteigt/teaching/algomob/))

■ **A2S (Android Analysis & Security), 2019, Version 1.1. (Akka Zemmari).** Dans le cadre de recherches sur l'application des techniques d'apprentissage [3, 5] et des méthodes de « model checking » [1], des membres du thème ont développé un logiciel (le logiciel A2S) capable d'extraire des caractéristiques (features) des applications Android et d'entraîner, par des méthodes d'apprentissage automatiques des modèles capables de classer des applications en logiciel malveillant ou logiciel sain. L'approche est basée tant sur l'analyse statique que sur l'analyse dynamique. L'analyse statique consiste à utiliser des outils de rétro-ingénierie [4], sans jamais exécuter les applications. L'analyse dynamique [2] consiste à créer un environnement de test permettant d'exécuter de manière sécurisée les applications (voir la figure 1.2). Cette deuxième approche permet de révéler d'autres caractéristiques liées essentiellement au comportement de l'application. L'approche proposée a été testée et comparée à d'autres solutions. Les comparaisons faites montrent la pertinence et l'efficacité de l'approche. Cela a

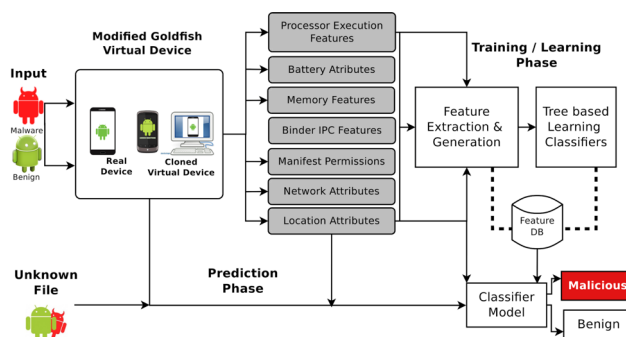


FIGURE 1.2 – Analyse dynamique des applications

donné lieu à une collaboration avec AST¹. L'organisme a financé des mois d'ingénieurs pour la maturation du logiciel. Actuellement, elle se charge de son transfert vers des partenaires industriels de l'écosystème aquitain.

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■ **Optional SageMath Package « slabbe » 2019, Version 0.6 (Sébastien Labbé).** <https://pypi.python.org/pypi/slabbe/>

<http://github.com/seblabbe/slabbe>

<https://www.labri.fr/perso/slabbe/docs/0.6/> License : GNU General Public License v2 or later (GPLv2+)

This is an optional package for SageMath containing modules on the following topics.

Discrete dynamical systems : diophantine approximation, Markov transformations, Wang tilings, Lyapunov exponents, matrix cocycles, multidimensional continued fraction algorithms, polyhedron exchange transformations,

1. Aquitaine Sciences Transfert

Combinatorics : 2d substitutions, bispecial factors, bond percolation, Dyck word in 3D, words, Joyal bijection, languages, Oldenburger sequence, ostrowski numeration, partial injections,
 Digital geometry : Christoffel graph, discrete subset, discrete plane, double square tiles, polyhedron partitions,
 Vizualization : tikzpicture

■ **pplpy 28/02/2019, Version 0.8.4 (Vincent Delecroix).** Python wrapper for the PPL library for rational Polyhedral computations

<https://gitlab.com/videlec/pplpy/> dépôt Gitlab

<https://pypi.org/project/pplpy/> dépôt pypi

License : GNU General Public License v3 (GPL)

■ **e-antic 17/06/2019, Version Version 0.1.3 (Vincent Delecroix).** <https://github.com/videlec/e-antic>

<https://www.labri.fr/perso/vdelecro/e-antic/>

License : GNU Lesser General Public License v3 (LGPL)

Description : C library and C++ wrapper for exact computations with embedded number fields

■ **Surface dynamics 28/07/2019, Version 0.4.3, 31/01/2020, Version 0.4.4 (Vincent Delecroix).** https://gitlab.com/videlec/surface_dynamics Dépôt Gitlab, <https://pypi.org/project/surface-dynamics/>

Dépôt Pypi. License : GNU General Public License v2 (GPL) Description : SageMath library for computations related to translation surfaces

1.5 Activités éditoriales

Les membres de l'équipe participent aux comités éditoriaux suivants

Tableau 1.1 : Activités d'édition

Rôle	Niveau	Nom de la revue	Période	Membre
Assoc. editor	Nat.	1024, revue de la Société Informatique de France	2015-	O. Baudon
Assoc. editor	Int.	Discrete Mathematics	2017-	M. Bonamy
Assoc. editor	Int.	Annals of Combinatorics	2019-	M. Bonamy
Editor	Int.	Annales Henri Lebesgue	2017-	M. Bousquet-Mélou
Editor	Int.	CRM Short Courses	2016-	M. Bousquet-Mélou
Editor	Int.	Electronic Journal of Combinatorics	2013-	M. Bousquet-Mélou
Editor	Int.	Annales IHP D : Combinatorics, Physics and their interactions	2013-	M. Bousquet-Mélou
Editor	Int.	Journal of Combinatorial Theory Ser. A	2008-	M. Bousquet-Mélou
Editor	Int.	Advances in Applied Mathematics	2008-	M. Bousquet-Mélou
Editor	Int.	Séminaire Lotharingien de Combinatoire	2008-	M. Bousquet-Mélou
Manag. Editor	Int.	Journal of Interconnection Networks	2017-	R. Klasing
Editor	Int.	Journal of Computer and System Sciences	2015-	R. Klasing
Editor	Int.	Computing and Informatics	2008-	R. Klasing
Editor	Int.	Networks	2007-	R. Klasing
Editor	Int.	Parallel Processing Letters	2007-	R. Klasing
Editor	Int.	Algorithmic Operations Research	2007-	R. Klasing
Editor	Int.	Journal of Interconnection Networks	2010-2017	R. Klasing

Editor	Int.	Wireless Networks	2010-	R. Klasing
Editor	Int.	Discrete Applied Mathematics	2010-	R. Klasing
Editor	Int.	Fundamenta Informaticae	2009-	R. Klasing
Editor	Int.	Theoretical Computer Science	2009-	R. Klasing
Assoc. editor	Int.	Annals of Applied Probability	2013-2019	JF Marckert
Editor	Int.	Discussiones Mathematicae Graph Theory	2013-	E. Sopena
Editor	Nat.	1024, bulletin de la Société informatique de France	2013-	E. Sopena
Editor in chief	Int.	Annals IHP D Combinatorics, Physics and their Interactions	2014-	A. Tanasa

Édition de numéro spécial

Tableau 1.2 : Édition de numéro spécial

Rôle	Nom du numéro spécial	Niveau	Année	Membre
Invited Editor	Algorithmica	Int.	2016	M. Bousquet-Mélou
Invited editor	Lecture Notes in Computer Science	Int.	2016	C. Gavoille, D. Ilcinkas
Invited Editor	Lecture Notes in Computer Science	Int.	2020	R. Klasing
Invited Editor	Lecture Notes in Computer Science	Int.	2017	R. Klasing, M. Zeitoun
Invited Editor	Lecture Notes in Computer Science	Int.	2017	R. Klasing

1.6 Activités d'évaluation

1.6.1 Evaluation d'articles

Les membres de CombAlgo évaluent un nombre considérable d'articles de journaux et de conférences, comme en témoigne pour commencer le grand nombre de participation des membres aux comités de programme des conférences, et aux activités éditoriales de journaux.

Parmi les revues pour lesquels les membres ont réalisé des évaluations, on trouve l'ensemble des revues couvrant les thèmes de la communauté internationale des thématiques de recherche de CombAlgo : JCTA et JCTB, Journal of the ACM, Discrete mathematics, Combinatorica, SIAM Journal on Computing, ACM Transactions on Algorithms, SIAM Journal on Discrete Mathematics, Distributed Computing, Theory of Computing Systems, Algorithmica, Annales de l'Institut Henri Poincaré D : Combinatorics, Physics and their Interactions, Electronic Journal of Combinatorics, Proceedings of the London Mathematical Society, Random Structures and Algorithms, et également des revues de mathématiques, notamment en probabilité (Annals of Mathematics, Annals of Applied Probability, Annals of Probability, Electronic Journal of Probability, ...)

Parmi les conférences, on trouve également de nombreuses évaluations, notamment dans STACS, ICALP, FPSAC, ESA, PODC, DISC, OPODIS, STOC, WORDS, SPAA, AofA, SODA, ANALCO, SOCG...

Steering committees

- DISC 2015-2019 (International Conference on Distributed Computing) Cyril Gavoille
- Bordeaux Graph Workshop, BGW 16 et 19 : thème graphes et optimisation
- Journées Combinatoires de Bordeaux 2015-2020 (Mireille Bousquet-Mélou & Yvan Le Borgne)

Chair Comité de programme

- DISC '16 International Symposium on Distributed Computing Cyril Gavoille
- ALGOSENSORS 2016 Int. Symposium on Algorithms and Experiments for Wireless Sensor Networks (Track on Distributed and Mobile Networks) Ralf Klasing
- 21st Fundamentals of Computation Theory (FCT 2017) Ralf Klasing - Marc Zeitoun
- 14th International Symposium on Pervasive Systems, Algorithms and Networks (I-SPAN 2017) Ralf Klasing
- DISC 2017, Workshop Computing in Dynamic Networks, Arnaud Casteigts
- IWOCA 2020, International Workshop on Combinatorial Algorithms (online), Ralf Klasing
- Winter school CALDAM Indo-French Pre-Conference School on Algorithms and Combinatorics, 2020, Eric Sopena

Participation à des comités de programme

Voici une liste de conférences internationales pour lesquelles, au moins un membre de l'équipe CombAlgo participait au comité de programme. En gras, les conférences A/A* pour Core :

- ADHOC-NOW 2015, 2016, 2017, 2018, 2019, 2020 , International Conference on Ad Hoc Networks and Wireless
- ALGOSENSORS 2020, International Symposium on Algorithms and Experiments for Wireless Sensor Networks
- ANALCO '17, Analytic Algorithmics and Combinatorics
- BGW 2016, 2019 ,Bordeaux Graph Workshop
- CALDAM 2020, International Conference on Algorithms and Discrete Applied Mathematics
- **DISC** 2015, 2016, International Symposium on DiStributed Computing
- **ESA** '18, Annual European Symposium on Algorithms
- EuroCG 2020, European Workshop on Computational Geometry
- EUROCOMB 2015, 2019, European Conference on Combinatorics, Graph Theory and Applications
- **FCT** '2017, '2019, Fundamentals of Computation Theory
- **FPSAC** '2015, '2016, International conferences on Formal Power Series and Algebraic Combinatorics
- FUN 2020, Fun with Algorithms
- **ICALP** '16 - Track A ICALP 2019, Track C International Colloquium on Automata, Languages and Programming
- ICDCN 2018, International Conference on Distributed Computing and Networking
- **ICPP** 2018, Algorithms track, International Conference on Parallel Processing
- **International Congress of Mathematicians** (Combinatorics session) 2018
- IPEC 2020 : 15th International Symposium on Parameterized and Exact Computation
- **IPDPS** 2017, International Parallel and Distributed Processing Symposium
- **ISAAC** 2018, International Symposium on Algorithms and Computation
- IWOCA 2015, 2016, 2017, 2018 , 2020 International Workshop on Combinatorial Algorithms
- JM 2018 Journées Montoises d'informatique théorique
- LAGOS 2019, Latin and American Algorithms, Graphs and Optimization Symposium
- **MFCS** 2019, International Symposium on Mathematical Foundations of Computer Science,

- OPODIS 2016, 2017, 2019, International Conference On Principles Of DIstributed Systems
- PIMRC 2020, International Symposium on Personal, Indoor and Mobile Radio Communications
- **PODC** 2019 Annual ACM Symposium on Principles of Distributed Computing
- Random Geometry and Quantum Gravity, Paris 2020
- Rouen Probability Meeting Stochastic geometry, Analysis of algorithms, Particle systems
- SEA 2018, 17th International Symposium on Experimental Algorithms
- SOFSEM 2018, 2019 Conference on Current Trends in Theory and Practice of Informatics
- SSS ' 18, International Symposium on Stabilization, Safety, and Security of Distributed Systems
- **STACS** '16 , STACS'17, Symposium on Theoretical Aspects of Computer Science
- WALCOM 2015,2018, 2020 , International Workshop on Algorithms and Computation
- WAOA 2018, Workshop on Approximation and Online Algorithms
- WISARN 2020 ,IEEE International Workshop on Wireless Sensor, Robot and UAV Networks
- WomENCourage 2018, ACM Celebration for Women in Computing

1.6.2 Participation à des jurys de thèse et de HDR

Nous avons recensé :

- 108 participations à des jurys de thèse,
 - . dont 37 fois en tant que rapporteur en France,
 - . dont 17 fois en tant que rapporteur pour des thèses à l'étranger (Tunisie, Maroc, Allemagne, Danemark, Suède, Royaume unis, Norvège, Inde, Espagne, Italie, Belgique, Suisse)
- et 13 participation à des jury d'HDR (dont 5 fois en tant que rapporteur, 2 fois président)

Participation à des comités de sélection

Nous avons recensé

- 19 participations à des comités pour des recrutements de MCF : 15 MdC à l'extérieur, 4 en local
- 12 participations à des comités pour des recrutements de professeurs : 10 à l'extérieur, 2 en local.

1.6.3 Examineur pour des jurys de recrutement/promotion de professeur ou assistant professeur à l'étranger :

- Ralf Klasing
 - . concours professeur, Wroclaw, Pologne, 2019,
 - . tenured associate professor (Rutgers University, U.S.A., 2017)
 - . Reviewer for W1 position, University of Hamburg, Germany, 2017
 - . Docentship, University of Turku, Finland, 2015
- Mireille Bousquet-Mélou
 - . tenure position, Brandeis University, Boston, 2016
 - . Review for professor position, University of Chalmers, Göteborg, 2018

1.6.4 Evaluation de projets étrangers :

- Évaluation d'une demande de financement, ETIS (agence Estonienne de la recherche), 2018, Philippe Duchon.
- NSERC (Canada) Sébastien Labbé, 2018.
- Member of the selection panel ST6 of the National Science Center Poland, Marthe Bonamy, 2019

- Expertise for the National Science Center Poland, Jean-Christophe Aval, 2017
- Grant Reviewer, Natural Sciences and Engineering Research Council of Canada (NSERC), 2015, Ralf Klasing
- Expertise d'une demande de financement pour le programme international STIC AmSud, 2019, Philippe Duchon.
- Expertise pour le Fondecyt du Chili, 2018, Marthe Bonamy,
- Expertise pour l'American University of Beirut, 2020, Marthe Bonamy,

1.6.5 Evaluation Nationale

- Participation à des évaluations de laboratoire HCERES :
 - Adrian Tanasa 2019, Laboratoire d'Informatique Gaspard-Monge UMR 8049
 - Philippe Duchon 2018 (Laboratoire d'Informatique de l'École Polytechnique, LIX),
 - Mireille Bousquet-Mélou, 2018, (Institut de mathématiques de Jussieu-Paris rive gauche)
- Yves Métivier, membre du Jury IUF Junior 2015, Senior 2016
- Cyril Gavaille, membre du Jury IUF Senior 2019 & 2020
- Cyril Gavaille, membre élu du Conseil Scientifique de l'Institut INS2I du CNRS, collège A2, 2014-2018.
- David Ilcinkas, membre élu et membre du bureau du Conseil Scientifique d'Institut de l'INS2I, 2018-2022.
- Membre du CNU 27 :
 - Colette Johnen, élue en 2020,
 - Alessia Milani et Arnaud Casteigts, nommés en 2020.
 - Nicolas Bonichon, 2012-2015.
 - Yves Métivier, 2012-2017.
- Mireille Bousquet-Mélou, Membre du comité national CNRS, section 41 (oct 2016 - oct 2021)
- Cyril Gavaille, Membre du Comité d'Evaluation Scientifique numéro 40 puis 48 de l'ANR (2018 & 2019).
- Cyril Gavaille, Membre du Comité d'Evaluation Scientifique de l'ANR de l'appel ASTRID sur les Technologies Quantiques.
- Expertise pour les projet Émergence, ville de Paris, 2020, Marthe Bonamy,

1.7 Contrats de recherche financés par des institutions publiques ou caritatives

Le tableau suivant rend compte de la plupart des contrats obtenus par l'équipe (en dehors des PhC, des contrats gérés sur d'autres sites, et d'autres « petits contrats »).

Tableau 1.3 : Contrats de l'équipe Combinatoire et Algorithmique, en k€

	2015	2016	2017	2018	2019	2020	Total
National	355	313	323	368	158	11	1528
Régional	0	0	27	46	0	0	73

Industrie	0	0	0	108	22	0	130
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Montant total des contrats pour l'équipe Combinatoire et Algorithmique : **1731 k€**.

Au niveau international, on note notamment que l'équipe, de 2011 à 2018, a créé et piloté un LIA en association avec des universités du Québec (le LIRCO, dirigé en local par J.-C. Aval puis M. Bousquet-Mélou). J.-F. Marckert a dirigé le GDRI (Europe) Alea Network (2013-2018), et est maintenant responsable adjoint de l'IRN Alea Network.

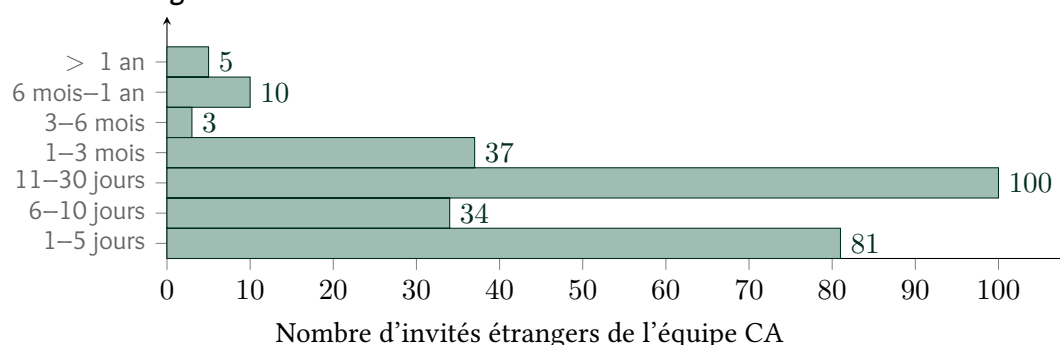
D'autres projets internationaux : mobilité France-Australie, dont PRC, projet bilatéral franco-indien (Cefipra, A. Zemhari), PHC avec la République tchèque, la Slovaquie, les Pays-Bas, projet multilatéral avec l'Amérique du Sud.

Tentatives infructueuses :

- Une ERC Consolidator a été déposée par Adrian Tanasa en 2017 sur la thématique des aspects combinatoires de la gravité quantique (qui a été jusqu'à la session d'oral),
- un projet COST impliquant des partenaires de 27 pays, globalement porté par JF. Marckert autour des 3 thématiques, combinatoire, théorie des probabilités et physique statistique (3 dépôts, sur les années 2018-2019, la 2ème version ayant obtenu la même note que certains projets retenus).

1.8 Post-doctorants et chercheurs accueillis

1.8.1 Chercheurs étrangers invités



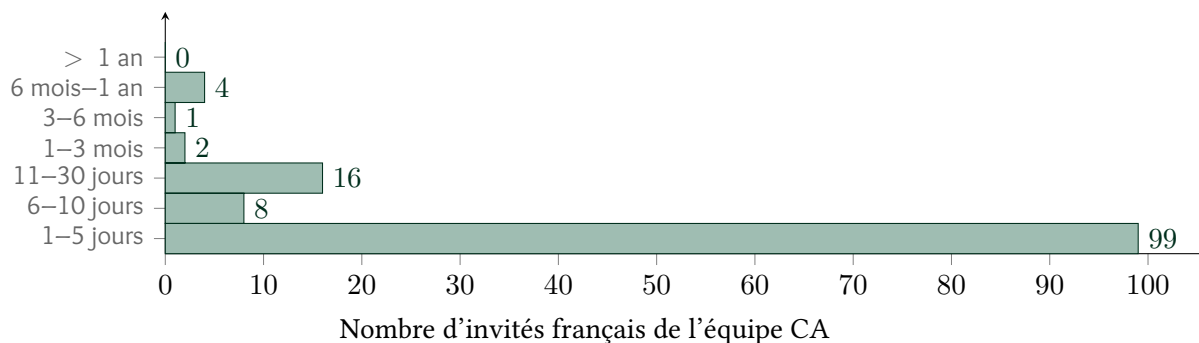
Les chercheurs ayant séjourné plus de 90 jours au sein de l'équipe CombAlgo sont listés dans le tableau 1.4.

Tableau 1.4 : Accueil chercheurs, équipe CA (international, ≥ 90 jours)

Invité	Institution	Pays	Annee	Durée	Invitant
MCLOUD-MANN J.	UNIVERSITY OF WASHINGTON BOTHELL	USA	2019	365	S. Labbé
MANN C.	UNIVERSITY OF WASHINGTON BOTHELL	USA	2019	365	S. Labbé
MCNAMARA P.	BUCKNELL UNIVERSITY	USA	2019	382	M. Bousquet-Mélou

WADE A. M.	ÉCOLE POLYTECHNIQUE DE THIÈS	SÉNÉGAL	2018	91	D. Ilcinkas
OUAHOU S.	UNIVERSITÉ MOHAMMED V	MAROC	2017	269	C. Johnen
VAHID DASTJERDI M.	ISFAHAN UNIVERSITY OF TECHNOLOGY (IUT)	IRAN	2019	186	E. Sopena
GONZALEZ A.	UNIVERSITY OF SEVILLE	ESPAGNE	2015	91	P. Dorbec
RODRIGUEZ CABALLERO J.M.	UNIVERSITÉ DU QUÉBEC À MONTRÉAL	CANADA	2017	272	S. Labbé
MISHNA M.	SIMON FRASER UNIVERSITY	CANADA	2018	300	M. Bousquet-Mélou
SEAMONE B.	DAWSON COLLEGE	CANADA	2019	180	E. Sopena
MISHNA M.	SIMON FRASER UNIVERSITY	CANADA	2019	351	M. Bousquet-Mélou
AFRA BRITO L.F.	FEDERAL UNIVERSITY OF UBERLÂNDIA	BRÉSIL	2020	334	Arnaud Casteigts
WALLNER M.	TU WIEN	AUTRICHE	2018	729	M. Bousquet-Mélou
ELVEY-PRICE A.	UNIVERSITÉ DE MELBOURNE	AUSTRALIE	2017	181	M. Bousquet-Mélou
ELVEY-PRICE A.	UNIVERSITÉ DE MELBOURNE	AUSTRALIE	2018	728	M. Bousquet-Mélou
LAÏCHE D.	UNIVERSITÉ ALGER 3	ALGÉRIE	2015	207	E. Sopena
BENMEDJDOUB B.	USTHB	ALGÉRIE	2015	207	E. Sopena
BENMEDJDOUB B.	USTHB	ALGÉRIE	2016	425	E. Sopena
LAÏCHE D.	UNIVERSITE ALGER 3	ALGÉRIE	2016	425	E. Sopena
BENMEDJDOUB B.	USTHB	ALGÉRIE	2018	128	E. Sopena

1.8.2 Chercheurs français invités



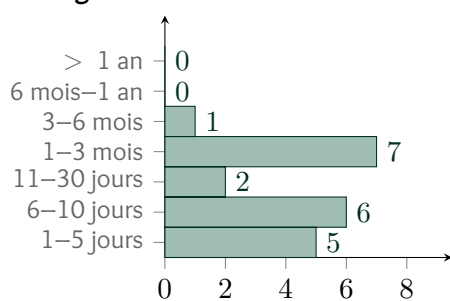
Le tableau 1.5 recense les visiteurs de longue durée accueillis par CombAlgo.

Tableau 1.5 : Accueil chercheurs, équipe CA (national, ≥ 90 jours)

Invité	Institution	Année	Durée	Invitant
FANG Wenjie	UNIVERSITÉ PARIS 7	2015	339	M. Bousquet-Mélou
ARRIVAULT Denis	UNIVERSITÉ AIX-MARSEILLE	2018	258	Arnaud Casteigts
FOUCAUD Florent	UNIVERSITÉ D'ORLÉANS	2019	365	E. Sopena
FREDES Luis	UNIVERSITÉ PARIS SACLAY	2020	351	Jean-François Marckert
DE ARAUJO Clément	EPITA	2020	137	Nicolas Hanusse, D. Ilcinkas

1.9 Indices de reconnaissance

1.9.1 Séjours dans des laboratoires étrangers



Nombre de séjours de membres l'équipe CA
dans des laboratoires étrangers

Membres de l'équipe de CombAlgo ayant été invités au moins 60 jours à l'international.

Tableau 1.6 : Séjours, équipe CA (international, ≥ 60 jours)

Institution	Pays	Année	Description	Durée	Membre
Institute of Mathematical Sciences, Chennai	India	2019	Professeur Invité Relax	75	Xavier Viennot
Institute of Mathematical Sciences, Chennai	India	2018	adjunct professor	75	Xavier Viennot
Institute of Mathematical Sciences, Chennai	India	2017	adjunct professor	75	Xavier Viennot
Simon Fraser University	Canada	2017	Invitation	60	Arnaud Casteigts

NYU–ECNU Institute of Mathematical Sciences at NYU Shanghai	China	2016	Professeur invité	121	Jean-François Marckert
Institute of Mathematical Sciences, Chennai	India	2016	adjunct professor	75	Xavier Viennot
International Indian Institute of Technology Madras	India	2015	Professeur invité	90	Xavier Viennot

1.9.2 Organisation de conférences

Les membres de l'équipe CombAlgo sont impliqués en tant qu'organisateur dans de nombreux événements internationaux et nationaux. Voici une liste des principaux événements organisés ; les deux premières de la liste, sont récurrentes, les autres, classées par année :

- Journées combinatoires de Bordeaux, chaque année depuis 10 ans (organisées ces 5 dernières années par Yvan Le Borgne et Mireille Bousquet-Mélou).
- les journées Bordeaux Graph Workshop (BGW), en 2016 et 2019 (organisées par le thème Graphes et Optimisation).
- Organisation des Journées du GDR Informatique mathématique, Bordeaux, février 2015 (Mireille Bousquet-Mélou, Jean-Christophe Aval et Marc Zeitoun). 160 participants
- ALGOTEL 2016 (resp. Organisation, Arnaud Casteigts).
- Organisation de FCT 2017 FCT 2017 était organisée pour la première fois en France (resp. Organisation, Arnaud Casteigts et Ralf Klasing, plusieurs autres membres de CombAlgo dans le comité d'organisation).
- Organisation d'un atelier "Lattice walks at the Interface of Algebra, Analysis and Combinatorics", BIRS, Banff, Canada, septembre 2017 (Mireille Bousquet-Mélou avec Marni Mishna, Steve Melczer, Michael Singer)
- Programme thématique « Algorithmic and Enumerative Combinatorics », 2017, à Vienne (Autriche), coorganisé par Mireille Bousquet-Mélou
- École de printemps en Informatique Théorique (EPIT 2017), organisée par Alessia Milani et David Ilcinkas
- Enumerative Combinatorics (Oberwolfach), 2018, coorganisé par Mireille Bousquet-Mélou
- 17th Mons Theoretical Computer Science Days, 2018, organisé par Sébastien Labbé et Vincent Delecroix.
- Workshop en l'honneur d'Yves Métivier, pour ses 61 ans, (2018). Organisée par Arnaud Casteigts, Akka Zemmar et, par des membres extérieurs au LaBRI (J. Chalopin et E. Godard).
- 31st International Workshop on Combinatorial Algorithms (IWCA 2020) , Resp.Organisation Florent Foucaud et Ralf Klasing, les organisateurs sont membres de CombAlgo).
- Conference Random geometry and quantum gravity (IHP Paris, 2020), coorganisé par Adrian Tanasa.
- L'école Jeunes Chercheuses et Chercheurs en Informatique Mathématique (EJCIM) organisée en 2020, puis annulée, puis tenue en distanciel en juin 2020. Il s'agit de l'un des rendez-vous annuel depuis 18 ans du GDR IM (resp. organisation, Sébastien Labbé).

Bien sûr, de nombreux autres conférences et workshops plus confidentiels ont été organisés, dans le cadre

d'animation d'ANR notamment.

1.9.3 Récompenses et prix

- Mireille Bousquet-Mélou a été élue à l'académie des sciences en 2019. Par ailleurs le CRM (Centre de recherches en maths, Montréal) l'a gratifiée d'une **chaire Aisenstadt** pour un séjour en 2018, dans le cadre des fêtes de son 50e anniversaire. Elle a reçu le prix Gavin Brown décerné par la société australienne de mathématiques (2018). Enfin, elle a été invitée en tant que "Distinguished speaker" de l'European Mathematical Society, à la rencontre FOCM (Foundations of Computational Mathematics) à Barcelone en 2017. Un interview de quatre pages, parue dans la Newsletter de l'EMS, et disponible sur le site ci-dessus.
- Best paper award, Remis à la conférence IEEE Symposium on Large Data Analysis and Visualization (LDAV 2015) pour l'article *Large Interactive Visualization of Density Functions on Big Data Infrastructure* (Alexandre Perrot, Romain Bourqui, Nicolas Hanusse, Frédéric Lalanne, David Auber)
- Best paper award, ALGOTEL 2019, Arnaud Casteigts, Joseph Petes et Jason Schoeters (Trouver des spanners peu denses dans les cliques temporelles)
- Best paper award à la conférence 4th EAI International Conference on Innovations pour l'article [1], *On the Treewidth of Planar Minor Free Graphs* (Cyril Gavoille et Youssou Dieng).
- Wenjie Fang, dirigé par Mireille Bousquet-Mélou et Guillaume Chapuy (IRIF), a eu un accessit au prix de thèse Gilles Kahn en 2017.
- Prix de thèse de l'université de Bordeaux (Prix spécial du jury international) décerné à Dominik Pajak (déc. 2015), dirigé par Ralf Klasing et Adrian Kosowski

Bibliographie

- [1] Youssou DIENG and **Cyril GAVOILLE**. "On the Treewidth of Planar Minor Free Graphs." In: *4th EAI International Conference on Innovations and Interdisciplinary Solutions for Underserved Areas (InterSol)*. Ed. by Jessica P.r. THORN, Assane GUEYE, and Adam P. HEJNOWICZ. Vol. 321. Lecture Notes of the Institute for Computer Sciences, Social Informatics and Telecommunications Engineering. Nairobi, Kenya: Springer, Cham, Mar. 2020, pp. 238–250. DOI: 10.1007/978-3-030-51051-0_17.

1.9.4 Participation à des jurys de prix

Les membres de l'équipe ont participé aux jurys suivants

Tableau 1.7 : Participation à des jurys de prix, équipe CA

Rôle	Description	Période	Membre
Membre	Flajolet lecture Prize	2018	Mireille Bousquet-Mélou
Chair	Best paper award committee de la conference CIAC 2017	2017	Ralf Klasing
Membre	Dissertation Award in Distributed Computing	2017	Cyril Gavoille
Chair	Dijkstra Prize	2016	Cyril Gavoille
Membre	Prix Charles Delorme	2019	Marthe Bonamy

Membre	Prix SMF Junior	2017	Jean-François Marckert
Membre	Prix Charles Delorme	2016	André Raspaud

Appartenance à l'IUF

- Nomination IUF Junior 2015 (Adrian Tanasa)

Invitation à des conférences

On note 2 invitations de M ; Bousquet-Mélou comme “Keynote speaker” aux conférences *Foundations of computational mathematics*, 2017, Barcelone et au *ANZAMP meeting (Australian and New Zealand Association of Mathematical Physics)*, 2015, Newcastle, Australie.

Les autres invitations comme “invited talk” à des conférences que nous avons recensées sont données dans le tableau suivant :

Tableau 1.8 : Conférences internationales

Nom de la conférence	Année	Lieu	Membre
23rd International Symposium on Mathematical Programming (ISMP 2018)	2018	Bordeaux	R. Klasing
ICALP 2018 workshop on Algorithmic Aspects of Temporal Graphs	2018	Prague	R. Klasing
Analysis of Algorithms (AofA)	2020	Klagenfurt, Autriche (annulé Covid)	M. Bousquet-Mélou
Random geometry and quantum gravity : Latest developments in 2D	2020	Paris (annulé Covid)	M. Bousquet-Mélou
Walking through the Brownian zoo, Conférence en l'honneur de Jean-François Le Gall	2019	Paris	M. Bousquet-Mélou
Séminaire lotharingien de combinatoire, édition spéciale pour les 60 ans de Christian Krattenthaler	2018	Strobl, Autriche	M. Bousquet-Mélou
Algèbre et combinatoire au LaCIM	2018	Montréal	M. Bousquet-Mélou
Algebra, Arithmetic and Combinatorics of Differential and Difference Equations	2018	Marseille	M. Bousquet-Mélou
Tutte centenary	2017	Cambridge, GB	M. Bousquet-Mélou
Foundations of computational mathematics	2017	Barcelone	M. Bousquet-Mélou
Séminaire lotharingien de combinatoire, édition spéciale pour les 60 ans de Jean-Yves Thibon	2017	Obernai, France	M. Bousquet-Mélou
Random Trees and Maps : Probabilistic and Combinatorial Aspects	2016	Marseille	M. Bousquet-Mélou
Conference dedicated to the scientific legacy of Marcel Paul Schützenberger	2015	Bordeaux	M. Bousquet-Mélou
Conference in honour of Tony Guttmann's 70th birthday	2015	Newcastle, Australie	M. Bousquet-Mélou
ANZAMP meeting (Australian and New Zealand Association of Mathematical Physics)	2015	Newcastle, Australia	M. Bousquet-Mélou
Journées Itzykson	2015	Saclay	M. Bousquet-Mélou

Approximation and Combinatorics	2015	Marseille	M. Bousquet-Mélou
Functional equations and special functions : From combinatorics to model theory	2015	Grenoble	M. Bousquet-Mélou
International Conference on Graph Theory, Combinatorics and Applications	2019	Kaohsiung, Taiwan	A. Pêcher
The beauty of discrete mathematics	2017	Montreal, Canada	A. Pêcher
International Conference on Graph Theory, Combinatorics and Applications	2016	Jinhua, China	A. Pêcher
International Conference on Graph Theory and its Applications	2015	Coimbatore, India	A. Pêcher
Statistical mechanics, g-measures and PCA's	2019	Créteil	JF Marckert
Rencontre de Géométrie Stochastique	2018	Lille	JF Marckert
Colourings, Independence and Domination, 18th workshop on Graph Theory, CID'19	2019	Piechowice, Poland	E. Sopena
6th Polish Combinatorial Conference	2016	Będlewo, Poland	E. Sopena
24th Workshop on Cycles and Colourings	2015	Nový Smokovec, High Tatras, Slovakia	E. Sopena
Discrete Math Days and Ontario Combinatorics Workshop	2015	Ottawa, Canada	E. Sopena
Searching and Routing in Discrete and Continuous Domains	2015	Oaxaca, Mexique	C. Gavoille
Complexity, Algorithms, Automata and Logic Meet (CAALM)	2019	Chennai, Inde	C. Gavoille
9th Slovenian International conference on graph theory	2019	Bled, Slovenia	C. Gavoille
Indo-French Conference on Algebraic Geometry, Dynamical Systems, Mathematical Physics and Number Theory	2016	Chennai, Inde	X.Viennot
K.Madhava Sarma Memorial Distinguished Lecture	2016	Chennai, Inde	X. Viennot
S.S.Pilai Endowment Lecture	2016	Chennai, Inde	X. Viennot
Twenty Second Srinivasa Rajan Memorial Lecture	2017	Chennai, Inde	X. Viennot
21st Ramanujan Symposium: National Conference on algebra and its application	2018	Chennai, Inde	X. Viennot
81th SLC (Séminaire Lotharingien de Combinatoire) en l'honneur de C. Krattenthaler	2018	Strobl, Autriche	X. Viennot
International Conference on Graph Theory and Applications (ICGTA)	2019	Coimbatore, Inde	X. Viennot
16th International Colloquium on Theoretical Aspects of Computing (ICTAC)	2019	Hammamet, Tunisia	A. Zemmari
10th ACM International Conference On Security Of Information And Networks (ACM SIN)	2017	Jaipur, Inde	A. Zemmari
Ecole Jeunes Chercheurs Smart Cities	2017	Bizerte, Tunisia	A. Zemmari
Algèbre et combinatoire au LaCIM	2018	Montréal, Canada	S. Labbé
Model Sets and Aperiodic Order	2018	Durham University, GB	S. Labbé
Shigeki Akiyama's Jean-Morlet chair, Tiling and Recurrence	2017	Marseille	S. Labbé
Workshop on substitutions and tiling spaces	2017	University of Vienna	S. Labbé
School on Combinatorics on Words and Tilings	2017	CRM Montréal, Canada	S. Labbé
Informal Workshop on Aperiodic Order	2018	Bielefeld University	S. Labbé
Algorithmic Aspects of Temporal Graphs I (@ICALP)	2018	Prague	A. Casteigts
Algorithmic Aspects of Temporal Graphs II (@ICALP)	2019	Patras, Grèce	A. Casteigts
Algorithmic Aspects of Temporal Graphs III (@ICALP)	2020	Sarrebruck, Allemagne	A. Casteigts
Distributed Algorithms in Dynamic Networks (@DISC)	2019	Budapest	A. Casteigts
Workshop on Graph Theory and Combinatorics in Thuringia	2020	online	M.Bonamy

Cycles and Colourings 2019	2019	Novy Smokovec	M.Bonamy
DIMEA Days 2019	2020	Brno	M.Bonamy
CanaDAM 2019	2019	Vancouver	M.Bonamy
8th Cracow Conference on Graph Theory	2018	Rytro	M.Bonamy
2nd Scottish Combinatorics Meeting	2016	Glasgow	M.Bonamy

Tableau 1.9 : Conférences nationales

Rôle	Nom de la conférence	Année	Lieu	Membre
Invited Talk	Workshop Complexité et algorithmes (CoA 2019)	2019	Roscoff	R. Klasing
Invited Talk	4èmes journées GT CoA	2015	Bordeaux	R. Klasing
Invited talk	Équations fonctionnelles et interactions	2019	Anglet	M. Bousquet-Mélou
Invited talk	Deuxième rencontre ANT (Automata and number theory)	2017	Porquerolles	M. Bousquet-Mélou
Invited talk	Marches aléatoires à grands pas dans des cônes	2016	Tours	M. Bousquet-Mélou
Invited talk	Journées de combinatoire de Lyon	2016	Lyon	M. Bousquet-Mélou
Invited talk	Marches aléatoires et processus de Dunkl : approches combinatoires et algébriques	2016	Nouan-le-Fuzelier	M. Bousquet-Mélou
Invited talk	Workshop Complexité et algorithmes (CoA 2019)	2019	Roscoff	C. Travers
Invited talk	44e École de Printemps en Informatique Théorique (EPIT) - calcul distribué	2017	Porquerolles	C. Gavoille
Invited talk	Journées Combinatoire Rhône-Alpes, Auvergne, Littoral Méditerranéen et Atlantique (JCRAALMA)	2020	Distanciel	C. Gavoille
Invited talk	RESCOM summer school	2019	Anglet	A. Casteigts
Invited talk	Journées Charles Hermite	2019	Nancy	A. Casteigts
Invited talk	École Jeunes Chercheurs Informatique Mathématiques	2020	Bordeaux, online	M.Bonamy
Invited talk	Quelles directions de recherche pour l'algorithmique en France ?	2019	Paris	M.Bonamy
Invited talk	20èmes Journées Graphes et Algorithmes	2018	Grenoble	M.Bonamy

Responsabilité dans des sociétés savantes

- Mireille Bousquet-Mélou, membre de l'académie des sciences
- SIF : Olivier Baudon, Secrétaire (jusqu'en fév. 2020); C. Gavoille, membre du Conseil Scientifique.

2 Interaction de l'équipe avec l'environnement non académique

Impacts sur l'économie, la société, la culture, la santé

2.1 Brevets, licences et déclarations d'invention

2.1.1 Brevets

L'équipe Combinatoire et Algorithmique n'a pas de membre ayant déposé un brevet.

2.2 Interactions avec les acteurs socio-économiques

- Thèse CIFRE : Nadia Chaabouni (2017 - juillet 2020), encadrée par Mohamed Mosbah et Akka Zemmari. Sujet : Détection et prévention des intrusions pour les systèmes IoT en utilisant des techniques d'apprentissage. Entreprise : AtoS

2.2.1 Création de start-up

L'équipe Combinatoire et Algorithmique n'a pas de membre ayant participé à la création d'une start-up.

3 Implication de l'équipe dans la formation par la recherche

La formation par la recherche de l'équipe CombAlgo prend des formes multiples, et s'adresse à différents types de publics.

Participation aux formations de Master

Le master Informatique de l'UF, comme tous les Master en France, ne fait plus de distinction entre les différents parcours (professionnels et recherche). Il existe cependant un parcours « Algorithmique et modèles » dans lequel la plupart des UE est orientée recherche. Les enseignements assurés par les membres de l'équipe sont les suivants :

- Cyril Gavaille resp. de 2 UE en M2 intitulées « Algorithmique Distribuée » (3 ECTS) et « Algorithmique Appliquée » (3 ECTS),
- Adrian Tanasa responsable d'une UE « Introduction à l'informatique quantique » (3ECTS)),
- Arnaud Casteigts, *Algorithmique de la Mobilité*, dans le M2 parcours RCI (6 ECTS), également dispensé en M1 Enseirb (version réduite à 26h),
- Nicolas Bonichon, responsable de l'UE « Séminaire »,

Par ailleurs, Olivier Baudon, est correspondant pour l'UF Informatique du Coursus Master Ingénierie (CMI) Optimisation mathématique et Algorithmes (CMI Optim) porté par les UF Mathématiques et Interactions et UF Informatique (également responsable de la 3ème année).

Chaque année, en moyenne 4 ou 5 étudiants font leur stage de M2 supervisés par un membre de CombAlgo.

D'autres stagiaires de tout niveau, 3ème, L2, L3 (dont des étudiants des ENS), M2 (dont ENS), rejoignent régulièrement l'équipe. D'ailleurs, l'accueil des étudiants des ENS (avec visite et rencontre avec des chercheurs et enseignant chercheur) est coorganisée par Marthe Bonamy.

Le lancement de la « Graduate Research Program in Digital Sciences *NUMERICS* » en 2021 est le fruit d'un travail intense et de longue haleine des porteurs Nicolas Hanusse, CombAlgo, et Laurent Simon, MF. Organisant

« la graduate school » autour des thématiques numériques, elle est une opportunité pour le LaBRI et ses partenaires de renforcer et développer l'attractivité de ses doctorats et formations, à l'international également. CombAlgo, à un positionnement singulier au laboratoire lui permettant de jouer un rôle dans ces parcours : plusieurs spécialités à l'interface des mathématiques et l'informatique, des résultats allant de la recherche amont à de l'algorithmique appliquée, une importante animation scientifique.

Organisation d'écoles thématiques

L'équipe CombAlgo lance régulièrement des nouveaux GT et petites écoles ; chacune d'elle commence toujours par quelques GT d'introduction à la discipline concernée.

- La **petite école de combinatoire** (en moyenne 1 fois par an, 6 leçons) est adossée au groupe de travail de combinatoire ; elle se présente selon les années comme une série de « cours » sur un sujet précis donnés par un membre de l'équipe à l'ensemble du groupe de travail, ou comme un groupe de lecture plus collaboratif. Le but est de présenter une introduction à un sujet d'intérêt pour les membres du groupe, avec l'objectif de partir d'un niveau accessible à un étudiant de Master.
- **Informatique quantique** : Le GT a été dévolu principalement à l'exposé didactique des fondements théoriques de l'informatique quantique : qubits, portes logiques, algorithmes historiques et initiation aux codes correcteurs quantiques. Quelques éléments de physique quantique ont également été apportés aux participants
- **GT Deep Learning** : il s'agissait de montrer les principes d'apprentissages, leur fondements mathématiques, et aller jusqu'à apprendre l'utilisation des solutions logicielles.
- Le **groupe de travail sur Coq** a pour objectif l'apprentissage de l'assistant de preuves Coq pour des utilisateurs novices. La plupart des participants réguliers sont des membres permanents de CombAlgo ou de Méthodes Formelles, mais on compte également quelques doctorants.
- **Masse de données** (2017-2019) avait pour but de présenter les problématiques propres à ce domaine de manière assez vulgarisée de manière que tous puissent suivre (animé par Nicolas Hanusse (CombAlgo)) ;
- Le **GT IA** (co-organisé avec MF depuis 2019), hérite à la fois du GT Deep Learning et Masse de données ; il a pour but de renforcer la thématique IA au sein du laboratoire, en fédérant les membres du laboratoire ayant une activité dans ce domaine, ou qui sont utilisateurs ou curieux.

Leçons de mathématiques et d'informatique d'aujourd'hui

(Séminaire de l'école doctorale informatique-mathématiques). Il s'agit d'une initiative commune IMB-LaBRI (existante depuis 1993), portée ces dernières années, au LaBRI, par un membre de CombAlgo, Adrian Tanasa. Ces leçons sont données par des grands noms de l'informatique théorique et des mathématiques, et sont destinées à un public large, dans un style accessible. Elles permettent aux doctorants notamment, au cours de leur parcours au LaBRI, de faire connaissance avec les grands thèmes de recherche actuel. Les Leçons sont enregistrées puis rédigées par des doctorants d'après cet enregistrement. Elles sont publiées depuis 2000 par les Éditions Cassini (Paris).

IREM

Plusieurs activités notables à l'IREM de Bordeaux (Unité de formation de mathématiques et interactions).

Hervé Hocquard est directeur adjoint, Olivier Baudon est responsable du groupe « Informatique », Eric Sopena du groupe « Algorithmique et programmation Lycée », Hervé Hocquard « Algorithmique Collège et Robotique ».

Introduction à la recherche

D'autres initiatives des membres de CombAlgo visent à faire découvrir la recherche à des élèves du primaire et secondaire :

– *Maths à modeler* (H. Hocquard, responsable pour l'Aquitaine, depuis 2016), dont l'objectif est de faire découvrir la recherche en informatique fondamentale et en mathématiques à des scolaires en les confrontant à de véritables questions de recherche adaptés à leurs compétences (du primaire au lycée). Maths à modeler participe par ailleurs à l'animation de certains événements nationaux (80 ans du CNRS, Fête de la science, semaine des maths)...

– *Ateliers Maths en Jeans* (O. Guibert, Y. Le Borgne, E. Sopena) : Un chercheur présente à des élèves motivés par un club de maths/informatique des sujets de recherche accessibles. Ils les étudient tout au long de l'année (environ une heure par semaine) librement ou guidés par leur professeur ou le chercheur à l'occasion de ses quelques visites. En fin d'année, les élèves présentent leurs résultats sous la forme d'un exposé et d'un atelier lors d'un congrès national rassemblant des centaines de participants. L'école doctorale a incité quelques doctorants, ces dernières années en moyenne 3 par an du LaBRI, à assumer le rôle de chercheur dans ces ateliers.

– *Conférences dans des lycées*, notamment de N. Bonichon, S. Labbé, transversales à MaM et MeJ.

3.1 Produits des activités pédagogiques et didactiques

Ouvrages pédagogiques

- [1] **Cyril GAVOILLE**. « Algorithmique Distribuée ». Notes de cours. 2020. URL : <http://dept-info.labri.fr/~gavoille/UE-AD/cours.pdf>.
- [2] **Cyril GAVOILLE**. « Analyse d'Algorithme – Cours d'introduction à la complexité paramétrique et aux algorithmes d'approximation ». Notes de cours. 2020. URL : <http://dept-info.labri.fr/~gavoille/UE-AA/cours.pdf>.
- [3] **Cyril GAVOILLE**. « Techniques Algorithmiques et Programmation ». Notes de cours. 2020. URL : <http://dept-info.labri.fr/~gavoille/UE-TAP/cours.pdf>.
- [4] **Sébastien LABBÉ**. « Logiciels mathématiques ». Notes de cours. 2017. URL : <http://www.slabbe.org/Enseignements/MATH2010/notesdecours/>.
- [5] **Jean-François MARCKERT**. « Processus stochastiques - Miage-2018-2019 ». Notes de cours. 2020. URL : <https://www.labri.fr/perso/marckert/Miage.pdf>.

3.2 Productions scientifiques (articles, ouvrages, etc.) issues des thèses

Dans ce rapport, dans les listes de publications, nous avons souligné les noms des docteurs ou doctorants pour chacune de leur contributions, articles ou ouvrage. En terme de quantité, les thésards sont contributeurs de :

- 25 / 166 articles de conférence soit 15%,
- 24 / 229 articles de journaux soit 10%.

3.2.1 Thèses et HDR

- 21 soutenances de thèse pendant la période [2015-2020] : Matthieu Barjon, Thomas Bellito, Shweta Bhandari, Claire Capdevielle, Jérôme Casse, Nadia Chaabouni, Henri Derycke, Christopher Duffy, Romaric Duvignau, Wenjie Fang, Luis Fredes, Ghazal Kachigar, Patxi Laborde Zubieta, Le van Linh, Philippe Moustrou, Yessin Neggaz, Nesrine Ouled Abdallah, Romain Pascalie, Claire Pennarun, Théo Pierron, Mohamed Senhaji.

- 3 soutenances HDR pendant la période [2015-2020] : Arnaud Casteigts, Alessia Milani, David Ilcinkas.

2

Image et Son

1 Production de connaissances et activités concourant au rayonnement et à l’attractivité scientifique

1.1 Revues

L’équipe Image et Son a publié 179 articles en revue.

Revue de l’équipe Image et Son		
	Q1	Autres
Nombre	121	58
Pourcentage	68%	32%

Revue, top 20%

- [IS*-J1] Olfa Ben AHMED, Jenny BENOIS-PINEAU, Michèle ALLARD, Gwénaëlle CATHELINE, and Chokri Ben AMAR. “Recognition of Alzheimer’s disease and Mild Cognitive Impairment with multimodal image-derived biomarkers and Multiple Kernel Learning.” In: *Neurocomputing* 220 (2017), pp. 98–110. doi: 10.1016/j.neucom.2016.08.041.
- [IS*-J2] Hichem BARKI, Gaël GUENNEBAUD, and Sebti FOUFOU. “Exact, robust, and efficient regularized Booleans on general 3D meshes.” In: *Comput. Math. Appl.* 70.6 (2015), pp. 1235–1254. doi: 10.1016/j.camwa.2015.06.016.
- [IS*-J3] Pascal BARLA, Romain PACANOWSKI, and Peter VANGORP. “A Composite BRDF Model for Hazy Gloss.” In: *Comput. Graph. Forum* 37.4 (2018), pp. 55–66. doi: 10.1111/cgf.13475.

- [IS*-J4] [Yann BAYLE](#), [Matthias ROBINE](#), and [Pierre HANNA](#). “SATIN: a persistent musical database for music information retrieval and a supporting deep learning experiment on song instrumental classification.” In: *Multim. Tools Appl.* 78.3 (2019), pp. 2703–2718. DOI: 10.1007/s11042-018-5797-8.
- [IS*-J5] Laurent BELCOUR and [Pascal BARLA](#). “A practical extension to microfacet theory for the modeling of varying iridescence.” In: *ACM Trans. Graph.* 36.4 (2017), 65:1–65:14. DOI: 10.1145/3072959.3073620.
- [IS*-J6] [Olfa BEN Ahmed](#), Maxim M. MIZOTIN, [Jenny BENOIS-PINEAU](#), Michèle ALLARD, Gwénaëlle CATHELIN, and Chokri Ben AMAR. “Alzheimer’s disease diagnosis on structural MR images using circular harmonic functions descriptors on hippocampus and posterior cingulate cortex.” In: *Comput. Medical Imaging Graph.* 44 (2015), pp. 13–25. DOI: 10.1016/j.compmedimag.2015.04.007.
- [IS*-J7] [Pierre BIASUTTI](#), Jean-François AUJOL, Mathieu BRÉDIF, and [Aurélien BUGEAU](#). “Diffusion and inpainting of reflectance and height LiDAR orthoimages.” In: *Comput. Vis. Image Underst.* 179 (2019), pp. 31–40. DOI: 10.1016/j.cviu.2018.10.011.
- [IS*-J8] [Anke BROCK](#), Philippe TRUILLET, Bernard ORIOLA, Delphine PICARD, and Christophe JOUFFRAIS. “Interactivity Improves Usability of Geographic Maps for Visually Impaired People.” In: *Hum. Comput. Interact.* 30.2 (2015), pp. 156–194. DOI: 10.1080/07370024.2014.924412.
- [IS*-J9] [Vincent BUSO](#), [Jenny BENOIS-PINEAU](#), and [Jean-Philippe DOMENGER](#). “Geometrical cues in visual saliency models for active object recognition in egocentric videos.” In: *Multim. Tools Appl.* 74.22 (2015), pp. 10077–10095. DOI: 10.1007/s11042-015-2803-2.
- [IS*-J10] [Pierrick COUPÉ](#), Gwénaëlle CATHELIN, Enrique LANUZA, and José Vicente MANJÓN. “Towards a unified analysis of brain maturation and aging across the entire lifespan: A MRI analysis.” In: *Human Brain Mapping* (July 2017). URL: <https://hal.archives-ouvertes.fr/hal-01563131>.
- [IS*-J11] Thomas CRESPEL, [Patrick REUTER](#), Adrian TRAVIS, Yves GENTET, and Xavier GRANIER. “Autostereoscopic transparent display using a wedge light guide and a holographic optical element: implementation and results.” In: *Applied optics* 58.34 (Nov. 2019). DOI: 10.1364/AO.58.00G293.
- [IS*-J12] Alberto CRIVELLARO, Mahdi RAD, Yannick VERDIE, Kwang Moo YI, Pascal FUA, and [Vincent LEPETIT](#). “Robust 3D Object Tracking from Monocular Images Using Stable Parts.” In: *IEEE Trans. Pattern Anal. Mach. Intell.* 40.6 (2018), pp. 1465–1479. DOI: 10.1109/TPAMI.2017.2708711.
- [IS*-J13] Dicle N DÖVENCIOGLU, Ohad BEN-SHAHAR, [Pascal BARLA](#), and Katja DOERSCHNER. “Specular motion and 3D shape estimation.” In: *Journal of Vision* 17.3 (June 2017). DOI: 10.1167/17.6.3.
- [IS*-J14] Marek DVOROZNÁK, [Pierre BÉNARD](#), [Pascal BARLA](#), Oliver WANG, and Daniel SÝKORA. “Example-based expressive animation of 2D rigid bodies.” In: *ACM Trans. Graph.* 36.4 (2017), 127:1–127:10. DOI: 10.1145/3072959.3073611.
- [IS*-J15] [Rémi GIRAUD](#), Vinh-Thong TA, [Aurélien BUGEAU](#), [Pierrick COUPÉ](#), and Nicolas PAPADAKIS. “Super-PatchMatch: An Algorithm for Robust Correspondences Using Superpixel Patches.” In: *IEEE Trans. Image Process.* 26.8 (2017), pp. 4068–4078. DOI: 10.1109/TIP.2017.2708504.
- [IS*-J16] Iván GONZÁLEZ-DÍAZ, [Jenny BENOIS-PINEAU](#), [Jean-Philippe DOMENGER](#), Daniel CATTART, and Aymar de RUGY. “Perceptually-guided deep neural networks for ego-action prediction: Object grasping.” In: *Pattern Recognit.* 88 (2019), pp. 223–235. DOI: 10.1016/j.patcog.2018.11.013.
- [IS*-J17] [Florent GRELARD](#), Fabien BALDACCI, Anne VIALARD, and [Jean-Philippe DOMENGER](#). “New methods for the geometrical analysis of tubular organs.” In: *Medical Image Anal.* 42 (2017), pp. 89–101. DOI: 10.1016/j.media.2017.07.008.

- [IS*-J18] Kilian HETT, Vinh-Thong TA, José V. MANJÓN, Pierrick COUPÉ, and Alzheimer's Disease Neuroimaging INITIATIVE. "Adaptive fusion of texture-based grading for Alzheimer's disease classification." In: *Comput. Medical Imaging Graph.* 70 (2018), pp. 8–16. DOI: 10.1016/j.compmedimag.2018.08.002.
- [IS*-J19] Jacek JANKOWSKI and Martin HACHET. "Advances in Interaction with 3D Environments." In: *Comput. Graph. Forum* 34.1 (2015), pp. 152–190. DOI: 10.1111/cgf.12466.
- [IS*-J20] Samuel ST-JEAN, Pierrick COUPÉ, and Maxime DESCOTEAUX. "Non Local Spatial and Angular Matching: Enabling higher spatial resolution diffusion MRI datasets through adaptive denoising." In: *Medical Image Anal.* 32 (2016), pp. 115–130. DOI: 10.1016/j.media.2016.02.010.
- [IS*-J21] Isinsu KATIRCIOGLU, Bugra TEKIN, Mathieu SALZMANN, Vincent LEPETIT, and Pascal FUA. "Learning Latent Representations of 3D Human Pose with Deep Neural Networks." In: *Int. J. Comput. Vis.* 126.12 (2018), pp. 1326–1341. DOI: 10.1007/s11263-018-1066-6.
- [IS*-J22] Thibaut LAMBERT, Pierre BÉNARD, and Gaël GUENNEBAUD. "Multi-Resolution Meshes for Feature-Aware Hardware Tessellation." In: *Comput. Graph. Forum* 35.2 (2016), pp. 253–262. DOI: 10.1111/cgf.12828.
- [IS*-J23] Fabien LOTTE, Jonathan BRUMBERG, Peter BRUNNER, Aysegul GUNDUZ, Anthony L. RITACCIO, Cuntai GUAN, and Gerwin SCHALK. "Electrocorticographic Representations of Segmental Features in Continuous Speech." In: *Frontiers in Human Neuroscience* 9.97 (Feb. 2015), p. 27. DOI: 10.3389/fnhum.2015.00097.
- [IS*-J24] Fabien LOTTE, Camille JEUNET, Ricardo CHAVARRIAGA, Laurent BOUGRAIN, Dave THOMPSON, Reinhold SCHERER, M.D. Rakibul MOWLA, Andrea KÜBLER, Moritz GROSSE-WENTRUP, Karen DIJKSTRA, and Natalie DAYAN. "Turning negative into positives! Exploiting "negative" results in Brain-Machine Interface (BMI) research." In: *Brain-Computer Interfaces* (2019). URL: <https://hal.inria.fr/hal-02375400>.
- [IS*-J25] José V. MANJÓN and Pierrick COUPÉ. "volBrain: An Online MRI Brain Volumetry System." In: *Frontiers Neuroinformatics* 10 (2016), p. 30. DOI: 10.3389/fninf.2016.00030.
- [IS*-J26] José V. MANJÓN, Pierrick COUPÉ, and Antonio BUADES. "MRI noise estimation and denoising using non-local PCA." In: *Medical Image Anal.* 22.1 (2015), pp. 35–47. DOI: 10.1016/j.media.2015.01.004.
- [IS*-J27] José V. MANJÓN, Pierrick COUPÉ, Parnesh RANIGA, Ying XIA, Patricia M. DESMOND, Jurgen FRIPP, and Olivier SALVADO. "MRI white matter lesion segmentation using an ensemble of neural networks and overcomplete patch-based voting." In: *Comput. Medical Imaging Graph.* 69 (2018), pp. 43–51. DOI: 10.1016/j.compmedimag.2018.05.001.
- [IS*-J28] Andreas MEINEL, Sebastián CASTAÑO-CANDAMIL, Benjamin BLANKERTZ, Fabien LOTTE, and Michael TANGERMANN. "Characterizing Regularization Techniques for Spatial Filter Optimization in Oscillatory EEG Regression Problems." In: *Neuroinformatics* (2018). URL: <https://hal.inria.fr/hal-01946130>.
- [IS*-J29] Jelena MLADENOVIC, Jérémy FREY, Mateus JOFFILY, Emmanuel MABY, Fabien LOTTE, and Jérémie MATTOUT. "Active inference as a unifying, generic and adaptive framework for a P300-based BCI." In: *Journal of Neural Engineering* (2019). DOI: 10.1088/1741-2552/ab5d5c.
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1.3 Production dans des colloques / congrès, séminaires de recherche

L'équipe Image et Son a publié 315 articles en conférences.

Conférences de l'équipe Image et Son		
	A* et A	Autres
Nombre	55	260
Pourcentage	17%	83%

Conférences, top 20%

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- [IS*-C40] Stéphanie REY, Célia PICARD, Yanis FATMI, Fanny FRANCO, Sarah GUILBERT, Jérémie MANÉRE, Christophe BORTOLASO, Mustapha DERRAS, Nadine COUTURE, and Anke BROCK. “Build Your Own Hercules: Helping Visitors Personalize their Museum Experience.” In: *TEI '20: Fourteenth International Conference on Tangible, Embedded, and Embodied Interaction, Sydney, NSW, Australia, February*

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1.4 Produits et outils informatiques

Au cours de la période d'évaluation, 19 Logiciels ont été déposés à Aquitaine Science Transfert, et d'autres ont également été développés. Nous listons ici les plus marquants

volBrain : Pierrick Coupé, José V. Manjon voir 1.3.2

Eigen : Eigen est une bibliothèque logicielle d'algèbre linéaire couvrant un très grand nombre de cas d'application. Par exemple, elle inclut aussi bien les matrices et tableaux denses que creux, et dans le cas dense, elle couvre les objets de taille statique comme dynamique. Elle fournit de nombreux algorithmes d'algèbre linéaire, un module dédié à la géométrie, etc. Elle propose en outre une API C++ claire et élégante, et offre des performances importantes de part son évaluation paresseuse des expressions et son support de la vectorisation. Eigen est extensivement utilisée non seulement dans le milieu académique (recherche et enseignement), mais aussi dans l'industrie (Google TensorFlow et Ceres, par exemple)

Malia Rendering Framework : Malia est une bibliothèque logicielle pour le rendu prédictif, physiquement réaliste. Elle s'accompagne de plusieurs applications : un path-tracer spectral, des fonctions de conversion RGB vers spectral, un plugin pour le logiciel Blender et un visualisateur d'images spectrales. Le temps de calcul d'une image pouvant devenir prohibitif lorsqu'un grand nombre de bandes spectrales sont utilisées, Malia a été conçue pour tirer pleinement partie de l'accélération offerte par les cartes graphiques.

DocCreator : DocCreator est un logiciel de génération d'images de documents synthétiques dont les contenus (textes, images, dégradations), une fois assemblés, permettent d'obtenir des images visuellement très ressemblantes aux images réelles. La génération automatique de documents synthétiques, fournit une annotation fine de leurs contenus et démontre tout son intérêt dans les campagnes d'évaluation de performances d'algorithmes et dans les méthodes d'apprentissage automatique. Des méthodes permettant de générer des images de documents synthétiques réalistes ont été développée et intégrées dans le logiciel DocCreator <https://doc-creator.labri.fr/>. Une liste de publications dans lesquels docCreator a été utilisé est disponible : <https://doc-creator.labri.fr/liste.html> (Google scholar référence 107 citations relatives aux publications qui décrivent DocCreator ou ses bases, DocCreator a été téléchargé et utilisé dans quinze laboratoires différents). Auteurs : Journet Nicholas, Visani Muriel, Mansencal Boris, Van-Cuong Kieu, Billy Antoine.

XLFG : XLFG est un analyseur syntaxique pour grammaires LFG (Lexical-Functional Grammars, Joan Bresnan et al.) disponible en ligne pour l'enseignement et la recherche. Il est actuellement utilisé dans le cadre de l'enseignement de la linguistique formelle pour de nombreuses langues et dans plusieurs universités. Le logiciel a subi récemment (25/06/2020) une refonte pour une mise en conformité de la réglementation RGPD et pour des ajouts et des améliorations techniques. Auteur : Lionel Clément

Colociel : Colociel est un logiciel de colorisation d'images en niveaux de gris. Il dispose d'une interface graphique qui permet de coloriser des images en utilisant à la fois des scribbles dessinés par l'utilisateur ainsi qu'une image de référence. Auteurs : Fabien Pierre, Jean-François Aujol, Aurélie Bugeau, Vinh-Thong Ta.

L'équipe a aussi produit plusieurs bases de données en plus de celle générée par DocCreator : Grasping-in-the-Wild et Mexculture 142 dont les deux corpus ont été déposés sur le serveur CNRS HumNum NAKALA en Open Access.

1.5 Développements instrumentaux et méthodologiques

Prototype d'un écran transparent auto-stéréoscopique Nous avons développé un écran transparent auto-stéréoscopique couleur à 5 vues qui a été présenté lors de la SID Display Week I-Zone, au San José Convention Center, du 14 au 16 mai 2019. Il peut être vu comme une fenêtre permettant de superposer des données 3D stéréo au dessus du monde réel sans que l'observateur ait besoin de porter aucun appareillage (lunette, casque, etc.). Ce prototype ouvre la voie à de nombreuses applications en réalité augmentée spatiale, notamment dans l'industrie automobile, la publicité et l'éducation.

Plate-forme SCRIME Le SCRIME est un groupement d'intérêt Scientifique et Artistique regroupant 6 partenaires (Université de Bordeaux, Bordeaux INP, le CNRS, la Ville Bordeaux, la Région Nouvelle Aquitaine et l'État (ministère de la culture et DRAC) rattaché au LaBRI. Il a pour objectifs principaux le développement de collaborations entre scientifiques et artistes à des fins de recherche et de création, la diffusion scientifique et artistique. La plateforme est composée de plusieurs studios de composition dont un studio 3D, d'une salle de spectacle d'expérimentation et d'une plate-forme logicielle pour piloter les équipements. La plate-forme accueille plus d'une quinzaine de résidences artistiques et de recherche par an, avec des visiteurs provenant de structures artistiques, d'entreprises ou d'universités en France ou à l'étranger. Grâce à ces résidences, le SCRIME permet :

- l'expérimentation permettant l'émergence de nouvelles idées,
- la consolidation de nouvelles technologies en les confrontant à la réalité de la création,
- l'expérimentation et l'appropriation par les artistes de nouveaux moyens de créer, permettant leur participation au processus de développement des outils.

Les projets développés au SCRIME sont issus notamment du domaine de recherche du groupe MSM du LaBRI, mais aussi de la lutherie instrumentale (INRIA, IMB UBx), de la sonification (INCIA, UBx), de la physique théorique (LOMA UBx), de la santé (ISPED, UBx), musicologie (IREMUS, Paris Sorbonne), de la spatialisation perceptive 3D (L3I, Université de La Rochelle), de l'interaction humain machine (ESTIA-recherche, Bidard). Du côté artistique, plusieurs disciplines sont ou ont été associées à ces travaux : musique électroacoustique (CRR de Bordeaux, Bayonne et Angoulême), d'ensemble (Proxima Centauri, Ars Nova), groupes de rock et metal (AREMA Rock et chanson, Praetorian, Phonema), spectacle vivant (Cie Ever, Mécaniques vivantes, Cie Lubat, Parti collectif, etc.), installations (Passerelle Toulouse, EBABX, Pascale Criton - sonotact), photographies (Champs sonores), cinéma (Marie-Laure Cazin - cinéma émotif).

1.6 Autres produits propres à une discipline

L'équipe n'a pas de contribution dans ce domaine.

1.7 Activités éditoriales

1.7.1 Participation à des comités éditoriaux

Texte éventuel commentant le tableau 2.10.

Tableau 2.1 : Édition, équipe IS

Rôle	Nom de la revue	Période	Membre
Review Editor	Frontiers in Neuroprosthetics	2015–2020	Fabien Lotte
Associate Editor	Journal of Neural Engineering	2016–2020	Fabien Lotte
Associate Editor	Brain Computer Interfaces	2016–2020	Fabien Lotte
Review Editor	Frontiers in Human-Media Interaction	2015–2019	Fabien Lotte
Associate Editor	IEEE Computer Graphics and Applications	2018–2019	Martin Hachet
Review Editor	Frontiers in Robotics and AI	2015–2016	Martin Hachet
Specialty Chief Editor	Frontiers in Neuroergonomics, Section Neurotechnology and Systems	2020–	Fabien Lotte
Editor	Multimedia Tools and Applications	2018–	Jenny Benois-Pineau
Editor	International Journal on Computer Vision	2016–	Vincent Lepetit
Associate editor	IEEE Transactions on Pattern Analysis and Machine Intelligence	2016–	Vincent Lepetit
Associate editor	Computer Vision and Image Understanding	2016–	Vincent Lepetit
Editor	journal of electronic imaging	2015–	Jenny Benois-Pineau
Editor	Signal Processing : Image Communication	2015–	Jenny Benois-Pineau

1.7.2 Éditeur invité, numéro spécial

Texte éventuel commentant le tableau 2.10.

Tableau 2.2 : Édition de numéros spéciaux, équipe IS

Rôle	Nom du numéro spécial	Année	Membre
Invited editor	Content-Based Multimedia Indexing in the Era of Artificial Intelligence	2019–2020	Jenny Benois-Pineau
Invited editor	section Brain-Computer Interfaces “Long Term User Training and Preparation to Succeed in a Closed-Loop BCI Competition”	2020	Fabien Lotte
Invited editor	Neuroergonomics : the Brain at Work in Everyday Settings	2019	Fabien Lotte
Invited editor	Educational Technology	2019	Martin Hachet
Invited editor	Frontiers in Human Neuroscience, “Detection and Estimation of Working Memory States and Cognitive Functions Based on Neurophysiological Measures”	2017	Fabien Lotte
Invited editor	TACCESS Special Issue for ASSETS’17 conference	2017	Anke Brock

Invited editor	Brain-Computer Interfaces Technologies for Robotics and Virtual Reality	2016	Fabien Lotte
Invited editor	International Workshop Patch-MI, Held in Conjunction with MICCAI, Lecture Notes in Computer Science	2015-2018	Pierrick Coupe
Invited editor	Tzadik. L'esthétique discographique selon John Zorn	2014–2015	Francois-xavier Feron

1.7.3 Direction de collection et de séries

L'équipe n'a pas de contribution dans ce domaine.

1.8 Activités d'évaluation

1.8.1 Evaluation d'articles

Les membres de l'équipe ont participé à de nombreux comités de programme de conférences :

Program Committee Member (PC), Program Committee Chair (Chair), Steering Committee Member (SC), équipe IS			
	Conferences internationales	Workshops internationaux	Conferences et workshops nationaux
PC	109	6	16
Chair	8	3	1
SC	4	1	0

Ci-dessous une liste non exhaustive des principales conférences concernées

- Digital Audio Effects
- Eurographics
- IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)
- Conference on Multimedia Modeling (ACM MMM)
- European Conference on Computer Vision
- Conference of the International Speech Communication Association (INTERSPEECH)
- Geometric Modeling and Processing Conference
- International BCI Meeting

Par ailleurs les membres de l'équipe effectuent régulièrement des revues d'articles dans les conférences et journaux majeurs du domaine : ACM Siggraph, ICDAR, IEEE Transactions on PAMI, ICCV, MICCAI, Eurographics, IEEE Transactions on Image Processing, Sound and Music Computing, etc. Notons que Fabien Lotte a reçu 2 prix Publons "top peer reviewer 2017" (1% plus grand nombre d'évaluations d'articles scientifiques, à la fois en ingénierie et en neurosciences).

1.8.2 Evaluation de projets de recherche

Participation à des comités de d'évaluation de projets, équipe IS

	National	International
Membre	4	1
Expert	16	11

1.8.3 Evaluation de laboratoire

Marie Beurton-Aimar a été membre du comité HCERES pour l'évaluation du LIRIS en 2020.

1.8.4 Responsabilités au sein d'instances d'évaluation

- Jenny Benois-Pineau a été vice-présidente du comité ANR CES 23 Appel générique pour la période 2018-2019.
- Jenny Benois-Pineau a été experte dans le cadre des évaluations HCERES des formations universitaires vague C en 2017.
- Fabien Lotte été membre du Comité des Emplois Recherche d'Inria en 2020
- Martin Hachet a été expert du "Credit Impot Recherche" en 2019
- Martin Hachet a été membre du comité pour la création de deux équipes Inria en 2019
- Pascal Guitton a été membre de la commission de recrutement des Inspecteurs Généraux de l'Education Nationale (IGEN) en 2019
- Jean-Philippe Domenger est membre de la section 27 du CNU depuis 2019.

1.9 Contrats de recherche financés par des institutions publiques ou caritatives

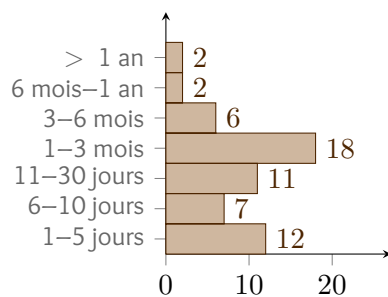
Tableau 2.3 : Contrats de l'équipe Image et Son, en k€

	2015	2016	2017	2018	2019	2020	Total
International, dont Europe	475	1563	135	0	0	0	2173
National	53	434	156	395	594	13	1645
Régional	46	0	113	63	0	0	222
Industrie	202	8	556	404	138	0	1308

Montant total des contrats pour l'équipe Image et Son : **5348 k€**.

1.10 Post-doctorants et chercheurs accueillis

1.10.1 Chercheurs étrangers invités



Nombre d'invités étrangers de l'équipe IS

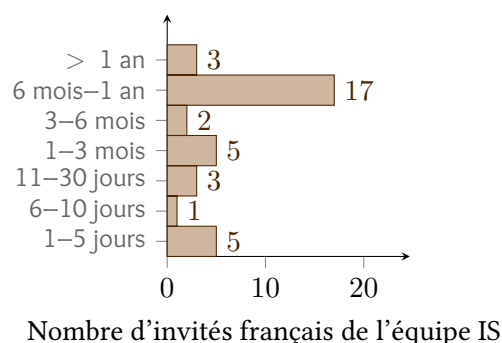
Texte éventuel commentant le tableau 2.10.

Tableau 2.4 : Accueil chercheurs, équipe IS (international, ≥ 90 jours)

Invité	Institution	Pays	Annee	Durée	Invitant
BOUZIDI Samah	UNIVERSITÉ DE SFAX	TUNISIE	2015	129	Fabien Baldacci,Pascal Desbarats
HAMROUN Mohamed	LABORATOIRE SETIT, UNIVERSITÉ DE SFAX, TUNISIE	TUNISIE	2015	91	Henri Nicolas
HAMROUN Mohamed	UNIVERSITÉ DE SFAX	TUNISIE	2017	1094	Henri Nicolas
HAMMAMI Amal	ENIS SFAX	TUNISIE	2018	121	Henri Nicolas
TARHOUNI Nesrine	ENIS	TUNISIE	2018	90	Jenny Benois-Pineau
ZRIGUI Sarra	UNIVERSITE DE MANNOUBA, TUNISIE	TUNISIE	2020	121	Henri Nicolas
SLIMI Anwer	UNIVERSITÉ DE MONASTIR	TUNISIE	2020	121	Henri Nicolas
ANTOINE Aurelien	UNIVERSITY OF PLYMOUTH	ROYAUME-UNI	2017	90	Myriam Desainte-Catherine
MONTOYA OBESO Abraham	IPN	MEXIQUE	2017	319	Jenny Benois-Pineau
ADERGHAL Karim	UNIVERSITÉ IBN ZOHR AGADIR	MAROC	2016	1096	Jenny Benois-Pineau
IMPEROLI Marco	SAPIENZA UNIVERSITY OF ROME	ITALIE	2018	183	Vincent Lepetit
AGUDO Antonio	INSTITUT DE ROBÒTICA I INFORMÀTICA INDUSTRIAL	ESPAGNE	2018	90	Vincent Lepetit
AGUDO Antonio	INSTITUT DE ROBÒTICA I INFORMÀTICA INDUSTRIAL	ESPAGNE	2019	151	Vincent Lepetit

POULIN Pierre	UNIVERSITÉ DE MONTRÉAL	CANADA	2017	174	Xavier Granier
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1.10.2 Chercheurs français invités



Texte éventuel commentant le tableau 2.10.

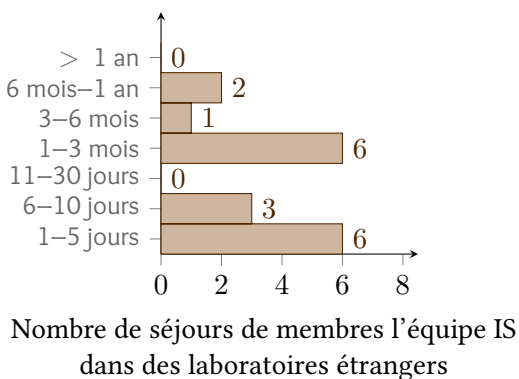
Tableau 2.5 : Accueil chercheurs, équipe IS (national, ≥ 90 jours)

Invité	Institution	Annee	Durée	Invitant
VISANI Muriel	UNIVERSITÉ DE LA ROCHELLE	2016	330	Pascal Desbarats
AGUER Nathalie	CONSERVATOIRE DE BORDEAUX	2017	199	Annick Mersier, Myriam Desainte-Catherine
MEAUX Eric	UNIVERSITÉ DE BORDEAUX	2018	90	Annick Mersier, Myriam Desainte-Catherine
CELERIER Jean- Michael	UNIVERSITÉ DE BORDEAUX	2018	121	Annick Mersier, Myriam Desainte-Catherine
GOURVAT Cyril	CONSERVATOIRE DE BORDEAUX	2018	303	Annick Mersier, Myriam Desainte-Catherine
ZIOLKOWSKA Aleksandra	CONSERVATOIRE DE BORDEAUX	2018	267	Annick Mersier, Myriam Desainte-Catherine
POUS Pierre-alain	CIAM	2018	299	Annick Mersier, Myriam Desainte-Catherine
AGUER Nathalie	CONSERVATOIRE DE BORDEAUX	2018	291	Annick Mersier, Myriam Desainte-Catherine
KURTAG György	UNIVERSITÉ DE BORDEAUX	2019	364	Annick Mersier, Myriam Desainte-Catherine
CELERIER Jean-Michael	UNIVERSITÉ DE BORDEAUX	2019	242	Annick Mersier, Myriam Desainte-Catherine
COLIN Jean-marie	OCTANDRE	2019	242	Annick Mersier, Myriam Desainte-Catherine

BESCHE Thierry	PASSERELLE ARTS SCIENCES TECHNOLOGIES	2019	228	Annick Mersier, Myriam Desainte-Catherine
ARMAND Edwige	UNIVERSITÉ DE TOULOUSE UT CAPITOLE	2019	228	Annick Mersier, Myriam Desainte-Catherine
BRETON Thomas	UNIVERSITÉ DE TOULOUSE UT CAPITOLE	2019	228	Annick Mersier, Myriam Desainte-Catherine
DUTHEN Yves	UNIVERSITÉ DE TOULOUSE UT CAPITOLE	2019	228	Annick Mersier, Myriam Desainte-Catherine
GARCIA Frederic	INRA	2019	228	Annick Mersier, Myriam Desainte-Catherine
RABIN Julien	GMEA	2019	228	Annick Mersier, Myriam Desainte-Catherine
CALANDRA Joséphine	UNIVERSITÉ PARIS SORBINNE	2019	1187	Myriam Desainte-Catherine
CHAMAGNE Mathieu	PASSERELLE ARTS SCIENCES TECHNOLOGIES	2019	102	Annick Mersier, Myriam Desainte-Catherine
JEAN-MICHAËL Celerier	UNIVERSITÉ DE BORDEAUX	2019	473	Annick Mersier, Myriam Desainte-Catherine
COLIN Jean-marie	GIS SCRIME	2019	395	Annick Mersier, Myriam Desainte-Catherine
GOURVAT Cyril	CONSERVATOIRE DE BORDEAUX	2019	365	Annick Mersier, Myriam Desainte-Catherine
KURTAG György	UNIVERSITÉ DE BORDEAUX	2020	365	Annick Mersier, Myriam Desainte-Catherine

1.11 Indices de reconnaissance

1.11.1 Séjours dans des laboratoires étrangers



Texte éventuel commentant le tableau 2.10.

Tableau 2.6 : Séjours, équipe IS (international, ≥ 90 jours)

Institution	Pays	Année	Description	Durée	Membre
University of Cambridge, UK	United Kingdom	2018	Séjour de recherche, Seconded at Mathworks	273	Aurelie Bugeau
RIKEN BSI	Japon	2017	with the JSPS (Japan Society for the Promotion of Science) Invitation fellowship program	300	Fabien Lotte
RIKEN BSI	Japon	2017	funded by the RIKEN BSI	180	Léa Pillette
RIKEN BSI	Japon	2017	funded by the RIKEN BSI	90	Aurélien Appriou

1.11.2 Récompenses et prix

L'équipe souhaite souligner les deux prix suivants :

- Vincent Lepetit a été nommé membre Senior de l'IUF en 2018.
- Jenny Benois-Pineau a été promue dans l'Ordre de Chevaliers des Palmes Académiques en 2016.

Elle a également obtenu des prix lors de conférences et d'événements :

- "Honorable mention award" à ACM ISS 2019
- "Best paper award" à ACM UIST 2019
- "Best presentation award" à Neuroadaptive Technologies 2019
- "Best Demonstration award" à IHM 2018
- 1st winning group à "Hackathon BR41N.IO", 7th BCI Meeting 2018
- Gagnant de "UIST conference hackathon", 2018
- "Best paper - Honorable mention award (top 5% over 2400 submissions)", ACM CHI 2017
- "Honorable mention award", MUM, 2017
- "Best technnote award", IEEE 3DUI 2017
- "Best Demo award" for Teegi, IHM 2017

1.11.3 Participation à des jurys de prix

Texte éventuel commentant le tableau 2.10.

Tableau 2.7 : Participation à des jurys de prix, équipe IS

Rôle	Description	Période	Membre
Membre	Annual BCI research award	2020	Fabien Lotte
Membre	Best poster award, BCI : Science and Practice conference, Samara, Russia	2019	Fabien Lotte

Membre	Best student poster and talk award, International Graz BCI conference (GBCIC'19), Graz, Austria 2019	2019	Fabien Lotte
Membre	Best paper award, international conference on NeuroAdaptive Technologies (NAT'19), Liverpool, UK, 2019	2019	Fabien Lotte
Membre	Best poster and talk award, International BCI conference, Graz, Autriche, 2017	2017	Fabien Lotte
Membre	IEEE 3DUI : Best paper award Committee	2015	Martin Hachet
Membre	Prix Science et Musique	2015–2020	Myriam Desainte-Catherine
Membre	Young Researcher Fellow EGFR 2019	2019	Gaël Guennebaud

1.11.4 Responsabilités dans des sociétés savantes

- Myriam Desainte-Catherine est co-présidente de l'Association Francophone d'Informatique Musicale depuis 2010.
- Fabien Lotte est membre élu du conseil d'administration de CORTICO, association nationale de BCI.
- Martin Hachet est membre du conseil d'administration de l'AFIHM
- Fabien Lotte est représentant de Inria à New European Media
- Martin Hachet est co-responsable du groupe EduIHM dédié à la recherche en interface homme machine pour l'éducation
- Martin Hachet est membre du conseil scientifique du SCRIME

1.11.5 Organisations de colloques / congrès internationaux

Au cours de la période, les membres de l'équipe ont fait partie de comités d'organisation de 40 conférences et workshops internationaux et 9 nationaux parmi lesquels :

- IPTA 2015, 2016, 2017
- International Conference ACM ICMR 2017
- International Workshop CBMI 2016, 2018
- International Conference on Scale Space and Variational Methods, 2015
- EduIHM workshop 2017, 2018, 2019, 2020

1.11.6 Invitations à des colloques / congrès à l'étranger

Ci-dessous la liste des conférences invités dans des conférences internationales :

- BCI & Neurotechnology Summer School 2020, online : Fabien Lotte
- Online Global Series BCI 2020 : Fabien Lotte
- BCI : Science and Practice international conference, Keynote, Samara, Russia, 2019 : Fabien Lotte
- International conference on NeuroAdaptive Technologies (NAT'19), Keynote, Liverpool, UK, 2019 : Fabien Lotte

- Symposium "Sonido y acción" Askuna, Bilbao, Espagne, 2018 : Myriam Desainte-Catherine
- Workshop on Frontier of Multidisciplinary Research : Brain Signal Processing and Multiway Data Mining , Saitama, Japan, 2018, Fabien Lotte
- Symposium "Colorisation of LiDAR point cloud", SIAM Conference on Imaging Science, Bologna, Italy, 2018 : Aurélie Bugeau
- Symposium "Learning for BCI and BCI for Learning", BCI, Tel Aviv, Israel, 2018, Fabien Lotte
- Symposium "Nonlocal partial differential equations and graph-based techniques for imaging", SciCADE, Bath, UK, 2017 : Aurélie Bugeau
- International Graz Brain-Computer Interfaces Conference, opening Keynote, Graz, Austria, 2017, Fabien Lotte
- ETIS Summer school, Luxembourg, 2017 : Martin Hachet
- Brain and Computers Digital Media Conference, Center for Digital Media, Vancouver, Canada, 2016 : Fabien Lotte
- European Research Day 2016, Tokyo, Japan : Fabien Lotte
- Iranian IBRO/APRC School of Cognitive Neuroscience, Tehran, Iran, September 2016 : Fabien Lotte
- Multimodal interaction workshop, Kyoto, Japan, 2015 : Aurélie Bugeau

2 Interaction de l'équipe avec l'environnement non académique

Impacts sur l'économie, la société, la culture, la santé

2.1 Brevets, licences et déclarations d'invention

2.1.1 Brevets

Texte éventuel commentant le tableau 2.10.

Tableau 2.8 : Brevets, équipe IS

Année	Titre	Laboratoire	Auteur
2019	Autostereoscopic transparent multi-view display	LABRI,LP2N	REUTER Patrick
2017	Digital audio flow managing method for musical work	LABRI	DESAINTE-CATHERINE Myriam
2017	Hybrid simulator and method for teaching optics or for training adjustment of an optical device	LaBRI IMS Celia	Martin Hachet
2016	Segmentation tridimensionnelle des voies aériennes par IRM proton à haute résolution	CRCTB,LABRI	DOURNES Gaël
2015	Analyse numérique d'une image numérique représentant une plaie pour sa caractérisation automatique	LABRI	DOMENGER Jean-Philippe

2015	Procédé et dispositif pour la réduction du rapport de puissance pic-moyenne dans un système de communication OFDM	LABRI	GORLOW Stanislaw
2015	Dispositif de positionnement occlusal et condylien	CRCTB,LABRI	LAURENTJOYE Mathieu

2.2 Interactions avec les acteurs socio-économiques

L'équipe a des interactions avec de nombreuses disciplines : santé, éducation, sciences humaines et sociales, agriculture, etc.

2.2.1 Thèses CIFRE

Texte éventuel commentant le tableau 2.10.

Tableau 2.9 : Thèses CIFRE, équipe IS

Doctorant	Titre	1 ^{re} année	Société	Encadrant
REBY Kevin	Estimation automatique de la douleur par reconnaissance posturale	2019	LUCINE	BEURTON AIMAR Marie
VU Manh Tu	Estimation de l'intensité de la douleur à partir du visage par apprentissage automatique de données limitées.	2019	LUCINE	BEURTON AIMAR Marie
CAUBET Christophe	Apprentissage sur des données multispectrales et multi-plateformes au profit des systèmes de mission de surveillance	2019	Thalès DMS France	DESBARATS Pascal,DOMENGER Jean-Philippe
BECHER Cindy	Numérisation 3D et géolocalisation centimétrique de réseaux sensibles enterrés pour la production de documents numériques dans les Travaux Publics	2018	SIG-IMAGE	DESBARATS Pascal
LOPEZ LEFEVRE Myriam	Localisation et prédiction de pannes pour l'usine du futur	2018	Lectra	BEURTON AIMAR Marie,MAABOUT Sofian
YEBDA Thinhinane	Reconnaissance des situations à risques de la vie quotidienne des personnes fragiles Analyse épidémiologique et Indexation vidéo connectée	2018	InfleXsys	BENOIS PINEAU Jenny
REY Stéphanie	Outils de gestion pour la création de parcours de visites personnalisés dans le contexte des musées : conception et évaluation	2017	BERGER LEVRAULT	COUTURE Nadine,BROCK Anke
PEREZ DE SAN ROMAN Philippe	Reconnaissance vidéo d'objets pré-documentés avec modèles 3D	2017	ITECA CNAM - Conservatoire National des Arts et Métiers	DESBARATS Pascal

BILLY Antoine	Imagerie multimodale 3D+ pour drone : application à l'évaluation de l'état phytosanitaire de la vigne	2017	I2S	DESBARATS Pascal, DOMENGER Jean-Philippe
BOYER Florian	Etude et développement d'un système de reconnaissance de parole en français basé sur des réseaux de neurones profonds	2016	EA4T	ROUAS Jean-Luc
CELERIER Jean-Michaël	Calques audio interactifs : théorie, mise en œuvre et usages	2015	Blue Yeti	DESAINTE-CATHERINE Myriam

2.2.2 Création de start-up

Texte éventuel commentant le tableau 2.10.

Tableau 2.10 : Start-up, équipe IS

Nom société	Année de création	Domaine	Participants
REALITYTECH	2016	Programmation informatique	Martin HACHET
ULLO	2016	Programmation informatique	Martin HACHET, Fabien LOTTE

2.3 Activités d'expertise scientifique

2.4 Produits destinés au grand public

MOOC Accessibilité numérique (publié sur la plate-forme nationale FUN, plus de 13 000 inscrits provenant de 60 pays)

Conférences

- "L'art et la science des films d'animation 3D" (30min) dans le cadre de la Fête de la Science (tous les ans), de la Semaine des Maths (15 mars 2018) et du Printemps de la Mixité (27 mars 2018)
- "Sciences et techniques pour l'animation 3D" (1h) à l'école de multimédia e-artsup (8 octobre 2018)

Expositions

- "Open Lab" à l'Espace 29, dans le cadre du festival Art & Science FACTS de l'Université de Bordeaux, en collaboration avec Maud Mulliez (du 14 au 21 nov. 2017)
- "Station campus" au Musée Ethnographique de Bordeaux, en collaboration avec Maud Mulliez (29 nov. 2018)
- "Textile 3D" au Musée Ethnographique de Bordeaux (du 1er octobre au 29 mai)

3 Implication de l'équipe dans la formation par la recherche

3.1 Produits des activités pédagogiques et didactiques

3.2 Productions scientifiques (articles, ouvrages, etc.) issues des thèses

Les productions scientifiques issues des thèses sont distinguées dans la liste des publications en soulignant les noms des doctorants pour chacune de leur contribution. Leur nombre est résumé dans le tableau suivant.

Tableau 2.11 : Production des doctorants, équipe Image et Son

	Doctorants	Total équipe	Pourcentage
Conférences	106	315	34%
Revue	42	179	23%

3.3 Formation

Anne Vialard, Aurélie Bugeau, Pascal Desbarats et Pierre Bénard de l'équipe Image et Son ont été responsables des parcours "Image et Son" et IPCV du Master Informatique de l'université de Bordeaux. Fabien Baldacci est responsable du parcours Génie Logiciel Vietnam du master Informatique. Vinh-Thong Ta est responsable de la 1ère année de spécialité informatique de l'ENSEIRB.

Durant la période d'évaluation, le parcours international de master IPCV a obtenu le label Erasmus Mundus Joint Master Degree.

Méthodes Formelles

1 Production de connaissances et activités concourant au rayonnement et à l’attractivité scientifique

1.1 Revues

L’équipe Méthodes Formelles a publié 136 articles en revue.

Revue de l’équipe Méthodes Formelles		
	Q1	Autres
Nombre	62	74
Pourcentage	46%	54%

Revue, top 20%

- [MF*-J1] Jorge ALMEIDA, José Carlos COSTA, and [Marc ZEITOUN](#). “McCammond’s normal forms for free aperiodic semigroups revisited.” In: *LMS Journal of Computation and Mathematics* 18.1 (2015), pp. 130–147. DOI: 10.1112/S1461157014000448.
- [MF*-J2] Jorge ALMEIDA, José Carlos COSTA, and [Marc ZEITOUN](#). “Factoriality and the Pin-Reutenauer procedure.” In: *Discret. Math. Theor. Comput. Sci.* 18.3 (2016). URL: <http://dmtcs.episciences.org/1412>.
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- [MF*-J4] Gilles AUDEMARD and [Laurent SIMON](#). “On the Glucose SAT Solver.” In: *Int. J. Artif. Intell. Tools* 27.1 (2018), 1840001:1–1840001:25. DOI: 10.1142/S0218213018400018.

- [MF*-J5] [Félix BASCHENIS](#), [Olivier GAUWIN](#), [Anca MUSCHOLL](#), and [Gabriele PUPPIS](#). “One-way definability of two-way word transducers.” In: *Log. Methods Comput. Sci.* 14.4 (2018). doi: 10.23638/LMCS-14(4:22)2018.
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- [MF*-J9] [Laurent BIENVENU](#) and Rod DOWNEY. “On low for speed oracles.” In: *J. Comput. Syst. Sci.* 108 (2020), pp. 49–63. DOI: 10.1016/j.jcss.2019.08.007.
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- [MF*-J11] [Louis-Marie DANDO](#) and [Sylvain LOMBARDY](#). “From Hadamard expressions to weighted rotating automata and back.” In: *Theor. Comput. Sci.* 787 (2019), pp. 28–44. DOI: 10.1016/j.tcs.2018.09.017.
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- [MF*-J13] Javier ESPARZA, Denis KUPERBERG, [Anca MUSCHOLL](#), and [Igor WALUKIEWICZ](#). “Soundness in negotiations.” In: *Log. Methods Comput. Sci.* 14.1 (2018). DOI: 10.23638/LMCS-14(1:4)2018.
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- [MF-A9] Boris KONEV, Stephan SCHULZ, and Laurent SIMON, eds. *IWIL@LPAR 2015, 11th International Workshop on the Implementation of Logics, Suva, Fiji, November 23, 2015*. Vol. 40. EPiC Series in Computing. EasyChair, 2016. URL: <https://easychair.org/publications/volume/IWIL-2015>.
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- [MF-Ch2] Julian C. BRADFIELD and [Igor WALUKIEWICZ](#). “The mu-calculus and Model Checking.” In: *Handbook of Model Checking*. Ed. by Edmund M. CLARKE, Thomas A. HENZINGER, Helmut VEITH, and Roderick BLOEM. Springer, 2018, pp. 871–919. DOI: 10.1007/978-3-319-10575-8_26.
- [MF-Ch3] Yliès FALCONE, Leonardo MARIANI, [Antoine ROLLET](#), and Saikat SAHA. “Runtime Failure Prevention and Reaction.” In: *Lectures on Runtime Verification*. Ed. by Ezio BARTOCCI and Yliès FALCONE. Vol. 10457. Lecture Notes in Computer Science. Springer, Feb. 2018, pp. 103–134. DOI: 10.1007/978-3-319-75632-5.
- [MF-Ch4] Olga KHARLAMPOVICH and [Pascal WEIL](#). “On the Generalized Membership Problem in Relatively Hyperbolic Groups.” In: *Fields of Logic and Computation III - Essays Dedicated to Yuri Gurevich on the Occasion of His 80th Birthday*. Ed. by Andreas BLASS, Patrick CÉGIELSKI, Nachum DERSHOWITZ, Manfred DROSTE, and Bernd FINKBEINER. Vol. 12180. Lecture Notes in Computer Science. Springer, 2020, pp. 147–155. DOI: 10.1007/978-3-030-48006-6_11.
- [MF-Ch5] [Laurent SIMON](#). “Reasoning with Propositional Logic: From SAT Solvers to Knowledge Compilation.” In: *A Guided Tour of Artificial Intelligence Research*. Ed. by Pierre MARQUIS, Odile PAPINI, and Henri PRADE. Springer, May 2020, pp. 115–152. ISBN: 978-3-030-06166-1. DOI: 10.1007/978-3-030-06167-8_5.

1.3 Production dans des colloques / congrès, séminaires de recherche

L'équipe Méthodes Formelles a publié 231 articles en conférences.

Conférences de l'équipe Méthodes Formelles		
	A* et A	Autres
Nombre	83	148
Pourcentage	36%	64%

Conférences, top 20%

- [MF*-C1] Myrto ARAPINIS, [Diego FIGUEIRA](#), and Marco GABOARDI. “Sensitivity of Counting Queries.” In: *43rd International Colloquium on Automata, Languages, and Programming, ICALP 2016, July 11-15, 2016, Rome, Italy*. Ed. by Ioannis CHATZIGIANNAKIS, Michael MITZENMACHER, Yuval RABANI, and Davide SANGIORGI. Vol. 55. LIPIcs. Schloss Dagstuhl - Leibniz-Zentrum für Informatik, 2016, 120:1–120:13. DOI: 10.4230/LIPIcs.ICALP.2016.120.
- [MF*-C2] Albert ATSERIAS, Anuj DAWAR, and [Joanna OCHREMIK](#). “On the Power of Symmetric Linear Programs.” In: *34th Annual ACM/IEEE Symposium on Logic in Computer Science, LICS 2019, Vancouver, BC, Canada, June 24-27, 2019*. IEEE, 2019, pp. 1–13. DOI: 10.1109/LICS.2019.8785792.

- [MF*-C3] Pablo BARCELÓ, [Diego FIGUEIRA](#), and Miguel ROMERO. “Boundedness of Conjunctive Regular Path Queries.” In: *46th International Colloquium on Automata, Languages, and Programming, ICALP 2019, July 9-12, 2019, Patras, Greece*. Ed. by Christel BAIER, Ioannis CHATZIGIANNAKIS, Paola FLOCCHINI, and Stefano LEONARDI. Vol. 132. LIPIcs. Schloss Dagstuhl - Leibniz-Zentrum für Informatik, 2019, 104:1–104:15. DOI: [10.4230/LIPIcs.ICALP.2019.104](#).
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- [MF*-C5] Nathalie BERTRAND, Miheer DEWASKAR, Blaise GENEST, and [Hugo GIMBERT](#). “Controlling a Population.” In: *28th International Conference on Concurrency Theory, CONCUR 2017, September 5-8, 2017, Berlin, Germany*. Ed. by Roland MEYER and Uwe NESTMANN. Vol. 85. LIPIcs. Schloss Dagstuhl - Leibniz-Zentrum für Informatik, 2017, 12:1–12:16. DOI: [10.4230/LIPIcs.CONCUR.2017.12](#).
- [MF*-C6] [Laurent BIENVENU](#) and Rodney G. DOWNEY. “On Low for Speed Oracles.” In: *35th Symposium on Theoretical Aspects of Computer Science, STACS 2018, February 28 to March 3, 2018, Caen, France*. Ed. by Rolf NIEDERMEIER and Brigitte VALLÉE. Vol. 96. LIPIcs. Schloss Dagstuhl - Leibniz-Zentrum für Informatik, 2018, 15:1–15:13. DOI: [10.4230/LIPIcs.STACS.2018.15](#).
- [MF*-C7] [Meghyn BIENVENU](#) and Pierre BOURHIS. “Mixed-World Reasoning with Existential Rules under Active-Domain Semantics.” In: *Proceedings of the Twenty-Eighth International Joint Conference on Artificial Intelligence, IJCAI 2019, Macao, China, August 10-16, 2019*. Ed. by Sarit KRAUS. ijcai.org, 2019, pp. 1558–1565. DOI: [10.24963/ijcai.2019/216](#).
- [MF*-C8] Mikolaj BOJANCZYK, [Hugo GIMBERT](#), and Edon KEMENDI. “Emptiness of Zero Automata Is Decidable.” In: *44th International Colloquium on Automata, Languages, and Programming, ICALP 2017, July 10-14, 2017, Warsaw, Poland*. Ed. by Ioannis CHATZIGIANNAKIS, Piotr INDYK, Fabian KUHN, and [Anca MUSCHOLL](#). Vol. 80. LIPIcs. Schloss Dagstuhl - Leibniz-Zentrum für Informatik, 2017, 106:1–106:13. DOI: [10.4230/LIPIcs.ICALP.2017.106](#).
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- [MF*-C23] Marie FORTIN, Anca MUSCHOLL, and Igor WALUKIEWICZ. “Model-Checking Linear-Time Properties of Parametrized Asynchronous Shared-Memory Pushdown Systems.” In: *Computer Aided Verification - 29th International Conference, CAV 2017, Heidelberg, Germany, July 24-28, 2017, Proceedings, Part II*. Ed. by Rupak MAJUMDAR and Viktor KUNCAK. Vol. 10427. Lecture Notes in Computer Science. Springer, 2017, pp. 155–175. DOI: 10.1007/978-3-319-63390-9_9.
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- [MF*-C25] Thomas GEFFROY, Jérôme LEROUX, and Grégoire SUTRE. “Occam’s Razor Applied to the Petri Net Coverability Problem.” In: *Reachability Problems - 10th International Workshop, RP 2016, Aalborg, Denmark, September 19-21, 2016, Proceedings*. Ed. by Kim Guldstrand LARSEN, Igor POTAPOV, and Jiri SRBA. Vol. 9899. Lecture Notes in Computer Science. Springer, 2016, pp. 77–89. DOI: 10.1007/978-3-319-45994-3_6.
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1.4 Produits et outils informatiques

Nous présentons par la suite une liste d’outils et de logiciels développés pendant la période d’évaluation par l’équipe Méthodes Formelles. L’équipe développe d’autres outils qui ne sont pas présentés dans cette liste pour les raisons suivantes :

- Les outils développés avant cette période ne sont pas présentés même si certains d’entre eux ont été maintenus pendant la période. C’est le cas de l’ensemble des outils pour le langage AltaRica utilisé dans l’aéronautique, et de l’outil Glucose qui implémente un solveur SAT très efficace (sur les podiums de nombreuses compétitions internationales). Ces deux outils sont respectivement disponibles aux adresses <https://altarica.labri.fr/wp/> et <https://www.labri.fr/perso/lsimon/glucose/>.

- Les outils développés pour des industriels avec lesquels un accord de non-divulgence (NDA) a été signé. C'est par exemple le cas des outils développés par Adrien Prevost en thèse CIFRE avec la SNCF et co-encadré localement par Grégoire Sutre et Igor Walukiewicz.
- Les outils en cours de développement qui seront présentés lors de la prochaine évaluation.

Les travaux de recherche menés dans l'équipe sont en partie guidés par l'expérimentation. Nous pouvons regrouper les outils développés en plusieurs catégories suivant l'objectif attendu :

- Pour évaluer des approches et des algorithmes pour des problèmes difficiles (par exemple indécidable) sur des instances concrètes, la seule solution passe par l'implémentation d'un outil. Les outils ICover, TChecker, et Mpbm présentés ci-dessous implémentent ainsi des algorithmes de vérification formelle pour respectivement des systèmes concurrents, temps-réels, et des réseaux booléens.
- Pour comprendre des problèmes fondamentaux sur des instances trop grandes pour être faites à la main. L'outil Stallings Graphs permet ainsi de réaliser des expérimentations dans le domaine des sous groupes finiment engendrés du groupe libre.
- Des outils pour définir et utiliser des nouveaux langages dédié de programmation (DSL). Les outils Timed Monad Stream, Octopus, T-calcul introduisent ainsi des outils pour la conception de systèmes temporisés interactifs.
- Des outils pour aider la communauté scientifique à reproduire des expérimentations. C'est ainsi le cas pour les outils The CoLoMoTo Interactive Notebook et SAT Heritage.

Ces outils sont présentés individuellement dans la liste suivante :

- Stallings Graphs [Pascal Weil] : L'approche algorithmique dans l'étude combinatoire des groupes libres a connu une grande activité ces dernières années, et on trouve dans la littérature de nombreux algorithmes efficaces pour la manipulation des sous-groupes finiment engendrés de ces groupes. Le package Stallings Graphs, conçu dans le cadre du logiciel libre de calcul mathématique SageMath, rassemble un nombre croissant de ces algorithmes. La plupart utilisent la notion de graphe de Stallings d'un sous-groupe, qui est une version de la notion d'automate minimal, adaptée au contexte de la théorie des groupes libres. Les sources sont librement disponibles sur <https://pypi.org/project/stallings-graphs/>.
- Timed Monad Stream [Simon Archipoff, David Janin, et Bernard Paul Serpette (INRIA Sophia Antipolis)] : Librairie proposant une API souple et particulièrement efficace pour la conception de systèmes temporisés interactifs (audio, musique), pour le traitement synchrone de flux de données et pour le traitement asynchrone de flux de contrôles [6, 7, 8, 4] ; réalisée via plusieurs extensions de la notion de monade ; codée principalement en Haskell, mais aussi en OCaml, avec quelques éléments de preuve en Agda. Les sources sont disponibles librement sur <https://github.com/djanin>.
- Octopus [Simon Archipoff et David Janin] : Langage dédié (DSL) à la programmation d'animations 3D avec une API de type LOGO [3] ; les animations s'exécutent sur GPU en OpenGL ; le langage est réalisé en Haskell. Les sources sont disponibles librement sur la page <https://github.com/djanin>.
- T-calcul [Simon Archipoff, Jaime Arias et David Janin] : Expérimentation des médias tuilés polymorphes, à travers la définition et la mise en oeuvre d'un langage déclaratif dédié à la programmation de systèmes musicaux interactifs [1, 2] ; réalisé en Haskell ; les expérimentations associées sont disponibles sur la page <https://poset.labri.fr/interpolations/>.
- ICover [Thomas Geffroy, Jérôme Leroux, et Grégoire Sutre] : Logiciel de vérification formelle pour les réseaux de Petri. Le logiciel ICover est une production destinée en premier lieu à la communauté académique. Il a été développé dans le cadre de la thèse de doctorat de Thomas Geffroy, afin de valider expérimentalement les techniques proposées dans la thèse. Ces techniques ont été présentées à la conférence RP en 2016.

ICover est basé sur le logiciel QCover développé par Michael Blondin, Alain Finkel, Christoph Haase and Serge Haddad (et présenté à la conférence TACAS en 2016). L'outil est disponible sur la page <https://github.com/gsutre/icover>.

- TChecker [Frédéric Herbreteau, Gérald Point et Thanh-Tung Tran] : Logiciel de vérification de systèmes temps-réels. TChecker prend en entrée un automate temporisé modélisant le système temps-réel à analyser et la propriété à vérifier. À l'aide d'algorithmes de vérification, il indique si l'automate satisfait la propriété ou non. TChecker est conçu comme une plateforme expérimentale pour la vérification d'automates temporisés. Il implémente donc plusieurs algorithmes de vérification, aussi bien ceux développés au sein de l'équipe Méthodes Formelles, que d'autres algorithmes inventés par d'autres équipes de recherche nationales ou internationales. TChecker permet donc la comparaison des algorithmes et la reproduction des résultats expérimentaux, en implémentant dans une seule et même base de code les algorithmes de vérification les plus performants. TChecker est distribué sous licence open-source et largement disponible sur la page <https://github.com/ticketac-project/tchecker>. Il est actuellement utilisé par plusieurs autres équipes de recherche, notamment au sein du projet ANR TickTac (2018-2023) auquel participe l'équipe Méthodes Formelles, dont l'un des objectifs consiste à intégrer d'autres outils de vérification, développés par les partenaires, au sein de TChecker.
- The CoLoMoTo Interactive Notebook [Loïc Paulevé, et Aurélien Naldi (Inria Saclay)] : Environnement unifié pour éditer, exécuter, partager, et reproduire des analyses de modèles qualitatifs de réseaux biologiques. Cet environnement est basé sur les technologies Docker et Jupyter. Il inclut 13 outils pour les réseaux booléens et multivalués [9]. Les sources sont disponibles sur la page <http://colomoto.org/notebook>.
- Mpbn [Loïc Paulevé] : Outils pour les problèmes d'atteignabilité et l'analyse des attracteurs pour des réseaux booléens les plus permissifs. Cet outil est distribué dans l'outil The CoLoMoTo Interactive Notebook [10]. Les sources sont disponibles sur la page <https://github.com/pauleve/mpbn>.
- SAT Heritage [Loïc Paulevé et Laurent Simon] : Archive permettant de compiler et exécuter plus de 1000 solveurs SAT [5]. L'archive est disponible depuis la page <https://github.com/sat-heritage/docker-images>.

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1.5 Développements instrumentaux et méthodologiques

L'équipe n'a pas de contribution dans ce domaine.

1.6 Autres produits propres à une discipline

L'équipe n'a pas de contribution dans ce domaine.

1.7 Activités éditoriales

Tableau 3.1 : Édition, équipe MF

Rôle	Niveau	Nom de la revue	Période	Membre
Editor-in-chief	Int.	journal of Groups, Complexity, Cryptology	2020-	Pascal Weil
Editor	Int.	Semigroup Forum	2019-	Pascal Weil
Editor	Int.	International Journal of Algebra and Computation	2019-	Pascal Weil
Editor	Int.	Journal of Computer and System Sciences	2016-	Marc Zeitoun
Editor	Int.	Discrete Mathematics and Theoretical Computer Science	2001-	Anca Muscholl

Editor	Int.	Fundamenta Informaticae	2016-	Igor Walukiewicz
Editor	Int.	Information and Computation	2013-	Géraud Sénizergues
Editor	Int.	RAIRO Theoretical Informatics and Applications	2009-	Pascal Weil
Editor	Int.	Information Processing Letters	2008-2015	Anca Muscholl
Editor	Int.	Leibniz International Proceedings in Informatics	2009-2017	Pascal Weil
Editor	Int.	Leibniz International Proceedings in Informatics	2017-	Anca Muscholl
Editor-in-chief	Int.	Groups, Complexity, Cryptology	2008-2019	Pascal Weil
Editor-in-chief	Int.	Bulletin of Symbolic Logic	2019-2022	Laurent Bienvenu
Editor	Nat.	Interstices	2015-	Antoine Rollet
Editor	Int.	ACM Transactions on Computational Logic	2019-	Meghyn Bienvenu

Tableau 3.2 : Édition de numéros spéciaux, équipe MF

Rôle	Nom de la revue (Nom du numéro spécial)	Niveau	Année	Membre
Invited editor	Special Issue on Formal Verification Methods for Biological Systems and Molecular Devices, in Theoretical Computer Science	Int.	2019	Loïc Paulevé
Invited editor	Selected Papers from ICALP'17 track B, in Logical Methods in Computer Science	Int.	2017	Anca Muscholl
Invited editor	Selected Papers from STACS'13, in Theory of Computing Systems	Int.	2015	Anca Muscholl
Invited editor	Selected Papers from FCT'17, in Journal of Computer and System Sciences	Int.	2020	Ralf Klasing et Marc Zeitoun
Invited editor	Selected Papers from CSR'17, in Theory of Computing Systems	Int.	2017	Pascal Weil
Invited editor	Selected Papers from GandALF'19, in Information and Computation	Int.	2020	Jérôme Leroux
Invited Editor	Informatique Mathématique : une photographie en 2020, in CNRS edition	Nat.	2020	Vincent Penelle

Tableau 3.3 : Direction de collection et de séries, équipe MF

Rôle	Niveau	Nom de la revue	Période	Membre
Editorial Board	Int.	Theory and Applications of Computability	2010-	Laurent Bienvenu

1.8 Activités d'évaluation

1.8.1 Evaluation d'articles

L'équipe MF a évalué de nombreux articles pour de nombreuses conférences et journaux nationaux et internationaux. Nous sommes aussi membres de PC et responsables de plusieurs PC chairs comme indiqué dans le tableau suivant.

Program Committee Member (PC), Program Committee Chair (Chair), Steering Committee Member (SC) dans les conférences (A*, A, ou autre), équipe MF

	A*	A	Autres
PC	12	20	35
Chair	1	2	7
SC	0	3	5

1.8.2 Participation à des jurys de thèse et de HDR

Nous avons recensé :

- 54 participations à des jurys de thèse,
- 9 participations à des jurys d'HDR.

1.8.3 Participation à des comités de sélection

Nous avons recensé :

- 9 participations à des comités pour des recrutements de MCF : 4 en local et 5 en extérieur.
- 3 participations à des comités pour des recrutements de PR : 2 en local et 1 en extérieur.

1.8.4 Evaluation de projets de recherche

Tableau 3.4 : Evaluation de projets de recherche, équipe MF

Type de projet	Institue demandant l'expertise	Date	Membre
Evaluation d'un projet de recherche STIC-AmSud	CNRS	2019	Pascal Weil
Evaluation d'un projet de recherche IRS	IDEX Université Grenoble Alpes	2019	Loïc Paulevé
Evaluation d'un projet de recherche	GIF (The German Israeli Foundation for Scientific Research and Development)	2019	Diego Figueira
Evaluation d'un projet de recherche	CEFIPRA	2018	Frédéric Herbreteau
Evaluation d'un projet de recherche	Deutsche Forschungsgemeinschaft (DFG)	2017	Anca Muscholl
Evaluation d'un projet de recherche	Deutsche Forschungsgemeinschaft (DFG)	2016	Anca Muscholl
Evaluation d'un projet de recherche	Polish National Research Minister	2016	Gabriele Puppis
Evaluation d'une demande de thèse CIFRE	ANRT	2016	Grégoire Sutre
Evaluation d'un projet de recherche AAP Générique	ANR	2015	Grégoire Sutre
Evaluation d'un projet de recherche starting grant	European Research Council (ERC)	2015	Anca Muscholl
Evaluation d'un projet de recherche «soutien aux Jeunes chercheurs»	Region Grand Est (France)	2018	Mohamed Mosbah
Evaluation de projets de recherche	ANR	2017	Mohamed Mosbah

1.8.5 Evaluation de laboratoire

Plusieurs membres de l'équipe Méthodes Formelles ont participé à des évaluations de laboratoire pour l'H-CERES : Gérald Point en 2018, Igor Walukiewicz en 2016 et 2018, Pascal Weil en 2018 et 2019 (Président les deux fois), et Mohamed Mosbah en 2018 et 2019.

1.8.6 Responsabilités au sein d'instances d'évaluation

Jusqu'en août 2016, Hugo Gimbert était membre de la Section 6 du Comité National du CNRS (secrétaire du bureau). Depuis septembre 2016, Igor Walukiewicz est membre de ce comité.

1.9 Contrats de recherche financés par des institutions publiques ou caritatives

Tableau 3.5 : Contrats de l'équipe Méthodes Formelles, en k€

	2015	2016	2017	2018	2019	2020	Total
National	223	234	458	383	50	636	1984
Industrie	40	90	0	606	0	0	736

Montant total des contrats pour l'équipe Méthodes Formelles : **2720 k€**.

1.10 Post-doctorants et chercheurs accueillis

1.10.1 Chercheurs étrangers invités

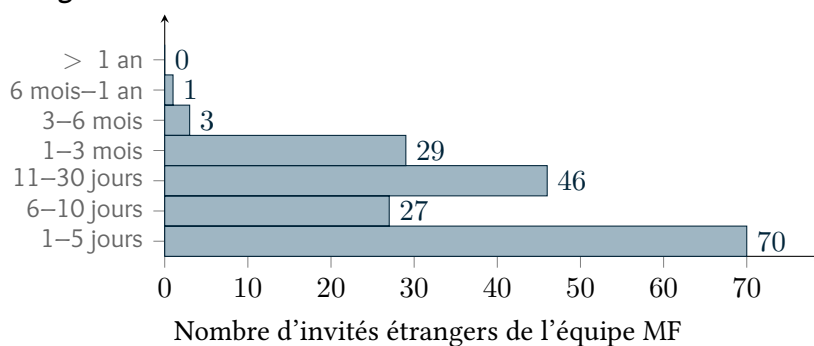


Tableau 3.6 : Accueil chercheurs, équipe MF (international, ≥ 90 jours)

Invité	Institution	Pays	Annee	Durée	Invitant
AYEB Neil	ENIT	TUNISIE	2017	181	Mohamed Mosbah
CHIKHAOUI Ons	ÉCOLE SUPÉRIEURE DES COMMUNICATIONS DE TUNIS	TUNISIE	2018	91	Mohamed Mosbah

MONTANARI Angelo	UNIVERSITY OF UDINE (ITALIE)	ITALIE	2017	91	Gabriele Puppis
MOLINARI Alberto	UNIVERSITY OF UDINE	ITALIE	2017	180	Gabriele Puppis
BAROZZINI David	UNIVERSITY OF UDINE	ITALIE	2017	121	Gabriele Puppis
DESCOTTE Maria Emilia	UNIVERSITÉ DE BUENOS AIRES	ARGENTINE	2017	91	Diego Figueira
KELMENDI Edon	TUM-IAS	ALLEMAGNE	2017	183	Anca Muscholl

1.10.2 Chercheurs français invités

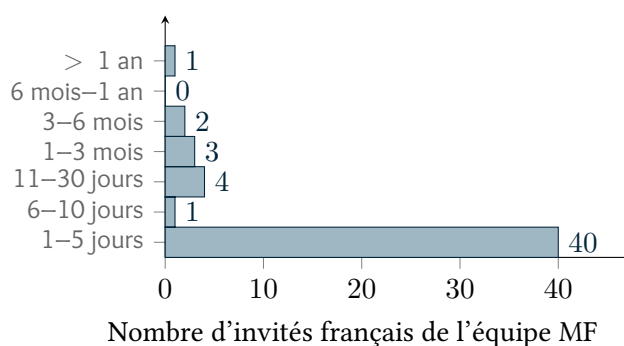


Tableau 3.7 : Accueil chercheurs, équipe MF (national, ≥ 90 jours)

Invité	Institution	Annee	Durée	Invitant
BIENVENU Laurent	LIRMM	2017	146	Diego Figueira
PRÉVOST Adrien	SNCF RESEAU	2017	101	Igor Walukiewicz, Grégoire Sutre
MAURAS Simon	ENS	2018	688	Hugo Gimbert

1.11 Indices de reconnaissance

1.11.1 Séjours dans des laboratoires étrangers

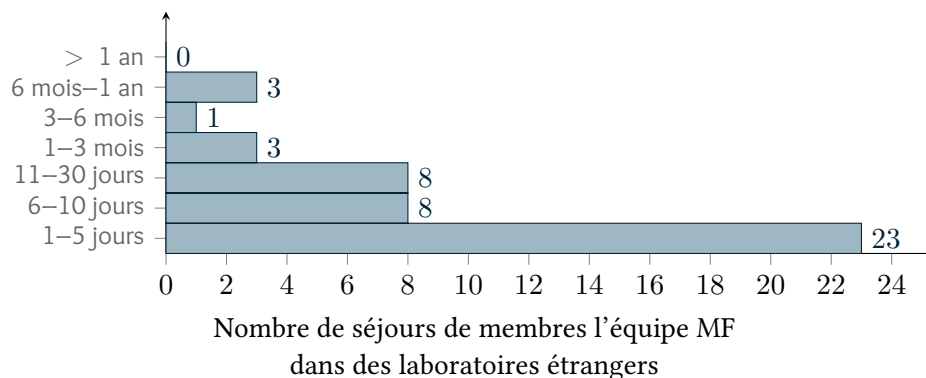


Tableau 3.8 : Séjours, équipe MF (international, ≥ 90 jours)

Institution	Pays	Année	Description	Durée	Membre
Universitat Politècnica de Catalunya	Spanish	2020	Professeur invité	150	Joanna Ochremiak
City University of New York, New York	United States of America	2016	Professeur invité	364	Pascal Weil
TU Munich	Germany	2015	Hans-Fischer Senior Fellowship, délégation CNRS	365	Anca Muscholl
TU Munich	Germany	2015	Mission longue durée	365	Igor Walukiewicz

1.11.2 Organisation de conférences

Nous ne présentons pas les conférences organisés à l'occasion de réunions de projet (ANR par exemple). L'équipe MF est impliquée dans l'organisation des conférences et workshops suivants :

- 10th International Symposium on Games, Automata, Logics, and Formal Verification (GandALF'19), 2019.
- 17th Mons Theoretical Computer Science Days, 2018.
- Conférence en mémoire de M.P. Schützenberger, 2018.
- Bonjour India CMI, 2018.
- 21st Fundamentals of Computation Theory (FCT), 2017.
- 19th International Conference on Theory and Applications of Satisfiability (SAT), 2016.
- Organisation des Journées du GDR IM (Informatique Mathématique), 2015.

1.11.3 Récompenses et prix

Tableau 3.9 : Récompenses et prix, équipe MF

Description	Date	Membre
Prix S. Barry Cooper	2020	Bruno Courcelle
Best paper award at CMSB	2019	Loïc Paulevé
Best paper award at STOC	2019	Jérôme Leroux
Ada Peluso Named Chair	2016	Pascal Weil
ACM PODS Alberto O. Mendelzon Test-of-Time Award	2016	Anca Muscholl
Hans-Fischer Senior Fellowship of TU Munich - Institute of Advanced Studies	2015-2018	Anca Muscholl
Test of Time Award' LICS	2015	Igor Walukiewicz
Médaille de bronze du CNRS	2016	Meghyn Bienvenu
Membre IUF junior	2017	Thomas Place

1.11.4 Responsabilités dans des sociétés savantes

Tableau 3.10 : Responsabilités dans des sociétés savantes, équipe MF

Description	Date	Membre
Membre de l'EATCS Council	2015-	Anca Muscholl
Vice-présidentes de l'EATCS (2 vice-présidents)	2020-	Anca Muscholl
Représentant national au TC1 de l'IFIP	2019-	Pascal Weil
Président du WG2.2 de l'IFIP	2009-2017	Igor Walukiewicz
Membre du WG2.2 de l'IFIP	-	Igor Walukiewicz
Membre élu du CA de l'Association Française Intelligence Artificielle	2019-	Laurent Simon
Président de l'Association Française de Programmation par Contraintes	2019-	Laurent Simon

1.11.5 Participation à des jurys de prix

Tableau 3.11 : Participation à des jurys de prix, équipe MF

Rôle	Description	Période	Membre
Membre	Witold Lipski Prize	2017–2020	Igor Walukiewicz
Membre	Jury EATCS Presburger award	2018–2020	Anca Muscholl
Membre	LICS - Test-of-time award	2018	Anca Muscholl
Membre	EATCS Fellows Committee	2014–2017	Anca Muscholl

1.11.6 Conférences Invitées

Nous avons été invité dans 56 conférences dont 7 dans des conférences A/A*.

Tableau 3.12 : Conférences Nationales Invités, équipe MF

Type	Conférence	Date	Lieu	Titre	Membre
Invited talk	Journées Nationales du GDR Informatique Mathématique	2018	Palaiseau, France	L'interrogation de données en présence d'ontologies : Exploiter les connaissances pour mieux tirer parti des données	Meghyn Bienvenu
Invited talk	Journées plénières du GDR IA	2018	Paris, France	Accès aux données médiatisé par des ontologies	Meghyn Bienvenu
Invited talk	Annual Meeting of the GT ALGA	2018	Lille, France	Ontology-mediated query answering : Harnessing knowledge to get more from data	Meghyn Bienvenu

Tableau 3.13 : Conférences Internationales Invités, équipe MF

Type	Conférence	Date	Lieu	Titre	Membre
Invited talk	Semigroups and connections with other fields	2019	Kochi, India	The star-free closure	Marc Zeitoun
Invited talk	Complexity, Algorithms, Automata and Logic Meet (CAALM)	2019	Chennai, India	Concatenation hierarchies and separation	Marc Zeitoun
Invited talk	12th International Computer Science Symposium in Russia (CSR)	2017	Kazan, Russia	Concatenation Hierarchies : New Bottle, Old Wine	Marc Zeitoun
Invited talk	Separation Problems, a satellite workshop of ICALP'17	2017	Warsaw, Poland	Separation and concatenation	Marc Zeitoun
Keynote talk	Highlights of Logic Games and Automata (HIGHLIGHTS)	2016	Brussels, Belgium	From membership to covering via separation	Marc Zeitoun
Invited talk	International Conference on Semigroups and Automata (CSA)	2016	Lisbon, Portugal	Separation-like problems for regular languages	Marc Zeitoun
Invited talk	Automata, Logic, Formal Languages and Algebra	2015	Bordeaux, France	The separation problem by first-order definable languages	Marc Zeitoun
Invited talk	AMS-EMS-SPM International Meeting, Special session on algebra	2015	Porto, Portugal	A Survey on Separation Problems	Marc Zeitoun

Invited talk	26th International Conference on DNA Computing and Molecular Programming (DNA)	2020	Virtual	Weakly Computing with Petri Nets	Jérôme Leroux
Keynote talk	35th Annual ACM/IEEE Symposium on Logic in Computer Science (LICS) and 47th International Colloquium on Automata, Languages and Programming (ICALP)	2020	Virtual	When Reachability Meets Grzegorzcyk	Jérôme Leroux
Invited talk	Highlights of Logic Games and Automata (HIGHLIGHTS)	2019	Warsaw, Poland	The Reachability Problem for Vector Addition Systems is Not Elementary	Jérôme Leroux
Invited talk	44th International Symposium on Mathematical Foundations of Computer Science (MFCS)	2019	Aachen, Germany	Petri Net Reachability Problem	Jérôme Leroux
Invited talk	Complexity, Algorithms, Automata and Logic Meet (CAALM)	2019	Chennai, India	The Reachability Problem for Petri Nets is Not Elementary	Jérôme Leroux
Invited talk	20th International Workshop on Verification of Infinite-State Systems (INFINITY)	2018	Prague, Czech Republic	Ideal Decompositions : Applications to Petri Net Extensions	Jérôme Leroux
Invited talk	33rd International Symposium on Theoretical Aspects of Computer Science (STACS)	2016	Orléans, France	Ideal Decompositions for Vector Addition Systems	Jérôme Leroux
Invited talk	9th International Workshop on Reachability Problems (RP)	2015	Warsaw, Poland	Vector Addition Systems Howto	Jérôme Leroux
Invited talk	10th International Symposium on Games, Automata, Logics, and Formal Verification (GandALF)	2019	Bordeaux, France	The quasipolynomial era of parity games	Nathanaël Fijalkow
Invited talk	15th IFIP WG 1.3 International Workshop on Coalgebraic Methods in Computer Science (CMCS)	2020	Virtual	Universal graphs for parity games	Nathanaël Fijalkow
Invited lecture	DigiCosme Spring School on Formal Methods and Machine Learning	2018	Cachan, France	Program synthesis	Nathanaël Fijalkow
Invited talk	Conference AutomathA	2015	Leipzig, Germany	Probabilistic automata	Nathanaël Fijalkow
Invited talk	Silver Jubilee Lecture Series, Chennai Mathematical Institute	2015	Chennai, India	Varieties of languages, varieties of finite monoids	Pascal Weil
Invited talk	Special Session on Algebra and Computer Science, session de la conférence conjointe des sociétés mathématiques américaine, européenne et portugaise	2015	Porto, Portugal	Generic properties of random subgroups of free groups, and random group presentations	Pascal Weil

Invited talk	Geometric and Asymptotic Group Theory and Applications (GAGTA)	2016	Hoboken, NJ, USA	Genericity of Whitehead minimality for subgroups of free groups	Pascal Weil
Invited talk	Computational and Algorithmic Group Theory, AMS Sectional Meeting 1129	2017	New York City, USA	A graph-based method to randomly generate subgroups of free groups	Pascal Weil
Invited talk	Conference on the occasion of the 60th birthday of Mark Sapir	2017	Urbana-Champaign, IL, USA	Stallings graphs for quasi-convex subgroups of automatic groups	Pascal Weil
Invited talk	Logic and Automata Theory (in memory of Zoltan Esik), a satellite workshop of CSL'17	2017	Stockholm, Sweden	About recognizable languages of finite trees	Pascal Weil
Invited talk	International Conference on Algebra and Related Topics (ICARTA)	2019	Chalakudy, KE, India	Representing subgroups of free groups and computing with them	Pascal Weil
Keynote talk	10th International Conference on Web Reasoning and Rule Systems (RR)	2016	Aberdeen, Scotland	On the Limits and Possibilities of Query Rewriting	Meghyn Bienvenu
Invited "Early Career Spotlight" Talk	25th International Joint Conference on Artificial Intelligence (IJCAI)	2016	New York City, USA	Ontology-mediated query answering : Harnessing knowledge to get more from data	Meghyn Bienvenu
Keynote talk	32nd International Workshop on Description Logics (DL)	2019	Oslo, Norway	Inconsistency Handling in Ontology-Mediated Query Answering : A Progress Report	Meghyn Bienvenu
Invited talk	21st International Workshop on Logic and Computational Complexity (LCC)	2020	virtual	Ontology-Mediated Query Answering in OWL 2 QL : Succinctness and Complexity Landscapes	Meghyn Bienvenu
Keynote talk	Logic Colloquium	2016	Leeds, UK	Randomized algorithms in computability theory	Laurent Bienvenu

Invited Talk	Workshop Trends in Transformations, a satellite workshop of FSTTCS'18	2018	Ahmedabad, India	Origin semantics and equivalence for non-functional transducers	Vincent Penelle
Invited Talk	FIT'2019, special session on Game Theory in Computer Science	2019	Krakow, Poland	Games and fixpoints	Igor Walukiewicz
Invited Talk	43rd International Conference on Current Trends in Theory and Practice of Computer Science (SOFSEM)	2017	Lero – Limerick, Ireland	Systems with parametric thread creation	Igor Walukiewicz
Invited Talk	Summer School on Modelling and Verification of Parallel Processes (MOVEP)	2018	ENS Cachan, France	Verification of Timed Systems	Frédéric Herbreteau
Invited Talk	4th International Workshop on Verification and Program Transformation (VPT), a satellite workshop of ETAPS'16	2016	Eindhoven, The Netherlands	Model-based approach to verification of higher-order programs	Igor Walukiewicz
Invited Talk	Workshop on Algorithmic Verification of Real-Time Systems (AVerTS)	2015	Bengaluru, India	Improving search order for reachability testing in timed automata	Frédéric Herbreteau
Invited talk	36th International Symposium on Theoretical Aspects of Computer Science (STACS)	2019	Berlin, Germany	The many facets of string transducers	Anca Muscholl
Tutorial	Summer School Verification Technology, Systems and Applications (VTSA)	2018	Nancy, France	Control and synthesis, from a distributed perspective	Anca Muscholl
Invited talk	IARCS Annual Conference on Foundations of Software Technology and Theoretical Computer Science	2017	Kanpur, India	Automated synthesis : a distributed viewpoint	Anca Muscholl
Tutorial	3rd Nordic Logic Summer School (NLS)	2017	Stockholm, Suède	Logic in computer science – control and synthesis	Anca Muscholl
Invited talk	21st International Symposium on Fundamentals of Computation Theory (FCT)	2017	Bordeaux	A tour of recent results on word transducers	Anca Muscholl
Invited talk	25th EACSL Annual Conference on Computer Science Logic (CSL)	2016	Marseille	Automated synthesis : going distributed	Anca Muscholl
Keynote talk	42nd International Colloquium on Automata, Languages and Programming (ICALP) and 30th Annual ACM/IEEE Symposium on Logic in Computer Science (LICS)	2015	Kyoto, Japan	Automated synthesis of distributed controllers	Anca Muscholl

Invited talk	11th Conference on Computability in Europe (CiE)	2015	Bucharest, Romania	Automated synthesis of distributed controllers	Anca Muscholl
Invited talk	Highlights in Logic, Games and Automata (HIGHLIGHTS)	2020	Paris	On string transducers with origins	Anca Muscholl
Invited talk	GALA, satellite workshop of FSTTCS'19 for the 60th birthday of Paul Gastein	2019	Mumbai, India	The many facets of string transducers	Anca Muscholl
Invited talk	Alpha 15	2015	Bordeaux, France	Languages and equations	Géraud Sénizergues
invited talk	Equations and formal languages in algebra	2016	Les Diablerets, Suisse	First-order logic with idempotent variables over free inverse monoids	Géraud Sénizergues
invited talk	Conference in honor of Paul Schupp's 80th birthday	2017	Hoboken, USA	Definable sets in tree-like structures	Géraud Sénizergues
Keynote talk	10th International Conference on Security of Information and Networks	2017	Jaipur, Inde	Models and Approaches for the Safety and the Security of Distributed Systems	Mohamed Mosbah
Keynote talk	8th International Conference on Model and Data Engineering	2018	Marrakech, Maroc	Modeling Distributed Algorithms by Local Computations with Applications	Mohamed Mosbah

2 Interaction de l'équipe avec l'environnement non académique

2.1 Brevets, licences et déclarations d'invention

L'équipe a déposé deux brevets pendant la période.

- Articulation de membre inférieur pour la locomotion bipède. Ce brevet décrit un système d'orthèse, et plus particulièrement d'articulation auto-stabilisante, visant à stabiliser la jambe de l'utilisateur durant la phase d'appui. L'articulation comporte deux degrés de liberté ainsi que d'un berceau de guidage actionné automatique durant la phase d'appui au moyen de la force de réaction du sol. L'orthèse est destinée aux personnes souffrant d'un déficit de contrôle du genou, typiquement après un AVC. Référence : <https://patents.google.com/patent/WO2016189253A1/zh>.
- Dispositif de guidage d'un attelage entraîné par un véhicule, et procédé correspondant. Ce brevet décrit un système formé typiquement d'un tracteur, d'un outil de désherbage, et d'un système intermédiaire ajoutant un contrôle automatique latéral de l'outil de désherbage. Tout cela allié à un système embarqué comprenant un système de géolocalisation (typiquement GNSS) centimétrique, ainsi que d'un système de vision. Le système permet la détection et le jeu d'une opération de désherbage en plein champs pour les cultures organisées en rang. Référence : <https://patents.google.com/patent/WO2016128688A1/fr>

2.2 Interactions avec les acteurs socio-économiques

2.2.1 Thèses CIFRE

Tableau 3.14 : Thèses CIFRE, équipe MF

Doctorant	Titre	1 ^{re} année	Société	Encadrant
PREVOST Adrien	Vérification formelle par abstraction et raffinement incrémental : application à la certification de la sûreté de fonctionnement des postes d'enclenchement en phase d'étude"	2018	SNCF RESEAU	Igor Walukiewicz, Grégoire Sutre
CHAABOUNI Nadia	Etude et développement d'algorithmes d'apprentissage et distribués pour lutter contre le hameçonnage	2016	ATOS	Mohamed Mosbah, Akka Zemmari
BAUD-BERTHIER Guillaume	Encodage efficace des systèmes critiques pour la vérification formelle par Model Checking à base de solveurs SAI/SMT	2015	SafeRiver	Laurent Simon

2.2.2 Création de start-up

L'équipe Méthodes Formelles n'a pas de membre ayant participé à la création d'une start-up.

2.3 Activités d'expertise scientifique

Nous avons participé au projet NIDS (National Interference Detection System) avec les PME HELILEO, TELERAD, et 2MoRO Solutions financé par la DGA (DGA-RAPID).

2.4 Produits destinés au grand public

- Joanna Ochremiak a publié en décembre 2019 dans le magazine de vulgarisation "Delta" imprimé par l'université de Varsovie une article "About Hilbert's tenth problem". L'article en polonais, est disponible à l'adresse http://www.deltami.edu.pl/temat/informatyka/algorytmy/2019/11/27/0_dziesiatym_problemie_Hilberta/
- Antoine Rollet est membre de comité éditorial de la revue Interstices : www.interstices.info. Il s'agit d'une revue de culture scientifique en ligne, créée par des chercheurs pour "inviter le lecteur à explorer les sciences du numérique". C'est une revue de vulgarisation de la recherche.

3 Implication de l'équipe dans la formation par la recherche

3.0.1 Participation aux formations de Master

L'équipe MF participe au master Informatique de l'UF de l'université de Bordeaux (Alain Griffault est co-responsable de l'UF Informatique). Nous sommes également co-monteur de l'EUR Bordeaux Graduates School « Numerics » qui ouvrira en 2021. Nous encadrons par ailleurs des étudiants sur des stages de Master et proposons des initiations à la recherche.

3.0.2 Organisation d'Écoles

L'équipe MF a co-organisé :

- l'école des jeunes chercheurs en Informatique Mathématique (EJCIM) en 2020.
- 3rd School on Foundations of Programming and Software Systems, Nominal Techniques en 2019

Nous avons aussi donné des cours à l'école doctorale Math-Info (environ 5 séances de 2H par cours) :

- *Reinforcement Learning for Playing Games : from Theory to Practice* (2019-2020).
- *Comprendre, Utiliser et étendre les solveurs SAT* (2 fois entre 2018-2020).
- *Les temps modernes de l'intelligence artificielle* (4 fois entre 2015-2019).
- *Proof and programs* (2018-2019).
- *Element de théorie des catégories* (2016-2017).
- *Le langage Adga* (2017-2018).

3.0.3 Groupes de travail

En plus du séminaire d'équipe hebdomadaire (liste des orateurs sur la page <http://mf.labri.fr>), nous animons des groupes de travail thématiques ouverts tout LaBRI :

- Le groupe de travail “Coq” (officiellement “assistants de preuves”) a pour objectif l'apprentissage de l'assistant de preuves Coq pour des utilisateurs novices. La plupart des participants réguliers sont des membres permanents de CombAlgo ou de Méthodes Formelles, mais on compte également quelques doctorants.
- Le groupe de travail “Machine learning” a permis d'initier les membres de CombAlgo et de Méthodes Formelles à la théorie de l'apprentissage machine. Nous avons présenté pendant ce GT un ensemble d'articles fondateurs de la théorie, et des applications récentes, plus d'info sur https://deepsynth.labri.fr/index.html?page=reading_group.
- Le groupe de travail “Logic+Data” a été actif pendant 2019, autour des problèmes liés aux données et contraintes, et a propulsé la formation du groupe de recherche RATIO. Il y a eu, par exemple, des séries de séminaires introductifs autour de CSP, ontologies, ou automates pondérés. Maintenant le groupe de travail s'est transformé en un groupe de recherche, plus d'information sur <https://ratio.labri.fr>.

3.1 Produits des activités pédagogiques et didactiques

- Nathanaël Fijalkow anime un blog recherche diffusant des résultats scientifiques <https://games-automata-play.github.io/>. En moyenne, le blog reçoit 100 visiteurs uniques par mois.

- Nathanaël Fijalkow propose des notes de cours sur l'apprentissage par renforcement pour les jeux (<https://games-automata-play.github.io/RL/>), accompagnées de code libre destiné à l'enseignement (<https://github.com/nathanael-fijalkow/Multi-Armed-Banditset> https://github.com/nathanael-fijalkow/TicTacToe_RL).
- Jérôme Leroux, Vincent Penelle, et Grégoire Sutre ont développé l'outil SPA (Simple program analyzers). Spa est une collection d'outils basiques d'analyse de programme basés sur le model-checking borné, la vérification d'invariants inductifs, et l'interprétation abstraite. Ces outils, écrits en OCaml (et documentés en OCamlDoc), ont été développés afin de servir de support pour un cours de vérification de logiciels (de niveau Master 2).
- Vincent Penelle a édité le livre "Informatique Mathématique en 2020" imprimé par CNRS edition contenant les notes de cours de l'école des jeunes chercheurs en Informatique Mathématique (EJCIM).
- Mentionnons que Rhoban contribue également au développement des EdTech. Précisément, le projet Rhoban a conçu un robot adapté pour l'enseignement du secondaire, dont aujourd'hui une centaine d'exemplaire sont en test en collaboration avec le réseau Canopé.

3.2 Productions scientifiques (articles, ouvrages, etc.) issues des thèses

Les productions scientifiques issues des thèses sont distinguées dans la liste des publications en soulignant les noms des doctorants pour chacune de leur contribution. Leur nombre est résumé dans le tableau suivant.

Tableau 3.15 : Production des doctorants, équipe Méthodes Formelles

	Doctorants	Total équipe	Pourcentage
Conférences	46	231	20%
Revues	8	136	6%

3.3 Formation

3.3.1 PHD et HDR

- 16 soutenances PHD pendant la période [2015-2020] : BASCHENIS Félix, BAUD-BERTHIER Guillaume, BITONNEAU David, CHAABOUNI Nadia, DANDO Louis-Marie, DUBOURG Etienne, GEFFROY Thomas, KERMENDI Edon, KIRMAN Jérôme, KSOURI Chahrazed, LHOTE Nathan, PASSAULT Grégoire, PIERRON Théo, RENARD Matthieu, ROUXEL Quentin, TRAN Thanh Tung.
- 3 soutenances HDR pendant la période [2015-2020] : BIENVENU Meghyn, ROLLET Antoine, SALVATI Sylvain.

Bench to Knowledge and Beyond

1 Production de connaissances et activités concourant au rayonnement et à l’attractivité scientifique

1.1 Revues

L’équipe Bench to Knowledge and Beyond a publié 97 articles en revue.

Revue de l’équipe Bench to Knowledge and Beyond		
	Q1	Autres
Nombre	54	43
Pourcentage	56%	44%

Revue, top 20%

- [BKB*-J1] [Karim ALAMI](#), [Nicolas HANUSSE](#), Patrick Kamnang WANKO, and [Sofian MAABOUT](#). “The negative skycube.” In: *Inf. Syst.* 88 (2020). DOI: 10.1016/j.is.2019.101443.
- [BKB*-J2] Pierre ALLIEZ, Roberto di COSMO, Benjamin GUEDJ, Alain GIRAULT, Mohand-Said HACID, Arnaud LEGRAND, and [Nicolas P. ROUGIER](#). “Attributing and Referencing (Research) Software: Best Practices and Outlook From Inria.” In: *Comput. Sci. Eng.* 22.1 (2020), pp. 39–52. DOI: 10.1109/MCSE.2019.2949413.
- [BKB*-J3] [Aaron AYLLON Benitez](#), Fleur MOUGIN, [Julien ALLALI](#), Rodolphe THIEBAUT, and [Patricia THEBAULT](#). “A new method for evaluating the impacts of semantic similarity measures on the annotation of gene sets.” In: *PLoS ONE* 13.11 (Nov. 2018). DOI: 10.1371/journal.pone.0208037.

- [BKB*-J4] V. BEAUDOUX, **Guillaume BLIN**, B. BARBREL, G. KANTOR, and C. ZACHARATOU. “Geant4 physics list comparison for the simulation of phase-contrast mammography (XPulse project).” In: *Physica Medica* 60 (Apr. 2019), pp. 66–75. DOI: 10.1016/j.ejmp.2019.03.026.
- [BKB*-J5] Djamal BELAZZOUGUI, Roman KOLPAKOV, and **Mathieu RAFFINOT**. “Indexing and querying color sets of images.” In: *Theor. Comput. Sci.* 647 (2016), pp. 74–84. DOI: 10.1016/j.tcs.2016.07.041.
- [BKB*-J6] Fabien C. Y. BENUREAU and **Nicolas P. ROUGIER**. “Re-run, Repeat, Reproduce, Reuse, Replicate: Transforming Code into Scientific Contributions.” In: *Frontiers Neuroinformatics* 11 (2017), p. 69. DOI: 10.3389/fninf.2017.00069.
- [BKB*-J7] **Romain BOURQUI**, **Isabelle DUTOIR**, Jonathan DUBOIS, William BENCHIMOL, and **Patricia THEBAULT**. “rNAV 2.0: a visualization tool for bacterial sRNA-mediated regulatory networks mining.” In: *BMC Bioinform.* 18.1 (2017), 188:1–188:10. DOI: 10.1186/s12859-017-1598-8.
- [BKB*-J8] Bryan BRANCOTTE, Bo YANG, **Guillaume BLIN**, Sarah Cohen BOULAKIA, Alain DENISE, and Sylvie HAMEL. “Rank aggregation with ties: Experiments and Analysis.” In: *Proc. VLDB Endow.* 8.11 (2015), pp. 1202–1213. DOI: 10.14778/2809974.2809982.
- [BKB*-J9] Yvan le BRAS, Olivier COLLIN, Cyril MONJEAUD, Vincent LACROIX, Eric RIVALS, Claire LEMAITRE, Vincent MIELE, Gustavo SACOMOTO, Camille MARCHET, Bastien CAZAUX, Amal Zine El AABIDINE, Leena SALMELA, Susete ALVES-CARVALHO, Alexan ANDRIEUX, **Raluca URICARU**, and Pierre PETER-LONGO. “Colib’read on galaxy: a tools suite dedicated to biological information extraction from raw NGS reads.” In: *GigaScience* 5.1 (Feb. 2016). DOI: 10.1186/s13742-015-0105-2.
- [BKB*-J10] G. Elisabeta MARAI, **Bruno PINAUD**, Katja BÜHLER, Alexander LEX, and John H. MORRIS. “Ten simple rules to create biological network figures for communication.” In: *PLoS Computational Biology* 15.9 (2019). DOI: 10.1371/journal.pcbi.1007244.
- [BKB*-J11] Fintan MCGEE, Mohammad GHONIEM, **Guy MÉLANÇON**, Benoit OTJACQUES, and **Bruno PINAUD**. “The State of the Art in Multilayer Network Visualization.” In: *Comput. Graph. Forum* 38.6 (2019), pp. 125–149. DOI: 10.1111/cgf.13610.
- [BKB*-J12] Fleur MOUGIN, **David AUBER**, **Romain BOURQUI**, **Gayo DIALLO**, **Isabelle DUTOIR**, Vianney JOUHET, Frantz THIESSARD, Rodolphe THIEBAUT, and **Patricia THEBAULT**. “Visualizing omics and clinical data: which challenges for dealing with their variety?” In: *Methods* (2017). DOI: 10.1016/j.ymeth.2017.08.012.
- [BKB*-J13] Paulo Henrique PISANI, Abir MHENNI, **Romain GIOT**, Estelle CHERRIER, Norman POH, André Carlos de LEON FERREIRA DE PONCE CARVALHO, Christophe ROSENBERGER, and Najoua Essoukri Ben AMARA. “Adaptive Biometric Systems: Review and Perspectives.” In: *ACM Comput. Surv.* 52.5 (2019), 102:1–102:38. DOI: 10.1145/3344255.
- [BKB*-J14] Nathalie QUENEL-TUEUX, Marc DEBLED, **Justine RUDEWICZ**, Gaetan MACGROGAN, Marina PULIDO, Louis MAURIAC, Florence DALENC, Thomas BACHELOT, Lortal BARBARA, Christelle BRETON-CALLU, Nicolas MADRANGES, Christine Tunon de LARA, Marion FOURNIER, Hervé BONNEFOI, Hayssam SOUEIDAN, **Marie NIKOLSKI**, Audrey GROS, Daly CATHERINE, Wood HENRY, Rabbitts PAMELA, and Richard IGGO. “Clinical and genomic analysis of a randomised phase II study evaluating anastrozole and fulvestrant in postmenopausal patients treated for large operable or locally advanced hormone-receptor-positive breast cancer.” In: *British Journal of Cancer* (July 2015), bjc.2015.247. DOI: 10.1038/bjc.2015.247.
- [BKB*-J15] Benjamin RENOUST, **Guy MÉLANÇON**, and Tamara MUNZNER. “Detangler: Visual Analytics for Multiplex Networks.” In: *Comput. Graph. Forum* 34.3 (2015), pp. 321–330. DOI: 10.1111/cgf.12644.

- [BKB*-J16] **Nicolas P. ROUGIER**. “A Density-Driven Method for the Placement of Biological Cells Over Two-Dimensional Manifolds.” In: *Frontiers Neuroinformatics* 12 (2018), p. 12. DOI: 10.3389/fninf.2018.00012.
- [BKB*-J17] **Justine RUDEWICZ**, Hayssam SOUEIDAN, **Raluca URICARU**, Hervé BONNEFOI, Richard IGGO, Jonas BERGH, and **Marie NIKOLSKI**. “MICADo - Looking for mutations in targeted PacBio cancer data: an alignment-free method.” In: *Frontiers in Genetics* (Nov. 2016). DOI: 10.3389/fgene.2016.00214.
- [BKB*-J18] **Joris SANSEN**, **Gaëlle RICHER**, Timothée JOURDE, **Frédéric LALANNE**, **David AUBER**, and **Romain BOURQUI**. “Visual Exploration of Large Multidimensional Data Using Parallel Coordinates on Big Data Infrastructure.” In: *Informatics* 4.3 (2017), p. 21. DOI: 10.3390/informatics4030021.
- [BKB*-J19] Gabriel SARGENT, Karina PEREZ-DANIEL, Andrei STOIAN, **Jenny BENOIS-PINEAU**, **Sofian MAABOUT**, **Henri NICOLAS**, Mariko NAKANO-MIYATAKE, and Jean CARRIVE. “A scalable summary generation method based on cross-modal consensus clustering and OLAP cube modeling.” In: *Multim. Tools Appl.* 75.15 (2016), pp. 9073–9094. DOI: 10.1007/s11042-015-2863-3.
- [BKB*-J20] Wahiba TAOUALI, Laurent GOFFART, **Frédéric ALEXANDRE**, and **Nicolas P. ROUGIER**. “A parsimonious computational model of visual target position encoding in the superior colliculus.” In: *Biological Cybernetics* 109.4-5 (2015), pp. 549–559. DOI: 10.1007/s00422-015-0660-8.
- [BKB*-J21] **Patricia THEBAULT**, **Romain BOURQUI**, William BENCHIMOL, Christine GASPIN, Pascal SIRAND-PUGNET, **Raluca URICARU**, and **Isabelle DUTOUR**. “Advantages of mixing bioinformatics and visualization approaches for analyzing sRNA-mediated regulatory bacterial networks.” In: *Briefings Bioinform.* 16.5 (2015), pp. 795–805. DOI: 10.1093/bib/bbu045.

1.2 Ouvrages

Livres

- [BKB-L1] Olivier CURÉ and **Guillaume BLIN**. *RDF Database Systems: Triples Storage and SPARQL Query Processing*. Morgan Kaufmann, 2015. ISBN: 978-0-12-799957-9. DOI: 10.1016/C2013-0-14009-3.

Éditions d’actes

- [BKB-A1] J. Christian ATTIOGBÉ, Flavio FERRAROTTI, and **Sofian MAABOUT**, eds. *New Trends in Model and Data Engineering - MEDI 2019 International Workshops, DETECT, DSSGA, TRIDENT, Toulouse, France, October 28-31, 2019, Proceedings*. Vol. 1085. Communications in Computer and Information Science. Springer, 2019. ISBN: 978-3-030-32212-0. DOI: 10.1007/978-3-030-32213-7.
- [BKB-A2] Fabrice GUILLET, **Bruno PINAUD**, and Gilles VENTURINI, eds. *Advances in Knowledge Discovery and Management - Volume 6 [Best of EGC 2014, Rennes, France / Best of EGC 2015, Luxembourg]*. Vol. 665. Studies in Computational Intelligence. 2017. ISBN: 978-3-319-45762-8. DOI: 10.1007/978-3-319-45763-5.
- [BKB-A3] Fabrice GUILLET, **Bruno PINAUD**, Gilles VENTURINI, and Djamel Abdelkader ZIGHED, eds. *Advances in Knowledge Discovery and Management - Volume 5 [Best of EGC 2013, Toulouse, France]*. Vol. 615. Studies in Computational Intelligence. Springer, 2016. ISBN: 978-3-319-23750-3. DOI: 10.1007/978-3-319-23751-0.

- [BKB-A4] **Bruno PINAUD**, Fabrice GUILLET, Bruno CRÉMILLEUX, and Cyril de RUNZ, eds. *Advances in Knowledge Discovery and Management - Volume 7 [Best of EGC 2016, Reims, France]*. Vol. 732. Studies in Computational Intelligence. Springer, 2018. ISBN: 978-3-319-65405-8. DOI: 10.1007/978-3-319-65406-5.
- [BKB-A5] **Bruno PINAUD**, Fabrice GUILLET, Fabien L. GANDON, and Christine LARGERON, eds. *Advances in Knowledge Discovery and Management - Volume 8 [Best of EGC 2017, Grenoble, France, and Best of EGC 2018, Paris, France]*. Vol. 834. Studies in Computational Intelligence. Springer, 2019. ISBN: 978-3-030-18128-4. DOI: 10.1007/978-3-030-18129-1.
- [BKB-A6] Evaggelia PITOURA, **Sofian MAABOUT**, Georgia KOUTRIKA, Amélie MARIAN, Letizia TANCA, Ioana MANOLESCU, and Kostas STEFANIDIS, eds. *Proceedings of the 19th International Conference on Extending Database Technology, EDBT 2016, Bordeaux, France, March 15-16, 2016, Bordeaux, France, March 15-16, 2016*. OpenProceedings.org, 2016. ISBN: 978-3-89318-070-7.

1.3 Production dans des colloques / congrès, séminaires de recherche

Comme indiqué précédemment, les membres de l'équipe privilégient des événements nationaux et internationaux représentatifs de la communauté de recherche et qui sont le lieu de rencontres fructueuses et vecteurs de collaborations. Pour autant, on peut constater qu'une bonne partie des publications longues en revue visent, quant à elles, des revues de premiers rangs.

L'équipe Bench to Knowledge and Beyond a publié 121 articles en conférences.

Conférences de l'équipe Bench to Knowledge and Beyond		
	A* et A	Autres
Nombre	11	110
Pourcentage	9%	91%

Conférences, top 20%

- [BKB*-C1] **Karim ALAMI** and **Sofian MAABOUT**. "Multidimensional Skylines over Streaming Data." In: *Database Systems for Advanced Applications - 24th International Conference, DASFAA 2019, Chiang Mai, Thailand, April 22-25, 2019, Proceedings, Part III, and DASFAA 2019 International Workshops: BDMS, BDQM, and GDMA, Chiang Mai, Thailand, April 22-25, 2019, Proceedings*. Ed. by Guoliang LI, Jun YANG, João GAMA, Juggapong NATWICHAI, and Yongxin TONG. Vol. 11448. Lecture Notes in Computer Science. Springer, 2019, pp. 338–342. DOI: 10.1007/978-3-030-18590-9_41.
- [BKB*-C2] **Julien ALLALI**, Cédric CHAUVE, and Laetitia BOURGEADE. "Chaining Fragments in Sequences: to Sweep or Not (Extended Abstract)." In: *String Processing and Information Retrieval - 22nd International Symposium, SPIRE 2015, London, UK, September 1-4, 2015, Proceedings*. Ed. by Costas S. ILIOPOULOS, Simon J. PUGLISI, and Emine YILMAZ. Vol. 9309. Lecture Notes in Computer Science. Springer, 2015, pp. 116–123. DOI: 10.1007/978-3-319-23826-5_12.

- [BKB*-C3] [Julien ALLALI](#), Rémi FABRE, Loïc GONDREY, [Ludovic HOFER](#), [Olivier LY](#), [Steve N'GUYEN](#), [Grégoire PASSAULT](#), Antoine PIRRONE, and [Quentin ROUXEL](#). “Rhuban Football Club: RoboCup Humanoid Kid-Size 2017 Champion Team Paper.” In: *RoboCup 2017: Robot World Cup XXI [Nagoya, Japan, July 27-31, 2017]*. Ed. by Hidehisa AKIYAMA, Oliver OBST, Claude SAMMUT, and Flavio TONIDANDEL. Vol. 11175. Lecture Notes in Computer Science. Springer, 2017, pp. 423–434. DOI: 10.1007/978-3-030-00308-1_35.
- [BKB*-C4] [Guillaume BLIN](#), Alexandre Blondin MASSÉ, [Marie GASPAREUX](#), Sylvie HAMEL, and Élise VANDOMME. “Nearest constrained circular words.” In: *Annual Symposium on Combinatorial Pattern Matching, CPM 2018, July 2-4, 2018 - Qingdao, China*. Ed. by Gonzalo NAVARRO, David SANKOFF, and Binhai ZHU. Vol. 105. LIPIcs. Schloss Dagstuhl - Leibniz-Zentrum für Informatik, 2018, 6:1–6:14. DOI: 10.4230/LIPIcs.CPM.2018.6.
- [BKB*-C5] [Romain BOURQUI](#), Dino IENCO, Arnaud SALLABERRY, and Pascal PONCELET. “Multilayer graph edge bundling.” In: *2016 IEEE Pacific Visualization Symposium, PacificVis 2016, Taipei, Taiwan, April 19-22, 2016*. Ed. by Chuck HANSEN, Ivan VIOLA, and Xiaoru YUAN. IEEE Computer Society, 2016, pp. 184–188. DOI: 10.1109/PACIFICVIS.2016.7465267.
- [BKB*-C6] [Maxime CARRERE](#) and [Frédéric ALEXANDRE](#). “Modeling pavlovian conditioning with multiple neuronal populations.” In: *2015 International Joint Conference on Neural Networks, IJCNN 2015, Killarney, Ireland, July 12-17, 2015*. IEEE, 2015, pp. 1–8. DOI: 10.1109/IJCNN.2015.7280716.
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1.4 Produits et outils informatiques

L'équipe BKB a développé plusieurs logiciels à forte visibilité :

- Tulip (<https://tulip.labri.fr>) - Tulip est la plateforme de visualisation analytique basée sur des graphes du LaBRI. Tulip est avant tout une riche bibliothèque de programmation en C++ pour créer, manipuler, visualiser et interagir avec des graphes. Un atout majeur de Tulip est que les nombreuses fonctionnalités existantes peuvent être enrichies par la création de modules additionnels. L'ensemble de la bibliothèque C++ est aussi accessible depuis un environnement complet de développement en Python inclus. Tulip est développé depuis le début des années 2000. Son développement reste actif avec le passage à la version 5.0 en 2017 et depuis deux nouvelles versions par année. Actuellement, la version 5.5 est en préparation pour une sortie fin 2020. Sur les 5 dernières années, Tulip a été téléchargé environ 41000 téléchargements soit presque 1 téléchargement par heure. Pour plus d'information, voir David Auber, Daniel Archambault, Romain Bourqui, Maylis Delest, Jonathan Dubois, et al.. TULIP 5. Reda Alhajj ; Jon Rokne. *Encyclopedia of Social Network Analysis and Mining*, Springer, pp.1-28, 2017 <hal-01654518>
- Porgy (<https://porgy.labri.fr>) - Porgy est une plateforme visuelle et interactive pour la modélisation, simulation et analyse de systèmes complexes à l'aide de la réécriture de graphe. Porgy permet de modéliser les évolutions du système par un ensemble de règles de réécriture appliquées sur un graphe qui représente

un état du système. Porgy construit un historique complet de l'ensemble des applications de règles sous la forme d'un arbre de dérivations. Cet arbre peut ensuite être étudié pour comprendre comment émerge le comportement global du système étudié à partir d'un ensemble de modifications locales qui sont les applications de règles. Cette plateforme est le résultat d'une collaboration entamée en 2009 entre Bruno Pinaud, Hélène Kirchner (Inria) et Maribel Fernandez (King's College London).

- discoSnp (<https://github.com/GATB/DiscoSnp>) et leon (<https://github.com/GATB/leon>) - Développés en collaboration avec l'équipe GenScale (Inria, Rennes). Il s'agit de logiciels de référence dans la détection de variations nucléotidiques pour discoSnp et dans la compression de données de séquençage pour leon. Publiés dans des journaux de référence en bioinformatique : Nucleic Acids Research (NAR), respectivement BMC Bioinformatics, les deux logiciels sont accessibles dans la suite de logiciels de haute performance dédiée à l'analyse de génomes, GATB <http://gatb.inria.fr/>. L'utilisation de discoSNP et de leon est largement répandue dans les communautés françaises et internationales de bioinformaticiens et biologistes.
- CoPHI - Joris Sansen, Gaëlle Richer, Frédéric Lalanne, Thimotée Jourde, David Auber et Romain Bourqui ont développé une application web nommée CoPHI pour l'exploration interactive de données multi-dimensionnelles (<https://www.labri.fr/perso/gricher/project/cophi/>). Cette méthode de visualisation associée à un stockage dédié sur infrastructure cloud permet de manipuler des données de très grandes tailles sans latence importante. L'application au Big Data a donné lieu à 2 publications en revue internationale et 1 publication dans un workshop international.
- rNAV v2.0 - Romain Bourqui, Isabelle Dutour, Jonathan Dubois, William Benchimol et Patricia Thébaud ont développé la version 2 du logiciel rNAV. Ce logiciel permet la visualisation et l'analyse de réseaux d'interaction entre différents types de molécules d'ARN prédits par des outils bioinformatiques afin d'identifier les interactions les plus probables qu'il faut ensuite valider expérimentalement. Ce logiciel a donné lieu à une publication en revue internationale de haut rang.
- ReservoirPy (<https://github.com/neuronX/reservoirpy>) - Cette boîte à outils fournit une classe de réseaux de type Echo State networks (ESN) qui peuvent être utilisés avec Python et ses bibliothèques scientifiques comme Numpy, Scipy et Matplotlib. Elle comprend une expertise utile pour former des réseaux neuronaux récurrents de type architecture ESN. ESN est un type particulier de réseau neuronal récurrent (RNN) avec ou sans neurones à fuites. Le flux d'entrée est projeté sur une couche récurrente aléatoire et une couche de sortie linéaire (appelée "read-out") est modifiée par apprentissage (qui peut également être effectué en ligne). Par rapport aux autres RNN, la couche d'entrée et la couche récurrente (appelée "réservoir") n'ont pas besoin d'être entraînées. Pour les autres RNN, la structure de la couche récurrente évolue dans la plupart des cas par des algorithmes de descente en gradient comme la rétropropagation en temps réel, qui n'est pas biologiquement plausible et qui est adaptée de manière itérative pour être capable d'extraire une représentation de la séquence d'entrée. En revanche, les poids aléatoires du réservoir de l'ESN ne sont pas entraînés, mais adaptés pour posséder la "propriété d'état de l'écho" (ESP) ou au moins une dynamique appropriée (par exemple "bord du chaos") à généraliser, ce qui inclut une transformation non linéaire de l'entrée qui peut être apprise par un classificateur linéaire. Les pondérations sont adaptées par une mise à l'échelle des poids basée sur la valeur propre absolue maximale (également appelée rayon spectral), qui est un hyperparamètre spécifique à la tâche. Les états du réservoir sont séparables linéairement et peuvent être cartographiés sur la couche de sortie par une régression linéaire peu coûteuse en termes de calcul, car aucune descente de gradient n'est nécessaire. Les poids de la couche d'entrée peuvent être mis à l'échelle par l'hyperparamètre de mise à l'échelle des entrées, qui dépend également de la nature des entrées.
- VirtualEnaction (<http://virtualenaction.gforge.inria.fr>) - Les modèles que nous étudions ont des applications qui vont bien au-delà de ce qu'il est possible d'expérimenter jusqu'à présent sur des sujets humains ou des primates non humains. Les expérimentations robotiques réelles sont également gênées par des contraintes technologiques assez lourdes. Le seul environnement polyvalent dans lequel des comportements aussi

complexes peuvent être étudiés à la fois globalement et au niveau des détails de la modélisation est un environnement virtuel, comme dans les jeux vidéo. Un tel système peut être mis en œuvre sous forme de "brainy-bot" (un joueur programmé basé sur notre connaissance de l'architecture du cerveau) dont le but est de survivre dans un environnement manipulable complet. Afin d'atteindre cet objectif plutôt ambitieux, nous devons à la fois (i) déployer un middleware de jeu vidéo open-source existant afin de pouvoir modéliser la situation de survie à étudier et (ii) revisiter les modèles existants afin de pouvoir les intégrer en tant que "brainy-bot" efficaces. Il s'agit d'une plateforme associée à un scénario le plus proche possible d'une situation de survie (recherche de nourriture, relation prédateur-proie, approche de partenaire) et dans laquelle il est facile d'intégrer un agent artificiel avec des entrées sensorielles (visuel, toucher et odorat), des signaux émotionnels et somatosensoriels (faim, soif, peur, ..) et des sorties motrices (mouvement, geste, ..) reliés à un "cerveau" dont l'architecture correspondra aux grandes régions anatomiques impliquées dans les questions d'apprentissage et de sélection des actions (cortex, ganglions de la base, hippocampe, et zones dédiées aux processus sensorimoteurs). L'horloge interne du jeu peut être suffisamment ralentie pour pouvoir exécuter des implémentations non triviales.

- DANA (<http://dana.loria.fr>) - DANA est un framework python dont le paradigme de calcul est basé sur la notion d'unité qui est essentiellement un ensemble de valeurs dépendantes du temps qui varient sous l'influence d'autres unités via des connexions pondérées adaptatives. Les évolutions de la valeur d'une unité sont définies par un ensemble d'équations différentielles exprimées en notation mathématique standard qui facilitent grandement leur définition. Les unités sont organisées en groupes qui forment un modèle. Chaque unité peut être connectée à toute autre unité (y compris elle-même) par le biais d'une connexion pondérée. Le cadre DANA offre un ensemble d'objets de base nécessaires pour concevoir et exécuter de tels modèles. Le modélisateur n'a qu'à définir les équations d'une unité ainsi que les équations régissant l'apprentissage des connexions. La simulation est complètement transparente pour le modelleur et est gérée par DANA. Cela permet à DANA d'être utilisé pour un large éventail de modèles numériques et distribués, pour autant qu'ils correspondent au cadre proposé (par exemple, automates cellulaires, système de réaction-diffusion, réseaux neuronaux décentralisés, réseaux neuronaux récurrents, traitement d'images basé sur les noyaux, etc.).

1.5 Développements instrumentaux et méthodologiques

L'équipe n'a pas de contribution dans ce domaine.

1.6 Autres produits propres à une discipline

L'équipe n'a pas de contribution dans ce domaine.

1.7 Activités éditoriales

1.7.1 Participation à des comités éditoriaux

Tableau 4.1 : Édition, équipe BKB

Rôle	Nom de la revue	Période	Membre
Associate editor	Membre du Comité éditorial de NAR Genomics and Bioinformatics du groupe Nucleic Acid Research.	2019	Patricia Thebault

Editor	Studies in Computational Intelligence - Advances In Knowledge Discovery and Management, Volume 5-8	2016–2019	Bruno Pinaud
Editor	PeerJ	2018	Nicolas Rougier
Editor	Web Intelligence An International Journal (IOS)	2015	Guy Melancon
Editor	Frontiers in Neurorobotics	2015	Nicolas Rougier
Editor in chief	ReScience	2015	Nicolas Rougier
Editor	Journal of Bioinformatics	2014–2015	Guillaume Blin

1.7.2 Éditeur invité, numéro spécial

Tableau 4.2 : Édition de numéros spéciaux, équipe BKB

Rôle	Nom du numéro spécial	Année	Membre
Invited editor	Metagenomics profiling : advances in algorithmic approaches and biomedical applications	2015	Macha Nikolski

1.8 Activités d'évaluation

1.8.1 Evaluation d'articles

Les membres de l'équipe interviennent au sein de conférences de rangs A/A* telles que Graph Drawing, International Conference on Document Analysis and Recognition, International Conference on Extending Database Technology, ACM International Conference on Information and Knowledge Management, International Conference on Intelligent User Interfaces.

Program Committee Member (PC), Program Committee Chair (Chair) dans les conférences (A/A* ou autre), équipe BKB

	A/A*	Autres
PC	7	42
Chair	1	6

1.8.2 Evaluation de projets de recherche

Les membres de l'équipe participent à de multiples évaluations de projets auprès d'instances nationales (ANR) et internationales (NSERC, NSFC, Marie-Curie, AMSUD, Engineering and Physical Sciences Research Council, BBSRC, UNESCO, ECOS Sud) dans le cadre d'AAP tels que l'AAP Discovery Grants NSERC Program (Canada), le FNR (Luxembourg), les projets PRC, PRESTIGE Marie Curie COFUND, STIC AMSUD, Sloan foundation, le Paris Call - Software Source Code as Heritage (France) et APHP (UK).

A noter que Sofian Maabout a été vice président bureau du CE 23 (Connaissances, HPC, Simulation, Big Data) auprès de l'ANR .

Participation à des comités de d'évaluation de projets, équipe BKB		
	National	International
Membre	1	
Expert	4	11

1.8.3 Evaluation de laboratoire

Dans l'équipe, Guillaume Blin a été membre invité du comité d'évaluation à mi-parcours du LITIS (Laboratoire d'Informatique, de Traitement de l'Information et des Systèmes, Université du Havre) en juin 2020.

1.8.4 Responsabilités au sein d'instances d'évaluation

- Patricia Thébault est membre élu du CNU en section 65 pour une période (2020-2023).
- Romain Bourqui est membre adjoint nommé du CNU en section 27 pour une période (2020-2023).

1.9 Contrats de recherche financés par des institutions publiques ou caritatives

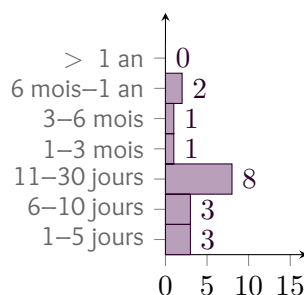
Le tableau suivant rend compte des contrats obtenus par l'équipe.

Tableau 4.3 : Contrats de l'équipe Bench to Knowledge and Beyond, en k€							
	2015	2016	2017	2018	2019	2020	Total
International, dont Europe	0	280	179	0	0	1500	1959
National	259	205	133	117	83	8	805
Régional	0	40	0	498	57	0	595
Industrie	65	271	0	73	146	0	555

Montant total des contrats pour l'équipe Bench to Knowledge and Beyond : **3914 k€**.

1.10 Post-doctorants et chercheurs accueillis

1.10.1 Chercheurs étrangers invités



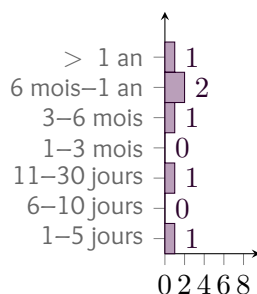
Nombre d'invités étrangers de l'équipe BKB

L'équipe invite régulièrement des chercheurs français et étrangers principalement pour des séjours de moyenne durée (moins de 30 jours) 4.4.

Tableau 4.4 : Accueil chercheurs, équipe BKB (international, ≥ 90 jours)

Invité	Institution	Pays	Annee	Durée	Invitant
SOLANO Geoffrey	UNIVERSITY OF THE PHILIPPINES, DILIMAN QUEZON CITY	PHILIPPINES	2017	188	Guillaume Blin
UREÑA Raquel	UNIVERSITY OF CADIZ	ESPAGNE	2017	102	Guy Melancon
CHAUVE Cedric	SIMON FRASER UNIVERSITY	CANADA	2018	302	Guillaume Blin
GHOUALMI Lamis	UNIVERSITY CONSTANTINE 2	ALGÉRIE	2015	91	Romain Giot

1.10.2 Chercheurs français invités



Nombre d'invités français de l'équipe BKB

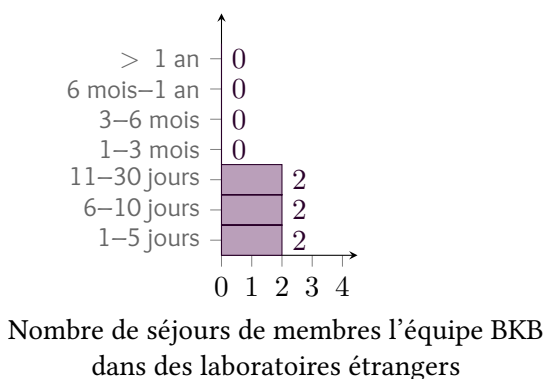
L'équipe invite régulièrement des chercheurs français et étrangers principalement pour des séjours de moyenne durée (moins de 30 jours) 4.4.

Tableau 4.5 : Accueil chercheurs, équipe BKB (national, ≥ 90 jours)

Invité	Institution	Annee	Durée	Invitant
CHAUMEIL Philippe	INRA	2015	199	David Sherman
REZZOUKI Marwane	IMS	2019	175	David Auber
JIANG Yiye	IMB	2019	892	David Auber
REZZOUKI Marwane	IMS	2019	338	David Auber

1.11 Indices de reconnaissance

1.11.1 Séjours dans des laboratoires étrangers



L'équipe Bench to Knowledge and Beyond n'a pas de membre ayant été invité au moins 90 jours à l'international.

1.11.2 Récompenses et prix

Sur la période, l'équipe a reçu trois "best paper awards" lors de l'IEEE Symposium on Large Data Analysis and Visualization (LDAV 2015) pour l'article "Large Interactive Visualization of Density Functions on Big Data Infrastructure", lors d'Information Visualisation (IV'15) pour l'article "Adjasankey : Visualization of huge hierarchical weighted and directed graphs" et lors de l'International Joint Conference on Computational Intelligence pour l'article "A Heteroassociative Learning Model Robust to Interference". Par ailleurs, Jason Vallet a obtenu le prix de thèse de la société EGC 2019 et le prix du meilleur article académique à EGC 2015.

1.11.3 Participation à des jurys de prix

L'équipe Bench to Knowledge and Beyond n'a pas de membre ayant participé à un jury de prix.

2 Interaction de l'équipe avec l'environnement non académique

Impacts sur l'économie, la société, la culture, la santé

Comme précédemment indiqué, l'équipe, de par ses thématiques de recherche appliquées et son vaste spectre de compétences, est largement sollicitée par des industriels locaux (e.g. Ubisoft, AT Internet, LECTRA, Suez, Bordeaux métropole, Betclick), nationaux (e.g. CEA, Orange, SNCF, Thalès) et des UMR d'autres disciplines (UMR Comptrasec et UMR PASSAGES). Tout particulièrement pour ses compétences en visualisation d'information, l'équipe a également participé à des projets portés par le Ministère de l'Enseignement supérieur, de la Recherche et de l'Innovation (algorithme Parcoursup) ainsi que le CNRS (Covid NMA).

2.1 Brevets, licences et déclarations d'invention

2.1.1 Brevets

Tableau 4.6 : Brevets, équipe BKB

Année	Titre	Laboratoire	Auteur
2017	Système de refroidissement sans apport d'énergie	LABRI	RAFFINOT Mathieu

2.2 Interactions avec les acteurs socio-économiques

2.2.1 Thèses CIFRE

L'équipe a une activité importante d'encadrement de thèse CIFRE 4.7.

Tableau 4.7 : Thèses CIFRE, équipe BKB

Doctorant	Titre	1 ^{re} année	Société	Encadrant
LALLIER Corentin	Détection d'anomalies pour l'optimisation de performance dans le contexte de l'industrie 4.0	2019	LECTRA	PINAUD Bruno, BLIN Guillaume
THAIO-FAYEL Bruno	Service de Gestion efficiente de métadonnées sémantiques pour la découverte et la réutilisation de données liées aux médicaments	2018	SYNAPSE MEDICINE	DIALLO Gayo, BLIN Guillaume
LOPEZ Myriam	Localisation et prédiction de pannes pour l'usine du futur	2018	Lectra	BEURTON AIMAR Marie, MAABOUT Sofian, DIALLO Gayo
DELIASSUS Rémy	Apprentissage et sélection de caractéristiques automatiques et en ligne pour la détection de pannes des systèmes de vélos libre service	2015	QU-CIT	MELANCON Guy, GIOT Romain
CHRAIBI KAADOUD Ikram	Approche bio-inspirée pour une planification hiérarchique et modulaire : application au traçage de schémas techniques	2015	Algo'Tech	ALEXANDRE Frédéric, ROUGIER Nicolas

REN Haolin	Cartographie interactive de réseaux multiplexes	2015	INA - Institut National de l'audiovisuel	MELANCON Guy
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2.2.2 Création de start-up

L'équipe Bench to Knowledge and Beyond n'a pas de membre ayant participé à un encadrement de thèse CIFRE.

2.3 Activités d'expertise scientifique

En 2017, Sofian Maabout a été vice président du comité d'évaluation de l'axe 23 de l'ANR (big data, connaissances, simulation, HPC).

2.4 Produits destinés au grand public

Les membres de l'équipe, principalement via l'EPI Mnemosyne, ont publié un grand nombre d'article grand public :

- F. Alexandre. Comprendre ou transformer l'humain ? Enjeux et voies potentielles de l'Intelligence Artificielle, in : Puissances technologiques et éthique de la finitude humaine, C. C. I. de Coopération avec l'UNESCO, A. C. de France (editors), Parole et Silence, November 2019, 23 p.
- F. Alexandre. De quelles façons l'intelligence artificielle se sert-elle des neurosciences ?, in : The Conversation, October 2019.
- N. P. Rougier. Pourquoi votre chat est nul aux échecs et pourtant plus intelligent qu'une IA, in : The Conversation, October 2019.
- M. Ciussi, N. Colombier, S. -C. Lefèvre, I. Yastrebova - Otmanine, M. Romero, C. De Smet, T. Viéville. Numérique et éducation ... vous avez dit CreaSmartEdtech ?, in : Blog Binaire LeMonde. fr, July 2018.
- T. F. Drumond, L. Viennot, T. Viéville, V. François. Jouez avec les neurones de la machine, in : Blog Binaire LeMonde. fr, October 2017, pp. 1-3.
- F. Alexandre. Marvin Minsky : l'intelligence artificielle débraillée, March 2016, Bulletin de la Société Informatique de France.
- Chraïbi Kaadoud, T. Viéville. L'apprentissage profond : une idée à creuser ? , in : Interstices, April 2016.
- N. P. Rougier. Silicon soul : The vain dream of electronic immortality, in : The Conversation, January 2016.
- N. P. Rougier. Why you'll never be able to upload your brain to the cloud, in : The Conversation, January 2016.
- N. P. Rougier. Open Science, November 2016, 35 p, AdaWeek.
- F. Alexandre. Où sont les vrais dangers de l'intelligence artificielle ?, April 2015, Pour la Science.
- F. Alexandre. Rien de neuf sous le soleil de l'Intelligence Artificielle, February 2015, [http : //www. scilogs. fr/intelligence-mecanique/rien-de-neuf-sous-le-soleil-de-lia/](http://www.scilogs.fr/intelligence-mecanique/rien-de-neuf-sous-le-soleil-de-lia/).
- Chraïbi Kaadoud, T. Viéville. Finalement l'apprentissage profond : est-ce une idée creuse ?, September 2015, 4 p, Publication sur le blog de [http : //www. scilogs. fr/intelligence-mecanique](http://www.scilogs.fr/intelligence-mecanique) de quatre articles sur les réseaux de neurones profonds.

- C. Héricé, I. Chraïbi Kaadoud, F. Alexandre. Bio-inspired modeling in the digital and health fields, October 2015, Fête de la Science 2015 - Inria Bordeaux Sud-Ouest, Poster.
- N. P. Rougier. Esprit in silico : les vains espoirs de l'immortalité, in : The Conversation, November 2015.
- N. P. Rougier. Esprit in silico : pourquoi l'idée de télécharger son cerveau n'a pas de sens, in : The Conversation, November 2015.
- N. P. Rougier. L'intelligence artificielle, mythes et réalités, in : Interstices, June 2015.
- N. P. Rougier. Silicon soul : The vain dream of electronic immortality, in : The Conversation, January 2016.
- N. P. Rougier. Why you'll never be able to upload your brain to the cloud, in : The Conversation, January 2016.
- N. P. Rougier. Une brève histoire de l'intelligence artificielle, in : Pint of Science, Bordeaux, France, May 2015.
- N. P. Rougier. L'Intelligence Artificielle n'aura pas lieu, January 2015, [http : //www. scilogs. fr/intelligence-mecanique/lintelligence-artificielle-naura-pas-lieu/](http://www.scilogs.fr/intelligence-mecanique/lintelligence-artificielle-naura-pas-lieu/).

3 Implication de l'équipe dans la formation par la recherche

3.1 Produits des activités pédagogiques et didactiques

Guillaume Blin est à l'origine du déploiement et de l'utilisation intensive de la solution Virtual Programming Lab au sein de la plateforme moodle (<https://github.com/GuillaumeBlin/vplbldx>). Bruno Pinaud est responsable de la mise en oeuvre du PIX au sein de l'enseignement Culture et Compétences numériques (CCN) sur le périmètre du collège ST (ensemble des étudiants de L1, 1800 étudiants).

3.2 Productions scientifiques (articles, ouvrages, etc.) issues des thèses

Les productions scientifiques (articles, ouvrages, etc.) issues des thèses sont distinguées dans ce rapport par un des co-auteurs souligné. Leur nombre est résumé dans le tableau suivant.

Tableau 4.8 : Production des doctorants, équipe Bench to Knowledge and Beyond

	Doctorants	Total équipe	Pourcentage
Conférences	61	121	50%
Revues	18	97	18%

3.3 Formation

- David Auber est responsable de la mention Master Informatique depuis 2019.
- Guillaume Blin a été porteur de la nouvelle accréditation (2016-2020) pour la Licence Informatique et responsable de la mention jusqu'en 2019.
- Romain Bourqui est responsable de l'alternance du département Informatique depuis 2016.
- Isabelle Dutour est membre élue du Conseil du Département Informatique depuis 2016.
- Sofian Maabout est membre de la commission de disciplines pour les utilisateurs (étudiants) depuis 2018.

- Guy Melancon est VP Numérique depuis 2018.
- Bruno Pinaud est élu au conseil du collège science et technologie, co-responsable du cursus CMI Ingénierie Statistiques et Informatique, et responsable formation au numérique en L1.
- Patricia Thébault est membre élue du conseil du collège des écoles doctorales depuis 2016 et responsable 2ème année Master Bioinformatique depuis 2019.
- Raluca Uricaru est responsable 1ère année Master Bioinformatique depuis 2019.

Programmation, Réseaux et Systèmes

1 Production de connaissances et activités concourant au rayonnement et à l'attractivité scientifique

1.1 Revues

L'équipe Programmation, Réseaux et Systèmes a publié 58 articles en revue.

Revue de l'équipe Programmation, Réseaux et Systèmes		
	Q1	Autres
Nombre	18	40
Pourcentage	31%	69%

Revue, top 20%

- [P*-J1] [Abdelhamid ALLEG](#), [Toufik AHMED](#), [Mohamed MOSBAH](#), and Raouf BOUTABA. "Joint Diversity and Redundancy for Resilient Service Chain Provisioning." In: *IEEE Journal on Selected Areas in Communications* 38.7 (2020), pp. 1490–1504.
- [P*-J2] Vincent AUTEFAGE and [Damien MAGONI](#). "NEmu: A distributed testbed for the virtualization of dynamic, fixed and mobile networks." In: *Comput. Commun.* 80 (2016), pp. 33–44. doi: 10.1016/j.comcom.2016.01.005.
- [P*-J3] Abbas BRADAI, Kamal Deep SINGH, [Toufik AHMED](#), and Tinku RASHEED. "Cellular software defined networking: a framework." In: *IEEE Communications Magazine* 53.6-Supplement (2015), pp. 36–43. doi: 10.1109/MCOM.2015.7120043.

- [P*-J4] [Joachim BRUNEAU-QUEYREIX](#), Jordi Mongay BATALLA, [Mathias LACAUD](#), and [Daniel NÉGRU](#). “PMS: A Novel Scale-Adaptive and Quality-Adaptive Hybrid P2P/Multisource Solution for Live Streaming.” In: *ACM Trans. Multim. Comput. Commun. Appl.* 14.2s (2018), 35:1–35:25. doi: 10.1145/3183515.
- [P*-J5] [Joachim BRUNEAU-QUEYREIX](#), [Mathias LACAUD](#), [Daniel NÉGRU](#), Jordi Mongay BATALLA, and Eugen BORCOCI. “Adding a New Dimension to HTTP Adaptive Streaming Through Multiple-Source Capabilities.” In: *IEEE Multim.* 25.3 (2018), pp. 65–78. doi: 10.1109/MMUL.2018.112142627.
- [P*-J6] [Matthieu FOUCAULT](#), Cédric TEYTON, David LO, [Xavier BLANC](#), and [Jean-Rémy FALLERI](#). “On the usefulness of ownership metrics in open-source software projects.” In: *Inf. Softw. Technol.* 64 (2015), pp. 102–112. doi: 10.1016/j.infsof.2015.01.013.
- [P*-J7] [Nicolas HERBAUT](#) and [Daniel NÉGRU](#). “A Model for Collaborative Blockchain-Based Video Delivery Relying on Advanced Network Services Chains.” In: *IEEE Communications Magazine* 55.9 (2017), pp. 70–76. doi: 10.1109/MCOM.2017.1700117.
- [P*-J8] [Mohamed Lamine LAMALI](#), Nasreddine FERGANI, and Johanne COHEN. “Algorithmic and Complexity Aspects of Path Computation in Multi-Layer Networks.” In: *IEEE/ACM Trans. Netw.* 26.6 (2018), pp. 2787–2800. doi: 10.1109/TNET.2018.2878103.
- [P*-J9] [Haider MSHALI](#), Tayeb LEMLOUMA, and [Damien MAGONI](#). “Adaptive monitoring system for e-health smart homes.” In: *Pervasive Mob. Comput.* 43 (2018), pp. 1–19. doi: 10.1016/j.pmcj.2017.11.001.
- [P*-J10] Roberto RIGGIO, Abbas BRADAI, Davit HARUTYUNYAN, Tinku RASHEED, and [Toufik AHMED](#). “Scheduling Wireless Virtual Networks Functions.” In: *IEEE Trans. Network and Service Management* 13.2 (2016), pp. 240–252. doi: 10.1109/TNSM.2016.2549563.
- [P*-J11] Martin ROSALIE, Grégoire DANOY, [Serge CHAUMETTE](#), and Pascal BOUVRY. “Chaos-enhanced mobility models for multilevel swarms of UAVs.” In: *Swarm Evol. Comput.* 41 (2018), pp. 36–48. doi: 10.1016/j.swevo.2018.01.002.

1.2 Ouvrages

Livres

- [P-L1] [Serge CHAUMETTE](#), Jin Hyun KIM, Kamesh NAMUDURI, and James Sterbenz P.G. *UAV Networks and Communications*. Cambridge University Press, 2017. doi: 10.1017/9781316335765.
- [P-L2] [Serge CHAUMETTE](#), Jin Hyun KIM, Kamesh NAMUDURI, and James Sterbenz P.G. *无人机网络与通信*. China Machine Press (for Cambridge University Press), 2019. URL: <https://hal.archives-ouvertes.fr/hal-02942060>.

Éditions d’actes

- [P-A1] [Laurent RÉVEILLÈRE](#), Tim HARRIS, and Maurice HERLIHY, eds. *Proceedings of the Tenth European Conference on Computer Systems, EuroSys 2015, Bordeaux, France, April 21-24, 2015*. ACM, 2015. ISBN: 978-1-4503-3238-5. URL: <http://dl.acm.org/citation.cfm?id=2741948>.
- [P-A2] Stefano SALSANO, Roberto RIGGIO, [Toufik AHMED](#), Taghrid SAMAK, and Carlos Raniery Paula dos SANTOS, eds. *14th International Conference on Network and Service Management, CNSM 2018, Rome, Italy, November 5-9, 2018*. IEEE Computer Society, 2018. ISBN: 978-3-9031-7614-0. URL: <https://ieeexplore.ieee.org/xpl/conhome/8572698/proceeding>.

1.3 Production dans des colloques / congrès, séminaires de recherche

L'équipe Programmation, Réseaux et Systèmes a publié 81 articles en conférences.

Conférences de l'équipe Programmation, Réseaux et Systèmes		
	A* et A	Autres
Nombre	19	62
Pourcentage	23%	77%

Conférences, top 20%

- [P*-C1] [Ilyes BEN Hadj Yahia](#), [Jean-Rémy FALLERI](#), and [Laurent RÉVEILLÈRE](#). “Polly: A Language-Based Approach for Custom Change Detection of Web Service Data.” In: *Service-Oriented Computing - 15th International Conference, ICSOC 2017, Malaga, Spain, November 13-16, 2017, Proceedings*. Ed. by E. Michael MAXIMILIEN, Antonio VALLECILLO, Jianmin WANG, and Marc ORIOL. Vol. 10601. Lecture Notes in Computer Science. Springer, 2017, pp. 430–444. DOI: 10.1007/978-3-319-69035-3_30.
- [P*-C2] [Hanyang CAO](#), [Jean-Rémy FALLERI](#), [Xavier BLANC](#), and Li ZHANG. “JSON Patch for Turning a Pull REST API into a Push.” In: *Service-Oriented Computing - 14th International Conference, ICSOC 2016, Banff, AB, Canada, October 10-13, 2016, Proceedings*. Ed. by Quan Z. SHENG, Eleni STROULIA, Samir TATA, and Sami BHIRI. Vol. 9936. Lecture Notes in Computer Science. Springer, 2016, pp. 435–449. DOI: 10.1007/978-3-319-46295-0_27.
- [P*-C3] Raziel CARVAJAL-GOMEZ, Yehia ELKHATIB, [Laurent RÉVEILLÈRE](#), Etienne RIVIÈRE, and Yérom-David BROMBERG. “Emergent Overlays for Adaptive MANET Broadcast.” In: *38th Symposium on Reliable Distributed Systems, SRDS 2019, Lyon, France, October 1-4, 2019*. IEEE, 2019, pp. 193–202. DOI: 10.1109/SRDS47363.2019.00030.
- [P*-C4] [Alan CHARPENTIER](#), [Jean-Rémy FALLERI](#), David Lo, and [Laurent RÉVEILLÈRE](#). “An empirical assessment of Bellon’s clone benchmark.” In: *Proceedings of the 19th International Conference on Evaluation and Assessment in Software Engineering, EASE 2015, Nanjing, China, April 27-29, 2015*. Ed. by Jian Lv, He Jason ZHANG, and Muhammad Ali BABAR. ACM, 2015, 20:1–20:10. DOI: 10.1145/2745802.2745821.
- [P*-C5] [Alan CHARPENTIER](#), [Jean-Rémy FALLERI](#), and [Laurent RÉVEILLÈRE](#). “Automated Extraction of Mixins in Cascading Style Sheets.” In: *2016 IEEE International Conference on Software Maintenance and Evolution, ICSME 2016, Raleigh, NC, USA, October 2-7, 2016*. IEEE Computer Society, 2016, pp. 56–66. DOI: 10.1109/ICSME.2016.15.
- [P*-C6] [Stephan CONTIU](#), Rafael PIRES, Sébastien VAUCHER, Marcelo PASIN, Pascal FELBER, and [Laurent RÉVEILLÈRE](#). “IBBE-SGX: Cryptographic Group Access Control Using Trusted Execution Environments.” In: *48th Annual IEEE/IFIP International Conference on Dependable Systems and Networks, DSN 2018, Luxembourg City, Luxembourg, June 25-28, 2018*. IEEE Computer Society, 2018, pp. 207–218. DOI: 10.1109/DSN.2018.00032.
- [P*-C7] [Stephan CONTIU](#), Sébastien VAUCHER, Rafael PIRES, Marcelo PASIN, Pascal FELBER, and [Laurent RÉVEILLÈRE](#). “Anonymous and confidential file sharing over untrusted clouds.” In: *Symposium on Reliable Distributed Systems (SRDS)*. IEEE Computer Society, 2019.

- [P*-C8] [Simon DA SILVA](#), Sonia Ben MOKHTAR, [Stephan CONTIU](#), [Daniel NÉGRU](#), [Laurent RÉVEILLÈRE](#), and Etienne RIVIÈRE. “PrivaTube: Privacy-Preserving Edge-Assisted Video Streaming.” In: *Proceedings of the 20th International Middleware Conference, Middleware 2019, Davis, CA, USA, December 9-13, 2019*. ACM, 2019, pp. 189–201. doi: 10.1145/3361525.3361546.
- [P*-C9] [Ema FALOMIR](#), [Serge CHAUMETTE](#), and Gilles GUERRINI. “A Mobility Model Based on Improved Artificial Potential Fields for Swarms of UAVs.” In: *2018 IEEE/RSJ International Conference on Intelligent Robots and Systems, IROS 2018, Madrid, Spain, October 1-5, 2018*. IEEE, 2018, pp. 8499–8504. doi: 10.1109/IROS.2018.8593738.
- [P*-C10] [Matthieu FOUCAULT](#), Marc PLYART, [Xavier BLANC](#), Gail C. MURPHY, and [Jean-Rémy FALLERI](#). “Impact of developer turnover on quality in open-source software.” In: *Proceedings of the 2015 10th Joint Meeting on Foundations of Software Engineering, ESEC/FSE 2015, Bergamo, Italy, August 30 - September 4, 2015*. Ed. by Elisabetta di NITTO, Mark HARMAN, and Patrick HEYMANS. ACM, 2015, pp. 829–841. doi: 10.1145/2786805.2786870.
- [P*-C11] Raziél Carvajal GÓMEZ, Yérom-David BROMBERG, [Laurent RÉVEILLÈRE](#), Yehia ELKHATIB, and Etienne RIVIERE. “Emergent Overlays for Adaptive MANET Broadcast.” In: *Symposium on Reliable Distributed Systems (SRDS)*. IEEE Computer Society, 2019.
- [P*-C12] Raziél Carvajal GÓMEZ, Inti Y. GONZALEZ-HERRERA, Yérom-David BROMBERG, [Laurent RÉVEILLÈRE](#), and Etienne RIVIERE. “Density and Mobility-Driven Evaluation of Broadcast Algorithms for MANETs.” In: *37th IEEE International Conference on Distributed Computing Systems, ICDCS 2017, Atlanta, GA, USA, June 5-8, 2017*. Ed. by Kisung LEE and Ling LIU. IEEE Computer Society, 2017, pp. 2308–2313. doi: 10.1109/ICDCS.2017.240.
- [P*-C13] Sarra HABCHI, [Xavier BLANC](#), and Romain ROUVOY. “On adopting linters to deal with performance concerns in Android apps.” In: *Proceedings of the 33rd ACM/IEEE International Conference on Automated Software Engineering, ASE 2018, Montpellier, France, September 3-7, 2018*. Ed. by Marianne HUCHARD, Christian KÄSTNER, and Gordon FRASER. ACM, 2018, pp. 6–16. doi: 10.1145/3238147.3238197.
- [P*-C14] [Mohamed Lamine LAMALI](#), Nasreddine FERGANI, Johanne COHEN, and Hélià POUYLLAU. “Path computation in multi-layer networks: Complexity and algorithms.” In: *35th Annual IEEE International Conference on Computer Communications, INFOCOM 2016, San Francisco, CA, USA, April 10-14, 2016*. IEEE, 2016, pp. 1–9. doi: 10.1109/INFOCOM.2016.7524550.
- [P*-C15] [Mohamed Lamine LAMALI](#), Simon LASSOURREUILLE, Stephan KUNNE, and Johanne COHEN. “A stack-vector routing protocol for automatic tunneling.” In: *2019 IEEE Conference on Computer Communications, INFOCOM 2019, Paris, France, April 29 - May 2, 2019*. IEEE, 2019, pp. 1675–1683. doi: 10.1109/INFOCOM.2019.8737536.
- [P*-C16] [Julien LEVEAU](#), [Xavier BLANC](#), [Laurent RÉVEILLÈRE](#), [Jean-Rémy FALLERI](#), and Romain ROUVOY. “Fostering the Diversity of Exploratory Testing in Web Applications.” In: *ICST 2020 - IEEE International Conference on Software Testing, Verification and Validation*. Ed. by Corina PASAREANU and Andreas ZELLER. Porto, Portugal, Mar. 2020. URL: <https://hal.inria.fr/hal-02398969>.
- [P*-C17] [Mohamed Ameziane OUMAZIZ](#), [Jean-Rémy FALLERI](#), [Xavier BLANC](#), Tegawendé F. BISSYANDÉ, and Jacques KLEIN. “Handling Duplicates in Dockerfiles Families: Learning from Experts.” In: *2019 IEEE International Conference on Software Maintenance and Evolution, ICSME 2019, Cleveland, OH, USA, September 29 - October 4, 2019*. IEEE, 2019, pp. 524–535. doi: 10.1109/ICSME.2019.00086.

1.4 Produits et outils informatiques

L'équipe Progress développe plusieurs logiciels pour valider les recherches qu'elle mène. Nous listons ici les logiciels à forte visibilité :

- AIFEX : Julien Leveau, Xavier Blanc et Laurent Réveillère ont développé AIFEX, un logiciel pour les tests exploratoires <https://www.aifex.fr>. AIFEX est utilisé par plusieurs industriels (dont Amadeus) pour réaliser des sessions de test exploratoires. Il permet de valider les expérimentations réalisées par l'équipe dans le domaine du test logiciel.
- Gumtree : Jean-Rémy Falleri et Floréal Morandat ont développé GumTree, un logiciel de différentiation de code source <https://github.com/GumTreeDiff/gumtree>. Gumtree est un des logiciels de référence sur ce sujet. Il comporte presque 400 étoiles sur GitHub et une centaine de forks. L'article correspondant est cité plus de 200 fois dans la conférence ASE (deuxième article le plus cité entre 2014 et 2018).
- MEDLEY : Elyas Ben Hadj Yahia et Laurent Réveillère ont développé Medley (<https://medley.io/>), une solution de gestion des médias sociaux. Après une phase de maturation de 2 ans, Medley est maintenant commercialisé par la société Actual Systèmes. Elyas Ben Hadj Yahia est en charge du développement du produit Medley.
- MS-STREAM : Daniel Négro, Mathias Lacaud et Joachim Bruneau-Queyreix ont développé MS-STREAM, une solution de diffusion vidéo multi-sources. MS-STREAM a été déployé et évalué à large échelle au niveau européen avec la participation de 7 partenaires (Grèce, Pologne, Roumanie, Portugal, Malte, Chypre, UK), faisant intervenir des centaines d'utilisateurs. MS-STREAM a reçu 3 prix internationaux dans 3 conférences de références dans le domaine du Multimédia.
- PARSEC : Stefan Contiu et Laurent Réveillère ont contribué au développement de Parsec (<https://www.parsec.cloud/>), une solution de protection et de partage des données sensibles dans le cloud. Parsec est actuellement commercialisé par la société Scille. Stefan Contiu est directeur des opérations chez Scille.
- Secure Electro-chrom Mobile Interaction : Serge Chaumette ont développé avec Sébastien Pouteau une solution d'interaction avec une matrice d'électro-chromes dans le cadre d'une collaboration avec le laboratoire ICMCB (financée par le fond de pré-maturation de l'Université). Cette application embarquée sur téléphone mobile permet d'exciter un afficheur électro-chrome et d'y associer des données sécurisées par un dispositif de type NFC.

1.5 Développements instrumentaux et méthodologiques

L'équipe souhaite mettre en avant ces deux prototypes :

- Dans le cadre du brevet intitulé 'SYSTEME DE GUIDAGE D'UN DRONE' l'équipe a réalisé un prototype financé par une pré-maturation de la SATT Aquitaine. Ce prototype avait pour objectif de mettre en oeuvre un drone se déplaçant le long d'un fil flottant tout en restant captif de sorte à sécuriser son utilisation.
- Dans le cadre de la collaboration avec l'ICMCB, le fond de pré-maturation de l'Initiative d'Excellence de l'Université de Bordeaux a financé le développement d'un prototype qui a montré, d'une part, la capacité à déclencher un électro-chrome via une puce NFC en exploitant le principe d'induction en permettant l'alimentation et, d'autre part, les apports potentiels des capacités de sécurité supportées par la puce NFC pour offrir un système de lutte contre la contrefaçon afin d'intégration dans des produits de luxe.

1.6 Autres produits propres à une discipline

L'équipe n'a pas de contribution dans ce domaine.

1.7 Activités éditoriales

1.7.1 Participation à des comités éditoriaux

Tableau 5.1 : Édition, équipe Progress

Rôle	Nom de la revue	Période	Membre
Associate editor	IEEE Transactions on Mobile Computing	2017–2020	Toufik Ahmed
Associate editor	Journal of Network and Systems Management	2013–2020	Toufik Ahmed
Associate editor	International Journal of Network Protocols and Algorithms	2015–2020	Serge Chaumette
Editor	Drones Networks	2015–2020	Serge Chaumette
Associate editor	Journal of Internet Services and Applications	2017	Laurent Réveillère
Associate editor	ISTE-Sciences Thème, Gestion et Contrôle des Réseaux	2017–2022	Francine Krief

1.7.2 Éditeur invité, numéro spécial

Tableau 5.2 : Édition de numéros spéciaux, équipe Progress

Rôle	Nom du numéro spécial	Année	Membre
Invited editor	IEEE Transactions on Mobile Computing	2017	Toufik Ahmed
Invited editor	thematic series on Complex Distributed Systems - Systems of Systems	2017	Laurent Réveillère
Invited editor	Special Issue on Blockchain and Artificial Intelligence for Network Security	2020	Francine Krief
Invited editor	International Journal of Computers & Distributed Systems 2017	2017	Francine Krief
Invited editor	International Journal of Computers & Distributed Systems 2016	2016	Francine Krief

1.7.3 Direction de collection et de séries

1.8 Activités d'évaluation

1.8.1 Evaluation d'articles

L'équipe a une forte présence dans les comités de programme des conférences de son domaine.

Program Committee Member (PC), Program Committee Chair (Chair) dans les conférences (A/A* ou autre), équipe Progress

	A/A*	Autres
PC	14	119
Chair	0	3

1.8.2 Evaluation de projets de recherche

Les membres de l'équipe évaluent régulièrement des projets (ANR ou autre).

Participation à des comités de d'évaluation de projets, équipe Progress

	National	International
Membre	1	0
Expert	15	6

1.8.3 Evaluation de laboratoire

Dans l'équipe, Xavier Blanc a été membre du comité HCERES qui a évalué le LRI (Laboratoire de Recherche en Informatique) en 2018 ; Serge Chaumette a été membre invité du comité d'évaluation à mi-parcours du LITIS (Laboratoire d'Informatique, de Traitement de l'Information et des Systèmes, Université du Havre) en juin 2020.

1.8.4 Responsabilités au sein d'instances d'évaluation

- Xavier Delord a été membre élu du CNU en section 27 pour une période (2019-2019)
- Jean-Rémy Falleri a été membre élu du CNU en section 27 pour une période (2015-2019)
- Francine Krief a été membre du comité ANR CES 25 Appel générique pour une période (2017-2019).
- Laurent Réveillère a été membre élu du CNU en section 27 pour une période (2019-2024)

1.9 Contrats de recherche financés par des institutions publiques ou caritatives

Le tableau suivant présente les montants des projets portés par l'équipe. Il montre bien que l'équipe a de fortes relations avec les industriels et porte régulièrement des projets. Ce tableau montre aussi la diversité des

financements obtenus par l'équipe. Enfin, la disparité entre les années est due au fait de la durée des projets (en moyenne 3 ans).

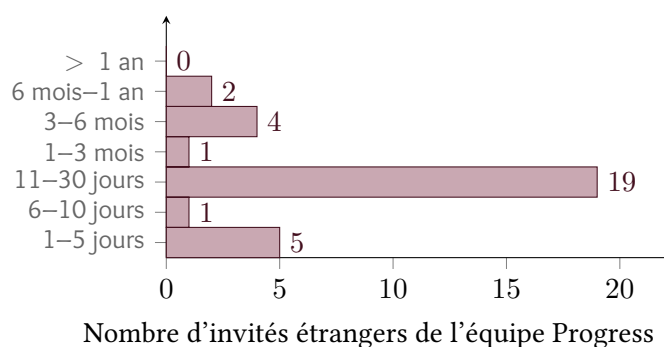
Tableau 5.3 : Contrats de l'équipe Programmation, Réseaux et Systèmes, en k€

	2015	2016	2017	2018	2019	2020	Total
International, dont Europe	72	53	0	0	490	0	615
National	267	0	0	329	58	92	746
Régional	0	0	0	227	149	0	376
Industrie	75	63	193	8	58	0	397

Montant total des contrats pour l'équipe Programmation, Réseaux et Systèmes : **2134 k€**.

1.10 Post-doctorants et chercheurs accueillis

1.10.1 Chercheurs étrangers invités



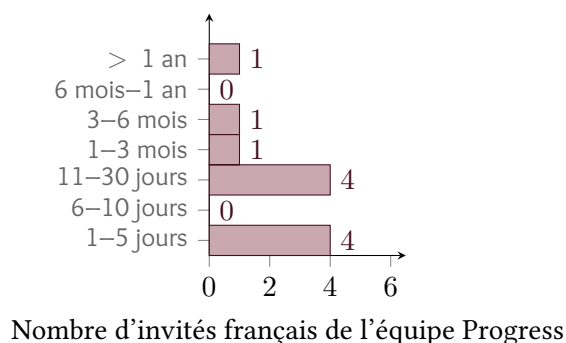
L'équipe invite régulièrement des chercheurs étrangers principalement pour des séjours de moyenne durée (moins de 30 jours) 5.4.

Tableau 5.4 : Accueil chercheurs, équipe Progress (international, ≥ 90 jours)

Invité	Institution	Pays	Annee	Durée	Invitant
XU Rongfei	BEIHANG UNIVERSITY	CHINE	2017	184	Xavier Blanc
BOUTABA Raouf	UNIVERSITY OF WATERLOO	CANADA	2019	93	Toufik Ahmed
KOUAH Riad	UNIV. SCIENCES ET DE LA TECHNOLOGIE ALGER	ALGERIE	2015	182	Toufik Ahmed
KOUAH Riad	UNIV. SCIENCES ET DE LA TECHNOLOGIE ALGER	ALGERIE	2016	181	Toufik Ahmed
KOUAH Riad	UNIV. SCIENCES ET DE LA TECHNOLOGIE ALGER	ALGERIE	2017	182	Toufik Ahmed

KOUAH Riad	UNIV. SCIENCES ET DE LA TECHNOLOGIE ALGER	ALGERIE	2018	265	Toufik Ahmed
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1.10.2 Chercheurs français invités



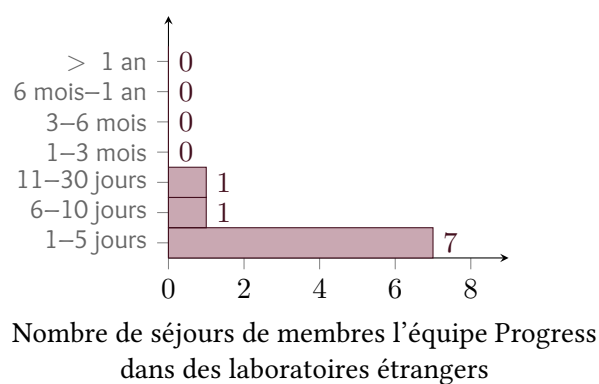
L'équipe invite des chercheurs français principalement pour des séjours de moyenne durée 5.5.

Tableau 5.5 : Accueil chercheurs, équipe Progress (national, ≥ 90 jours)

Invité	Institution	Annee	Durée	Invitant
BENMANSOUR Tariq	USTHB ALGER	2015	1095	Toufik Ahmed
BENMANSOUR Tariq	USTHB ALGER	2017	92	Toufik Ahmed

1.11 Indices de reconnaissance

1.11.1 Séjours dans des laboratoires étrangers



Les membres de l'équipe ont effectués plusieurs séjours (essentiellement de courte durée) dans les laboratoires étrangers 5.6.

Tableau 5.6 : Séjours, équipe Progress (international, ≥ 0 jours)

Institution	Pays	Année	Description	Durée	Membre
University of Victoria, Canada	Canada	2017	Collaboration with Margaret Anne Storey	14	Xavier Blanc
Université du Luxembourg	Luxembourg	2017	Research with Pr. Le Traon	4	Xavier Blanc
IEEE	Etats-Unis	2017	Démonstration invitée sur le stand IEEE du CES 2017	4	Daniel Négro, Joachim Bruneau-Queyreix, Mathias Lacaud
IEEE	Grèce	2016	Keynote speaker au sein de la conférence IEEE TEMU 2016	4	Daniel Négro
CHIST-ERA	Suisse	2016	Démonstration et présentation invitées au séminaire CHIST-ERA C3N	3	Daniel Négro
Mobile World Congress	Espagne	2016	Démonstration invitée de Virtual CDN au sein du stand d'Italtel du Mobile World Congress 2016	3	Daniel Négro, Nicolas Herbaut
The University of British Columbia	Canada	2015	Research with Pr. Gail Murphy	9	Xavier Blanc
Université du Luxembourg	Luxembourg	2015	Research with Pr. Lionel Briand	4	Xavier Blanc
National Institute of Telecommunications	Pologne	2015	Séminaire conjoint avec Orange Pologne sur les réseaux basés contexte et contenus	2	Daniel Négro

1.11.2 Récompenses et prix

L'équipe souhaite mettre en avant ces deux prix :

- Les travaux de recherche sur l'évolution des techniques de streaming actuelles vers le streaming adaptatif multi-source/peer-to-peer (solution MS-STREAM) de l'équipe PROGRESS du LaBRI ont reçu le prix d'excellence scientifique pour la meilleure démonstration lors de la conférence IEEE CCNC 2017 et ont remporté le Grand Challenge de DASH-IF lors de la conférence IEEE ICME 2017.
- L'index a attribué son prix de thèse sciences et technologies 2018 à Joachim Bruneau-Queyreix pour ses travaux sur l'optimisation multi-critères du streaming vidéo au sein de l'Internet Media du Futur. Ce prix de thèse était ouvert à tous les jeunes docteurs de l'université de Bordeaux faisant partie du collège Sciences et Technologies.

1.11.3 Appartenance à l'IUF

Dans l'équipe Xavier Blanc a été nommé membre junior de l'IUF 2015-2020.

1.11.4 Responsabilités dans des sociétés savantes

Dans l'équipe Damien Magoni était membre du conseil d'administration et adjoint en charge de la recherche de la SIF.

1.11.5 Organisations de colloques / congrès internationaux

La liste suivante présente l'implication des membres de l'équipe dans l'organisation de colloques ou de congrès internationaux.

- Laurent Réveillère a été General chair pour EuroSys en 2015, Doctoral symposium co-chair pour Middleware en 2018 et Publicity Chair pour Mascots en 2019.
- Serge Chaumette a été co-organisateur et membre du steering committee de AETOS en 2016
- Serge Chaumette a été co-organisateur et membre du steering committee de Unmanned and Swarming Conference en 2018

1.11.6 Participation à des jurys de prix

Les membres de l'équipe ont effectués plusieurs séjours (essentiellement de courte durée) dans les laboratoires étrangers 5.6.

Tableau 5.7 : Participation à des jurys de prix, équipe Progress

Rôle	Description	Période	Membre
Président	Prix Isabelle Attali	2015–2020	Serge Chaumette
Membre	Prix Concept Drone	2018–2020	Serge Chaumette
Membre	Prix de thèse Gilles Kahn	2015–2019	Xavier Blanc

2 Interaction de l'équipe avec l'environnement non académique

Impacts sur l'économie, la société, la culture, la santé L'équipe a un fort impact mesurable par le nombre de thèses CIFRE, de brevets et de création de startups.

2.1 Brevets, licences et déclarations d'invention

2.1.1 Brevets

Les activités de recherche qui portent sur le domaine des drones (activés essentiellement menées par Serge Chaumette) conduisent à déposer des brevets afin de protéger les résultats obtenus. Ceci permet par la suite de les intégrer dans des projets nécessitant des clauses de jouissance paisible ou de réaliser des opérations de valorisation ou de transfert dans le cadre de la SATT Nouvelle-Aquitaine. 5.8.

Tableau 5.8 : Brevets, équipe Progress

Année	Titre	Laboratoire	Auteur
2018	Mosquito Killer 1 (MK1)	LABRI	CHAUMETTE Serge
2017	ConBot et essais de ConBots	LABRI	CHAUMETTE Serge
2016	Tyrolienne drone	LABRI	CHAUMETTE Serge
2016	Procédé de détection d'incident par un capteur induction	LABRI	CHAUMETTE Serge
2016	Multi-fonctionnalité : activation d'un afficheur électrochrome via un signal NFC avec potentialité de lecture/écriture sur la puce du TAG NFC	ICMCB,LABRI	ROUGIER Aline, CHAUMETTE Serge

2.2 Interactions avec les acteurs socio-économiques

2.2.1 Thèses CIFRE

La liste suivante montre toutes les thèses CIFRE portées par l'équipe 5.9.

Tableau 5.9 : Thèses CIFRE, équipe Progress

Doctorant	Titre	1 ^{re} année	Société	Encadrant
GARRIGUES Mathilde	Planification d'objectifs pour une flotte d'aéronefs multirôles	2020	Thalès AVS France	CHAUMETTE Serge
LEVEAU Julien	Appréhender les évolutions d'une ERP face aux changements métiers	2018	Cis Valley	RÉVEILLÈRE Laurent, BLANC Xavier
MARIE-MAGDELAINE Nicolas	Gestion de ressources, de monitoring et d'optimisation de qualité de service dans les environnements de type Cloud Computing	2017	Lectra	AHMED Toufik
LACAUD Mathias	Vers des solutions pragmatiques pour améliorer la qualité des diffusions vidéo dans les réseaux actuels et les réseaux du futur	2017	JOADA	RÉVEILLÈRE Laurent, NEGRU Daniel
CONTIU Stefan	Stockage sécurisé et résilient de données dans le cloud	2016	SCILLE	RÉVEILLÈRE Laurent
FALOMIR Ema	Optimisation multicritère de la mission d'un essaim compact de drones autonomes dans un environnement complexe	2016	Thalès DMS France	CHAUMETTE Serge

2.2.2 Création de start-up

Les recherches menées par les membres de l'équipe ont permis la création d'une nouvelle startup : ProMyze¹. Lors de la dernière évaluation, la startup NFC-i avait été créée ; cette startup s'appelle maintenant Preditic² et a plus d'une dizaine d'employés. 5.10.

Tableau 5.10 : Start-up, équipe Progress

Nom société	Année de création	Domaine	Participants
Promyze	2016	Edition de logiciels applicatifs	Xavier Blanc, Cedric Teyton

2.3 Activités d'expertise scientifique

Plusieurs membres de l'équipe ont des activités d'expertise scientifique :

- Serge Chaumette était expert pour le CIR (2015-2020) ;
- Jean-Rémy Falleri était expert pour le CIR (2019) et expert pour le FRQNT (Établissement de nouveaux chercheurs et de nouvelles chercheuses universitaires - Province du Québec, Canada) en 2018 et 2019 ;
- Laurent Réveillère était expert pour le CIR (2015-2020).

2.4 Produits destinés au grand public

L'équipe souhaite mettre en avant les productions suivantes :

- une intervention réalisée par Serge Chaumette à Bordeaux au Cap Sciences dont le titre est "tout savoir sur l'intelligence artificielle" ;
- une interview de Serge Chaumette dans l'émission "La méthode scientifique" animée par Nicolas Martin à France Culture réalisée le 10 juin 2020, et dont le thème était : "Drones : la conquête des airs" ;
- un article dans "Les Echos" par Frank Niedercorn dont le titre est "Quand les drones passeront à l'action" (le 27 novembre 2018) sur les travaux réalisés par l'équipe dans ce domaine ;

3 Implication de l'équipe dans la formation par la recherche

Les membres de l'équipe ont une forte implication dans la formation avec de nombreuses responsabilités. De plus, certains de ses membres réalisent une activité de recherche en pédagogie.

3.1 Produits des activités pédagogiques et didactiques

L'équipe souhaite mettre en avant ces deux activités :

- Jean-Rémy Falleri et Laurent Réveillère ont publié deux articles pédagogiques[2, 1]. Un décrivant l'organisation des projets avancés du département télécom de l'Enseirb-Matmeca, mettant l'accent sur une immersion sur le travail en mode projet, en partenariat avec quatre groupes industriels (Sogeti, Bull, Atos, Thalès) sur un travail transdisciplinaire[1]. Un décrivant le montage d'un musée télécom qui expose des technologies historiques de ce domaine au sein de l'Enseirb-Matmeca[2] ;

1. <https://www.promyze.com>

- Jean-Rémy Falleri, en collaboration avec l'université de Lodz en Pologne, participe au montage d'une étude comparative sur les différentes manières d'encadrer les projets de programmations et l'impact que chaque manière a sur les apprentissages des étudiants.

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- [2] Eric GRIVEL, Susan MEDINA, Francine KRIEF, Jean-Rémy FALLERI, Guillaume FERRÉ, Laurent RÉVEILLÈRE, and Daniel NÉGRU. "Telecom showcase: An exhibition of ole technology useful for students and teachers." In: *25th European Signal Processing Conference, EUSIPCO 2017, Kos, Greece, August 28 - September 2, 2017*. IEEE, 2017, pp. 2373–2377. DOI: 10.23919/EUSIPCO.2017.8081635.

3.2 Productions scientifiques (articles, ouvrages, etc.) issues des thèses

Les productions scientifiques issues des thèses sont distinguées dans la liste des publications en soulignant les noms des doctorants pour chacune de leur contribution. Leur nombre est résumé dans le tableau suivant.

Tableau 5.11 : Production des doctorants, équipe Programmation, Réseaux et Systèmes

	Doctorants	Total équipe	Pourcentage
Conférences	42	81	52%
Revue	16	58	27%

3.3 Formation

Voici les responsabilités enseignement portées par les membres de l'équipe :

- Toufik Ahmed est directeur de la recherche, l'innovation et du transfert de l'ENSEIRB-MATMECA ;
- Toufik Ahmed est responsable de l'option BAC+5 informatique : cyber-sécurité, Réseaux et Systèmes de l'ENSEIRB-MATMECA ;
- Joachim Bruneau-Queyreix est responsable de la 2eme année de la filière Réseaux et Système d'Information à l'ENSEIRB-MATMECA ;
- Serge Chaumette est responsable du parcours Autonomous Systems, Perception, Interaction, Control (ASPIC) du Master 2 Informatique de l'Université de Bordeaux, responsable du parcours Réseaux du Master 1 Informatique de l'Université de Bordeaux, et responsable du Master (en alternance sur 4 ans) Ingénierie de l'Informatique de l'Université de Bordeaux ;
- Xavier Delord était directeur du département "Réseaux et systèmes d'information" (formation d'ingénieurs en alternance sur trois ans) de l'ENSEIRB-MATMECA ;
- Jean-Rémy Falleri était responsable de la première année du département Télécommunication de l'ENSEIRB-MATMECA ;

- Francine Krief était responsable de l'option de 3ème année "Réseaux, Sécurité et objets Connectés" au département Télécommunications de l'ENSEIRB-MATMECA ;
- Daniel Négro est directeur du département Télécommunication de l'ENSEIRB-MATMECA ;
- Damien Magoni est responsable du parcours Réseaux de Communication et Internet du Master 2 Informatique de l'Université de Bordeaux ;
- Laurent Réveillère est responsable de la Licence Informatique de l'Université de Bordeaux ;
- Laurent Réveillère était responsable de la deuxième année du département Télécommunication de l'ENSEIRB-MATMECA.

Supports et AlgoriThmes pour les Applications Numériques hAutes performanceS

1 Production de connaissances et activités concourant au rayonnement et à l’attractivité scientifique

L’extraction correspond aux entrées bibliographiques issues de HAL pour les 4 EPCs, en date du mois de février 2020, suite à la consolidation des publications pour les rapports d’activité Inria. Seules les publications présentant un co-auteur membre ou membre associé du LaBRI ont été retenues. Ceci explique, pour l’EPC PHOENIX en particulier, un écart important par rapport à ses rapports d’activité Inria. Les entrées correspondant à :

- 13 conférences nationales,
- 72 conférences sans actes,
- 10 posters,

ne sont pas présentées dans cette annexe.

1.1 Revues

Pour une sélection de 20% de nos publications en revue, nous avons retenu artificiellement les contributions dans : SISC, SIMAX, TPDS, TOMS et JPDC.

L’équipe Supports et AlgoriThmes pour les Applications Numériques hAutes performanceS a publié 75 articles en revue.

Revues de l'équipe Supports et AlgoriThmes pour les Applications Numériques hAutes performanceS

	Q1	Autres
Nombre	35	40
Pourcentage	47%	53%

Revues, top 20%

- [S*-J1] [Emmanuel AGULLO](#), Patrick R. AMESTOY, Alfredo BUTTARI, [Abdou GUERMOUCHE](#), Jean-Yves L'EXCELLENT, and François-Henry ROUET. "Robust memory-aware mappings for parallel multifrontal factorizations." In: *SIAM Journal on Scientific Computing* 38.3 (July 2016), p. 23. URL: <https://hal.inria.fr/hal-01334113>.
- [S*-J2] [Emmanuel AGULLO](#), [Olivier AUMAGE](#), [Bérenger BRAMAS](#), [Olivier COULAUD](#), and Samuel PITOISSET. "Bridging the gap between OpenMP and task-based runtime systems for the fast multipole method." In: *IEEE Transactions on Parallel and Distributed Systems* (Apr. 2017), p. 14. DOI: 10.1109/TPDS.2017.2697857.
- [S*-J3] [Emmanuel AGULLO](#), [Olivier AUMAGE](#), [Mathieu FAVERGE](#), [Nathalie FURMENTO](#), Florent PRUVOST, [Marc SERGENT](#), and [Samuel THIBAULT](#). "Achieving High Performance on Supercomputers with a Sequential Task-based Programming Model." In: *IEEE Transactions on Parallel and Distributed Systems* (2017). DOI: 10.1109/TPDS.2017.2766064.
- [S*-J4] [Emmanuel AGULLO](#), Alfredo BUTTARI, [Abdou GUERMOUCHE](#), and Florent LOPEZ. "Implementing multifrontal sparse solvers for multicore architectures with Sequential Task Flow runtime systems." In: *ACM Transactions on Mathematical Software* (July 2016). DOI: 10.1145/0000000.0000000.
- [S*-J5] [Emmanuel AGULLO](#), Eric DARVE, [Luc GIRAUD](#), and Yuval HARNESS. "Low-Rank Factorizations in Data Sparse Hierarchical Algorithms for Preconditioning Symmetric Positive Definite Matrices." In: *SIAM Journal on Matrix Analysis and Applications* 39.4 (Oct. 2018), pp. 1701–1725. URL: <https://hal.inria.fr/hal-01940053>.
- [S*-J6] [Emmanuel AGULLO](#), [Luc GIRAUD](#), and [Louis POIREL](#). "Robust preconditioners via generalized eigenproblems for hybrid sparse linear solvers." In: *SIAM Journal on Matrix Analysis and Applications* 40.2 (2019), pp. 417–439. DOI: 10.1137/17M1153765.
- [S*-J7] [Emmanuel AGULLO](#), [Luc GIRAUD](#), Pablo SALAS, and [Maurissi ZOUNON](#). "Interpolation-restart strategies for resilient eigensolvers." In: *SIAM Journal on Scientific Computing* 38.5 (2016), pp. C560–C583. DOI: 10.1137/15M1042115.
- [S*-J8] Louis-Claude CANON and [Emmanuel JEANNOT](#). "Correlation-Aware Heuristics for Evaluating the Distribution of the Longest Path Length of a DAG with Random Weights." In: *IEEE Transactions on Parallel and Distributed Systems* 27.11 (2016), pp. 3158–3171. DOI: 10.1109/TPDS.2016.2528983.
- [S*-J9] Siegfried COOLS, Emrullah Fatih YETKIN, [Emmanuel AGULLO](#), [Luc GIRAUD](#), and Wim VANROOSE. "Analyzing the Effect of Local Rounding Error Propagation on the Maximal Attainable Accuracy of the Pipelined Conjugate Gradient Method." In: *SIAM Journal on Matrix Analysis and Applications* 39.1 (Mar. 2018), pp. 426–450. DOI: 10.1137/17M1117872.

- [S*-J10] [Nicolas DENOYELLE](#), [Brice GOGLIN](#), Aleksandar ILIC, [Emmanuel JEANNOT](#), and Leonel SOUSA. “Modeling Non-Uniform Memory Access on Large Compute Nodes with the Cache-Aware Roofline Model.” In: *IEEE Transactions on Parallel and Distributed Systems* 30.6 (June 2019), pp. 1374–1389. DOI: 10.1109/TPDS.2018.2883056.
- [S*-J11] [Mathieu FAVERGE](#), Julien HERRMANN, Julien LANGOU, Bradley LOWERY, Yves ROBERT, and Jack DONGARRA. “Mixing LU and QR factorization algorithms to design high-performance dense linear algebra solvers.” In: *Journal of Parallel and Distributed Computing*. IPDPS 2014 Selected Papers on Numerical and Combinatorial Algorithms 85 (Nov. 2015), p. 15. DOI: 10.1016/j.jpdc.2015.06.007.
- [S*-J12] Julien HERRMANN and [Guillaume PALLEZ](#). “H-Revolve: A Framework for Adjoint Computation on Synchronous Hierarchical Platforms.” In: *ACM Transactions on Mathematical Software* (2020). DOI: 10.1145/3378672.
- [S*-J13] [Grégoire PICHON](#), [Mathieu FAVERGE](#), [Pierre RAMET](#), and [Jean ROMAN](#). “Reordering Strategy for Blocking Optimization in Sparse Linear Solvers.” In: *SIAM Journal on Matrix Analysis and Applications*. SIAM Journal on Matrix Analysis and Applications 38.1 (2017), pp. 226–248. DOI: 10.1137/16M1062454.
- [S*-J14] Dalal SUKKARI, Hatem LTAIEF, [Mathieu FAVERGE](#), and David KEYES. “Asynchronous Task-Based Polar Decomposition on Single Node Manycore Architectures.” In: *IEEE Transactions on Parallel and Distributed Systems* XX (Aug. 2017). DOI: 10.1109/TPDS.2017.2755655.
- [S*-J15] Didem UNAT, Anshu DUBEY, Torsten HOEFLE, John SHALF, Mark ABRAHAM, Mauro BIANCO, Bradford L. CHAMBERLAIN, Romain CLEDAT, H. Carter EDWARDS, Hal FINKEL, Karl FUERLINGER, Frank HANNIG, [Emmanuel JEANNOT](#), Amir KAMIL, Jeff KEASLER, Paul H J KELLY, Vitus LEUNG, Hatem LTAIEF, Naoya MARUYAMA, Chris J. NEWBURN, and Miquel PERICÀS. “Trends in Data Locality Abstractions for HPC Systems.” In: *IEEE Transactions on Parallel and Distributed Systems* 28.10 (Oct. 2017), pp. 3007–3020. DOI: 10.1109/TPDS.2017.2703149.

1.2 Ouvrages

Livres

- [S-L1] Jesus CARRETERO, [Emmanuel JEANNOT](#), and Albert ZOMAYA. *Ultrascale Computing Systems*. Institution of Engineering and Technology, Jan. 2019. DOI: 10.1049/PBPC024E.

Chapitre de livres

- [S-Ch1] [Guillaume AUPY](#) and Yves ROBERT. “Scheduling for Fault-Tolerance: An Introduction.” In: *Topic in parallel and distributed computing: Enhancing the Undergraduate Curriculum: Performance, Concurrency, and Programming on Modern Platforms*. Springer International Publishing, Sept. 2018, pp. 143–170. URL: <https://hal.inria.fr/hal-01968454>.
- [S-Ch2] Pascal BOUVRY, Ghislain Landry Tsafack CHETSA, Georges da COSTA, [Emmanuel JEANNOT](#), Laurent LEFÈVRE, Jean-Marc PIERSON, Frederic PINEL, Patricia STOLF, and Sebastien VARRETTE. “Energy efficiency and high-performance computing.” In: *Large-scale Distributed Systems and Energy efficiency*. Wiley, 2015. DOI: 10.1002/9781118981122.ch7.

- [S-Ch3] **Charles CONSEL**, Lucile DUPUY, and Hélène SAUZÉON. “HomeAssist: An Assisted Living Platform for Aging in Place Based on an Interdisciplinary Approach.” In: *Advances in Human Factors and Ergonomics in Healthcare and Medical Devices*. Vol. 16. Springer, July 2017, pp. 165–140. doi: 10.1007/978-3-319-60483-1_14.
- [S-Ch4] Georges da COSTA, Alexey L. LASTOVETSKY, Jorge G. BARBOSA, Juan Carlos Diaz MARTIN, Juan-Luis Garcia ZAPATA, Matthias JANETSCHKE, **Emmanuel JEANNOT**, João LEITÃO, Ravi Reddy MANUMACHU, Radu PRODAN, Juan A. RICO-GALLEGU, Peter van ROY, Ali SHOKER, and Albert van der LINDE. “Programming models and runtimes.” In: *Ultrascale Computing Systems*. Institution of Engineering and Technology, 2019. doi: 10.1049/PBPC024E_ch2.
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- [S-Ch7] **François PELLEGRINI**. “Security and digitization.” In: *La sécurité : mutations et incertitudes*. Ed. by Mustapha AFROUKH, Christophe MAUBERNARD, and Claire VAL. Collection Colloques & Essais 77. Institut universitaire Varenne, Jan. 2019, pp. 89–100. URL: <https://hal.inria.fr/hal-02069419>.

1.3 Production dans des colloques / congrès, séminaires de recherche

Pour une sélection de 20% de nos publications en conférence, nous avons retenu artificiellement les contributions dans : IPDPS, ICSE et Europar.

L’équipe Supports et AlgoriThmes pour les Applications Numériques hAutes performanceS a publié 142 articles en conférences.

Conférences de l’équipe Supports et AlgoriThmes pour les Applications Numériques hAutes performanceS		
	A* et A	Autres
Nombre	47	95
Pourcentage	33%	67%

Conférences, top 20%

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1.4 Produits et outils informatiques

L'activité de développements logiciels est centrale pour notre équipe, car elle permet de valider le passage à l'échelle des approches méthodologiques et numériques qui sont au cœur de notre activité de recherche. Pour être en capacité d'avoir un impact visible, cela nécessite d'aller jusqu'à la mise en œuvre de nos bibliothèques dans des codes applicatifs académiques ou industriels avec des outils de déploiements efficaces et robustes. Ces logiciels sont un vecteur essentiel de collaboration avec les communautés scientifiques qui en sont utilisatrices et qui en retour nous ouvrent de nouvelles perspectives de recherche dans une boucle avec feed-back vertueuse. Ce sont aussi notre "ticket" d'entrée dans des projets collaboratifs plus larges tels que les projets européens.

Plusieurs logiciels phares sont donc développés dans l'équipe Satanas et ont vocation à être largement utilisés, en particulier : SCOTCH, StarPU, hwloc, Topomatch, NewMadeleine, PaStiX, MAPHYS, Chameleon, AFF3CT. Ces logiciels sont maintenus dans la durée, les développeurs assurent un support aux utilisateurs et ils s'intègrent dans la stratégie de l'équipe. D'autres logiciels sont développés dans l'équipe pour accompagner les publications scientifiques et les expérimentations. Enfin, nous contribuons également de manière significative dans des logiciels externes de la communauté, par exemple : QR-MUMPS, OpenMPI, DPLASMA.

Voici la liste des logiciels mis en avant dans les rapports d'activité pour les EPCs HIEPACS, STORM, TADAAM et PHOENIX.

AVCI *Adaptive vibrational configuration interaction*

KEYWORDS : Vibrational spectra - Eigen value

FUNCTIONAL DESCRIPTION : A-VCI is a theoretical vibrational spectroscopy algorithm developed to effectively reduce the number of vibrational states used in the configuration-interaction (CI) process. It constructs a nested basis for the discretization of the Hamiltonian operator inside a large CI approximation space and uses an a-posteriori error estimator (residue) to select the most relevant directions to expand the discretization space.

The Hamiltonian operator consists of 3 operators : a harmonic oscillator sum, the potential energy surface operator and the Coriolis operators. In addition, the code can compute the intensity of eigenvectors.

The code can handle molecules up to 10 atoms, which corresponds to solving an eigenvalue problem in a 24-dimensional space.

- Authors : Olivier Coulaud and Quentin Khan
- Partner : IPREM
- Contact : Olivier Coulaud

Chameleon KEYWORDS : Runtime system - Task-based algorithm - Dense linear algebra - HPC - Task scheduling

SCIENTIFIC DESCRIPTION : Chameleon is part of the MORSE (Matrices Over Runtime Systems @ Exascale) project. The overall objective is to develop robust linear algebra libraries relying on innovative runtime systems that can fully benefit from the potential of those future large-scale complex machines.

The overall goal of the MORSE associate team is to enable advanced numerical algorithms to be executed on a scalable unified runtime system for exploiting the full potential of future exascale machines.

FUNCTIONAL DESCRIPTION : Chameleon is a dense linear algebra software relying on sequential task-based algorithms where sub-tasks of the overall algorithms are submitted to a Runtime system. A Runtime system such as StarPU is able to manage automatically data transfers between not shared memory area (CPUs-GPUs, distributed nodes). This kind of implementation paradigm allows to design high performing linear algebra algorithms on very different type of architecture : laptop, many-core nodes, CPUs-GPUs, multiple nodes. For example, Chameleon is able to perform a Cholesky factorization (double-precision) at 80 TFlop/s on a dense matrix of order 400 000 (i.e. 4 min 30 s).

- Participants : Cédric Castagnede, Samuel Thibault, Emmanuel Agullo, Florent Pruvost and Mathieu Faverge
- Partners : Innovative Computing Laboratory (ICL) - King Abdulla University of Science and Technology - University of Colorado Denver
- Contact : Emmanuel Agullo
- URL : <https://gitlab.inria.fr/solverstack/chameleon>

Diodon KEYWORDS : Dimensionality reduction - Data analysis

FUNCTIONAL DESCRIPTION : Most of dimension reduction methods inherited from Multivariate Data Analysis, and currently implemented as element in statistical learning for handling very large datasets (the dimension of spaces is the number of features) rely on a chain of pretreatments, a core with a SVD for low rank approximation of a given matrix, and a post-treatment for interpreting results. The costly part in computations is the SVD, which is in cubic complexity. Diodon is a list of functions and drivers which implement (i) pre-treatments, SVD and post-treatments on a large diversity of methods, (ii) random projection methods for running the SVD which permits to bypass the time limit in computing the SVD, and (iii) an implementation in C++ of the SVD with random projection at prescribed rank or precision, connected to MDS.

- Authors : Alain Franc, Florent Pruvost, Romain Peressoni and Romain Peressoni
- Contact : Alain Franc
- URL : <https://gitlab.inria.fr/afranc/diodon>

Fabulous *Fast Accurate Block Linear krylOv Solver*

KEYWORDS : Numerical algorithm - Block Krylov solver

SCIENTIFIC DESCRIPTION : Versatile and flexible numerical library that implements Block Krylov iterative schemes for the solution of linear systems of equations with multiple right-hand sides

FUNCTIONAL DESCRIPTION : Versatile and flexible numerical library that implements Block Krylov iterative schemes for the solution of linear systems of equations with multiple right-hand sides. The library implements block variants of minimal norm residual variants with partial convergence management and spectral information recycling. The package already implements regular block-GMRES (BGMRES), Inexact Breakdown BGMRES (IB-BMGRES), Inexact Breakdown BGMRES with Deflated Restarting (IB-BGMRES-DR), Block Generalized Conjugate Residual with partial convergence management. The C++ library relies on callback mechanisms to implement the calculations (matrix-vector, dot-product, ...) that depend on the parallel data distribution selected by the user.

- Participants : Emmanuel Agullo, Luc Giraud, Gilles Marait and Cyrille Piacibello
- Contact : Luc Giraud
- URL : <https://gitlab.inria.fr/solverstack/fabulous/>

MAPHYS *Massively Parallel Hybrid Solver*

KEYWORD : Parallel hybrid direct/iterative solution of large linear systems

FUNCTIONAL DESCRIPTION : MaPhyS is a software package that implements a parallel linear solver coupling direct and iterative approaches. The underlying idea is to apply to general unstructured linear systems domain decomposition ideas developed for the solution of linear systems arising from PDEs. The interface problem, associated with the so called Schur complement system, is solved using a block preconditioner with overlap between the blocks that is referred to as Algebraic Additive Schwarz. A fully algebraic coarse space is available for symmetric positive definite problems, that insures the numerical scalability of the preconditioner.

The parallel implementation is based on MPI+thread. Maphys relies on state-of-the art sparse and dense direct solvers.

MaPhyS is essentially a preconditioner that can be used to speed-up the convergence of any Krylov subspace method and is coupled with the ones implemented in the Fabulous package.

- Participants : Emmanuel Agullo, Luc Giraud, Matthieu Kuhn, Gilles Marait and Louis Poiriel
- Contact : Emmanuel Agullo
- URL : <https://gitlab.inria.fr/solverstack/maphys>

MetaPart KEYWORDS : High performance computing - HPC - Parallel computing - Graph algorithmics - Graph - Hypergraph

FUNCTIONAL DESCRIPTION : MetaPart is a framework for graph or hypergraph manipulation that addresses different problems, like partitioning, repartitioning, or co-partitioning, ... MetaPart is made up of several projects, such as StarPart, LibGraph or CoPart. StarPart is the core of the MetaPart framework. It offers a wide variety of graph partitioning methods (Metis, Scotch, Zoltan, Patoh, ParMetis, Kahip, ...), which makes it easy to compare

these different methods and to better adjust the parameters of these methods. It is built upon the LibGraph library, that provides basic graph and hypergraph routines. The Copart project is a library used on top of StarPart, that provides co-partitioning algorithms for the load-blancing of parallel coupled simulations.

- Participant : Aurélien Esnard
- Contact : Aurélien Esnard
- URL : <https://gitlab.inria.fr/metapart>

MPICPL *MPI CouPLing*

KEYWORDS : MPI - Coupling software

FUNCTIONAL DESCRIPTION : MPICPL is a software library dedicated to the coupling of parallel legacy codes, that are based on the well-known MPI standard. It proposes a lightweight and comprehensive programing interface that simplifies the coupling of several MPI codes (2, 3 or more). MPICPL facilitates the deployment of these codes thanks to the mpicplrun tool and it interconnects them automatically through standard MPI inter-communicators. Moreover, it generates the universe communicator, that merges the world communicators of all coupled-codes. The coupling infrastructure is described by a simple XML file, that is just loaded by the mpicplrun tool.

- Participant : Aurélien Esnard
- Contact : Aurélien Esnard
- URL : <https://gitlab.inria.fr/esnard/mpicpl>

OptiDis KEYWORDS : Dislocation dynamics simulation - Fast multipole method - Large scale - Collision

FUNCTIONAL DESCRIPTION : OptiDis is a new code for large scale dislocation dynamics simulations. Its purpose is to simulate real life dislocation densities (up to 5.1022 dislocations/m-2) in order to understand plastic deformation and study strain hardening. The main application is to observe and understand plastic deformation of irradiated zirconium. Zirconium alloys are the first containment barrier against the dissemination of radioactive elements. More precisely, with neutron irradiated zirconium alloys we are talking about channeling mechanism, which means to stick with the reality, more than tens of thousands of induced loops, i. e. 100 million degrees of freedom in the simulation. The code is based on Numodis code developed at CEA Saclay and the ScalFMM library developed in HiePACS project. The code is written in C++ language and using the last features of C++11/14. One of the main aspects is the hybrid parallelism MPI/OpenMP that gives the software the ability to scale on large cluster while the computation load rises. In order to achieve that, we use different levels of parallelism. First of all, the simulation box is distributed over MPI processes, then we use a thinner level for threads, dividing the domain by an Octree representation. All theses parts are controlled by the ScalFMM library. On the last level, our data are stored in an adaptive structure that absorbs the dynamics of this type of simulation and manages the parallelism of tasks..

- Participant : Olivier Coulaud
- Partner : CEA
- Contact : Olivier Coulaud
- URL : <http://optidis.gforge.inria.fr/>

PaStiX *Parallel Sparse matriX package*

KEYWORDS : Linear algebra - High-performance calculation - Sparse Matrices - Linear Systems Solver - Low-Rank compression

SCIENTIFIC DESCRIPTION : PaStiX is based on an efficient static scheduling and memory manager, in order to solve 3D problems with more than 50 million of unknowns. The mapping and scheduling algorithm handle a combination of 1D and 2D block distributions. A dynamic scheduling can also be applied to take care of NUMA architectures while taking into account very precisely the computational costs of the BLAS 3 primitives, the communication costs and the cost of local aggregations.

FUNCTIONAL DESCRIPTION : PaStiX is a scientific library that provides a high performance parallel solver for very large sparse linear systems based on block direct and block ILU(k) methods. It can handle low-rank compression techniques to reduce the computation and the memory complexity. Numerical algorithms are implemented in single or double precision (real or complex) for LLt, LDLt and LU factorization with static pivoting (for non symmetric matrices having a symmetric pattern). The PaStiX library uses the graph partitioning and sparse matrix block ordering packages Scotch or Metis.

The PaStiX solver is suitable for any heterogeneous parallel/distributed architecture when its performance is predictable, such as clusters of multicore nodes with GPU accelerators or KNL processors. In particular, we provide a high-performance version with a low memory overhead for multicore node architectures, which fully exploits the advantage of shared memory by using an hybrid MPI-thread implementation.

The solver also provides some low-rank compression methods to reduce the memory footprint and/or the time-to-solution.

- Participants : Tony Delarue, Grégoire Pichon, Mathieu Faverge, Esragul Korkmaz and Pierre Ramet
- Partners : INP Bordeaux - Université de Bordeaux
- Contact : Pierre Ramet
- URL : <https://gitlab.inria.fr/solverstack/pastix>

pmtool **KEYWORDS** : Scheduling - Task scheduling - StarPU - Heterogeneity - GPGPU - Performance analysis

FUNCTIONAL DESCRIPTION : Analyse post-mortem the behavior of StarPU applications. Provide lower bounds on makespan. Study the performance of different schedulers in a simple context. Provide implementations of many scheduling algorithms from the literature

- Participant : Lionel Eyraud-Dubois
- Contact : Lionel Eyraud-Dubois
- URL : <https://gitlab.inria.fr/eyrauddu/pmtool>

rotor *Re-materializing Optimally with pyTORch*

KEYWORDS : Deep learning - Optimization - Python - GPU - Automatic differentiation

FUNCTIONAL DESCRIPTION : Allows to train very large convolutional networks on limited memory by optimally selecting which activations should be kept and which should be recomputed. This code is meant to replace the

checkpoint.py utility available in pytorch, by providing more efficient rematerialization strategies. The algorithm is easier to tune : the only required parameter is the available memory, instead of the number of segments.

- Authors : Lionel Eyraud-Dubois, Olivier Beaumont, Alena Shilova, Julien Herrmann and Rémi Duclos
- Contact : Lionel Eyraud-Dubois

ScalFMM *Scalable Fast Multipole Method*

KEYWORDS : N-body - Fast multipole method - Parallelism - MPI - OpenMP

SCIENTIFIC DESCRIPTION : ScalFMM is a software library to simulate N-body interactions using the Fast Multipole Method. The library offers two methods to compute interactions between bodies when the potential decays like $1/r$. The first method is the classical FMM based on spherical harmonic expansions and the second is the Black-Box method which is an independent kernel formulation (introduced by E. Darve @ Stanford). With this method, we can now easily add new non oscillatory kernels in our library. For the classical method, two approaches are used to decrease the complexity of the operators. We consider either matrix formulation that allows us to use BLAS routines or rotation matrix to speed up the M2L operator.

ScalFMM intends to offer all the functionalities needed to perform large parallel simulations while enabling an easy customization of the simulation components : kernels, particles and cells. It works in parallel in a shared/distributed memory model using OpenMP and MPI. The software architecture has been designed with two major objectives : being easy to maintain and easy to understand. There is two main parts : the management of the octree and the parallelization of the method the kernels. This new architecture allow us to easily add new FMM algorithm or kernels and new paradigm of parallelization.

FUNCTIONAL DESCRIPTION : Compute N-body interactions using the Fast Multipole Method for large number of objects

- Participants : Bramas Bérenger, Olivier Coulaud and Pierre Estérie
- Contact : Olivier Coulaud
- URL : <https://gitlab.inria.fr/solverstack/ScalFMM>

VITE *Visual Trace Explorer*

KEYWORDS : Visualization - Execution trace

FUNCTIONAL DESCRIPTION : ViTE is a trace explorer. It is a tool made to visualize execution traces of large parallel programs. It supports Pajé, a trace format created by Inria Grenoble, and OTF and OTF2 formats, developed by the University of Dresden and allows the programmer a simpler way to analyse, debug and/or profile large parallel applications.

- Participant : Mathieu Faverge
- Contact : Mathieu Faverge
- URL : <http://vite.gforge.inria.fr/>

KaStORS *The KaStORS OpenMP Benchmark Suite*

KEYWORDS : Benchmarking - HPC - Task-based algorithm - Task scheduling - OpenMP - Data parallelism

FUNCTIONAL DESCRIPTION : The KaStORS benchmarks suite has been designed to evaluate implementations of the OpenMP dependent task paradigm, introduced as part of the OpenMP 4.0 specification.

- Participants : François Broquedis, Nathalie Furmento, Olivier Aumage, Philippe Virouleau, Pierrick Brunet, Samuel Thibault and Thierry Gautier
- Contact : Thierry Gautier
- URL : <http://kastors.gforge.inria.fr/#!/index.md>

KStar *The KStar OpenMP Compiler*

KEYWORDS : Source-to-source compiler - OpenMP - Task scheduling - Compilers - Data parallelism

FUNCTIONAL DESCRIPTION : The KStar software is a source-to-source OpenMP compiler for languages C and C++. The KStar compiler translates OpenMP directives and constructs into API calls from the StarPU runtime system or the XKaapi runtime system. The KStar compiler is virtually fully compliant with OpenMP 3.0 constructs. The KStar compiler supports OpenMP 4.0 dependent tasks and accelerated targets.

- Participants : Nathalie Furmento, Olivier Aumage, Philippe Virouleau and Samuel Thibault
- Contact : Olivier Aumage
- URL : <http://kstar.gforge.inria.fr/#!/index.md>

AFF3CT *A Fast Forward Error Correction Toolbox*

KEYWORDS : High-Performance Computing - Signal processing - Error Correction Code

FUNCTIONAL DESCRIPTION : AFF3CT proposes high performance Error Correction algorithms for Polar, Turbo, LDPC, RSC (Recursive Systematic Convolutional), Repetition and RA (Repeat and Accumulate) codes. These signal processing codes can be parameterized in order to optimize some given metrics, such as Bit Error Rate, Bandwidth, Latency, ...using simulation. For the designers of such signal processing chain, AFF3CT proposes also high performance building blocks so to develop new algorithms. AFF3CT compiles with many compilers and runs on Windows, Mac OS X, Linux environments and has been optimized for x86 (SSE, AVX instruction sets) and ARM architectures (NEON instruction set).

- Authors : Adrien Cassagne, Bertrand Le Gal, Camille Leroux, Denis Barthou and Olivier Aumage
- Partner : IMS
- Contact : Adrien Cassagne
- URL : <https://aff3ct.github.io/>

SwLoc *Software Contexts for Locality*

KEYWORDS : HPC - Locality - Contexts - Multicore - GPU

FUNCTIONAL DESCRIPTION : SwLoc is a library for flexible and generic partitioning of computing resources (processors, accelerators) to be able to co-execute confined parallel regions which can rely on different runtime systems (e.g. OpenMP, Intel TBB, StarPU, etc.). With all different hypervisor strategies, It is possible to adapt dynamically the computing resources of each context, in order to match each parallel region's need as closely as possible.

- Contact : Corentin Salingue
- URL : <http://swloc.gforge.inria.fr/web/>

PARCOACH *PARallel Control flow Anomaly CHecker*

KEYWORDS : High-Performance Computing - Program verification - Debug - MPI - OpenMP - Compilation

SCIENTIFIC DESCRIPTION : PARCOACH verifies programs in two steps. First, it statically verifies applications with a data- and control-flow analysis and outlines execution paths leading to potential deadlocks. The code is then instrumented, displaying an error and synchronously interrupting all processes if the actual scheduling leads to a deadlock situation.

FUNCTIONAL DESCRIPTION : Supercomputing plays an important role in several innovative fields, speeding up prototyping or validating scientific theories. However, supercomputers are evolving rapidly with now millions of processing units, posing the questions of their programmability. Despite the emergence of more widespread and functional parallel programming models, developing correct and effective parallel applications still remains a complex task. As current scientific applications mainly rely on the Message Passing Interface (MPI) parallel programming model, new hardwares designed for Exascale with higher node-level parallelism clearly advocate for an MPI+X solutions with X a thread-based model such as OpenMP. But integrating two different programming models inside the same application can be error-prone leading to complex bugs - mostly detected unfortunately at runtime. PARallel Control flow Anomaly CHecker aims at helping developers in their debugging phase.

- Participants : Emmanuelle Saillard, Denis Barthou and Pierre Huchant
- Partner : CEA
- Contact : Emmanuelle Saillard
- URL : <https://esaillar.github.io/PARCOACH/>

StarPU *The StarPU Runtime System*

KEYWORDS : Multicore - GPU - Scheduling - HPC - Performance

SCIENTIFIC DESCRIPTION : Traditional processors have reached architectural limits which heterogeneous multicore designs and hardware specialization (eg. coprocessors, accelerators, ...) intend to address. However, exploiting such machines introduces numerous challenging issues at all levels, ranging from programming models and compilers to the design of scalable hardware solutions. The design of efficient runtime systems for these architectures is a critical issue. StarPU typically makes it much easier for high performance libraries or compiler

environments to exploit heterogeneous multicore machines possibly equipped with GPGPUs or Cell processors : rather than handling low-level issues, programmers may concentrate on algorithmic concerns. Portability is obtained by the means of a unified abstraction of the machine. StarPU offers a unified offloadable task abstraction named "codelet". Rather than rewriting the entire code, programmers can encapsulate existing functions within codelets. In case a codelet may run on heterogeneous architectures, it is possible to specify one function for each architectures (eg. one function for CUDA and one function for CPUs). StarPU takes care to schedule and execute those codelets as efficiently as possible over the entire machine. In order to relieve programmers from the burden of explicit data transfers, a high-level data management library enforces memory coherency over the machine : before a codelet starts (eg. on an accelerator), all its data are transparently made available on the compute resource. Given its expressive interface and portable scheduling policies, StarPU obtains portable performances by efficiently (and easily) using all computing resources at the same time. StarPU also takes advantage of the heterogeneous nature of a machine, for instance by using scheduling strategies based on auto-tuned performance models.

FUNCTIONAL DESCRIPTION : StarPU is a runtime system that offers support for heterogeneous multicore machines. While many efforts are devoted to design efficient computation kernels for those architectures (e.g. to implement BLAS kernels on GPUs), StarPU not only takes care of offloading such kernels (and implementing data coherency across the machine), but it also makes sure the kernels are executed as efficiently as possible.

- Participants : Corentin Salingue, Andra Hugo, Benoît Lize, Cédric Augonnet, Cyril Roelandt, François Tessier, Jérôme Clet-Ortega, Ludovic Courtès, Ludovic Stordeur, Marc Sergent, Mehdi Juhoor, Nathalie Furmento, Nicolas Collin, Olivier Aumage, Pierre-André Wacrenier, Raymond Namyst, Samuel Thibault, Simon Archipoff, Xavier Lacoste, Terry Cojean, Yanis Khorsi, Philippe Virouleau, Loïc Jouans and Leo Villeveygoux
- Contact : Olivier Aumage
- URL : <http://starpu.gforge.inria.fr/>

Hsplit *Hardware communicators split*

KEYWORDS : MPI communication - Topology - Hardware platform

SCIENTIFIC DESCRIPTION : Hsplit is a library that implements an abstraction allowing the programmer using MPI in their parallel applications to access the underlying hardware structure through a hierarchy of communicators. Hsplit is based on the MPI_Comm_split_type routine and provides a new value for the split_type argument that specifically creates a hierarchy a subcommunicators where each new subcommunicator corresponds to a meaningful hardware level. The important point is that only the structure o the hardware is exploited and the number of levels or the levels names are not fixed so as to propose a solution independent from future hardware evolutions (such as new levels for instance). Another flavor of this MPI_Comm_split_type function is provided that creates a roots communicators at the same time a subcommunicator is produced, in order to ease the collective communication and/or synchronization among subcommunicators.

FUNCTIONAL DESCRIPTION : Hsplit implements an abstraction that allows the programmer using MPI in their parallel applications to access the underlying hardware structure through a hierarchy of communicators. Hsplit is based on the MPI_Comm_split_type routine and provides a new value for the split_type argument that specifically creates a hierarchy a subcommunicators where each new subcommunicator corresponds to a meaningful hardware level. The important point is that only the structure o the hardware is exploited and the number of levels or the levels names are not fixed so as to propose a solution independent from future hardware evolutions (such as new levels for instance). Another flavor of this MPI_Comm_split_type function is provided that creates a roots

communicators at the same time a subcommunicator is produced, in order to ease the collective communication and/or synchronization among subcommunicators.

- Participants : Guillaume Mercier, Brice Goglin and Emmanuel Jeannot
- Contact : Guillaume Mercier
- URL : <http://mpi-topology.gforge.inria.fr/>

hwloc *Hardware Locality*

KEYWORDS : NUMA - Multicore - GPU - Affinities - Open MPI - Topology - HPC - Locality

FUNCTIONAL DESCRIPTION : Hardware Locality (hwloc) is a library and set of tools aiming at discovering and exposing the topology of machines, including processors, cores, threads, shared caches, NUMA memory nodes and I/O devices. It builds a widely-portable abstraction of these resources and exposes it to applications so as to help them adapt their behavior to the hardware characteristics. They may consult the hierarchy of resources, their attributes, and bind task or memory on them.

hwloc targets many types of high-performance computing applications, from thread scheduling to placement of MPI processes. Most existing MPI implementations, several resource managers and task schedulers, and multiple other parallel libraries already use hwloc.

- Participants : Brice Goglin and Valentin Hoyet
- Partners : Open MPI consortium - Intel - AMD - IBM
- Contact : Brice Goglin
- URL : <http://www.open-mpi.org/projects/hwloc/>

NetLoc *Network Locality*

KEYWORDS : Topology - Locality - Distributed networks - HPC - Parallel computing - MPI communication

FUNCTIONAL DESCRIPTION : netloc (Network Locality) is a library that extends hwloc to network topology information by assembling hwloc knowledge of server internals within graphs of inter-node fabrics such as Infiniband, Intel OmniPath or Cray networks.

Netloc builds a software representation of the entire cluster so as to help applications properly place their tasks on the nodes. It may also help communication libraries optimize their strategies according to the wires and switches.

Netloc targets the same challenges as hwloc but focuses on a wider spectrum by enabling cluster-wide solutions such as process placement. It interoperates with the Scotch graph partitioner to do so.

Netloc is distributed within hwloc releases starting with hwloc 2.0.

- Participants : Brice Goglin, Clément Foyer and Cyril Bordage
- Contact : Brice Goglin
- URL : <http://www.open-mpi.org/projects/netloc/>

NewMadeleine *NewMadeleine : An Optimizing Communication Library for High-Performance Networks*

KEYWORDS : High-performance calculation - MPI communication

FUNCTIONAL DESCRIPTION : NewMadeleine is the fourth incarnation of the Madeleine communication library. The new architecture aims at enabling the use of a much wider range of communication flow optimization techniques. Its design is entirely modular : drivers and optimization strategies are dynamically loadable software components, allowing experimentations with multiple approaches or on multiple issues with regard to processing communication flows.

The optimizing scheduler SchedOpt targets applications with irregular, multi-flow communication schemes such as found in the increasingly common application conglomerates made of multiple programming environments and coupled pieces of code, for instance. SchedOpt itself is easily extensible through the concepts of optimization strategies (what to optimize for, what the optimization goal is) expressed in terms of tactics (how to optimize to reach the optimization goal). Tactics themselves are made of basic communication flows operations such as packet merging or reordering.

The communication library is fully multi-threaded through its close integration with PIOMan. It manages concurrent communication operations from multiple libraries and from multiple threads. Its MPI implementation MadMPI fully supports the MPI_THREAD_MULTIPLE multi-threading level.

- Participants : Alexandre Denis, Clément Foyer, Nathalie Furmento, Raymond Namyst, Adrien Guilbaud, Florian Reynier and Philippe Swartvagher
- Contact : Alexandre Denis
- URL : <http://pm2.gforge.inria.fr/newmadeleine/>

PaMPA *Parallel Mesh Partitioning and Adaptation*

KEYWORDS : Dynamic load balancing - Unstructured heterogeneous meshes - Parallel remeshing - Subdomain decomposition - Parallel numerical solvers

SCIENTIFIC DESCRIPTION : PaMPA is a parallel library for handling, redistributing and remeshing unstructured meshes on distributed-memory architectures. PaMPA dramatically eases and speeds-up the development of parallel numerical solvers for compact schemes. It provides solver writers with a distributed mesh abstraction and an API to : - describe unstructured and possibly heterogeneous meshes, on the form of a graph of interconnected entities of different kinds (e.g. elements, faces, edges, nodes), - attach values to the mesh entities, - distribute such meshes across processing elements, with an overlap of variable width, - perform synchronous or asynchronous data exchanges of values across processing elements, - describe numerical schemes by means of iterators over mesh entities and their connected neighbors of a given kind, - redistribute meshes so as to balance computational load, - perform parallel dynamic remeshing, by applying adequately a user-provided sequential remesher to relevant areas of the distributed mesh.

PaMPA runs concurrently multiple sequential remeshing tasks to perform dynamic parallel remeshing and redistribution of very large unstructured meshes. E.g., it can remesh a tetrahedral mesh from 43Melements to more than 1Belements on 280 Broadwell processors in 20 minutes.

FUNCTIONAL DESCRIPTION : Parallel library for handling, redistributing and remeshing unstructured, heterogeneous meshes on distributed-memory architectures. PaMPA dramatically eases and speeds-up the development of

parallel numerical solvers for compact schemes.

- Participants : Cécile Dobrzynski, Cedric Lachat and François Pellegrini
- Partners : Université de Bordeaux - CNRS - IPB
- Contact : François Pellegrini
- URL : <http://project.inria.fr/pampa/>

TopoMatch KEYWORDS : Intensive parallel computing - High-Performance Computing - Hierarchical architecture - Placement

SCIENTIFIC DESCRIPTION : TreeMatch embeds a set of algorithms to map processors/cores in order to minimize the communication cost of the application.

Important features are : the number of processors can be greater than the number of applications processes , it assumes that the topology is a tree and does not require valuation of the topology (e.g. communication speeds) , it implements different placement algorithms that are switched according to the input size.

Some core algorithms are parallel to speed-up the execution. Optionally embeds scotch for fix-vertex mapping. enable exhaustive search if required. Several metric mapping are computed. Allow for oversubscribing of ressources. multithreaded.

TreeMatch is integrated into various software such as the Charm++ programming environment as well as in both major open-source MPI implementations : Open MPI and MPICH2.

FUNCTIONAL DESCRIPTION : TreeMatch is a library for performing process placement based on the topology of the machine and the communication pattern of the application.

- Participants : Adele Villiermet, Emmanuel Jeannot, François Tessier, Guillaume Mercier and Pierre Celor
- Partners : Université de Bordeaux - CNRS - IPB
- Contact : Emmanuel Jeannot
- URL : <http://treematch.gforge.inria.fr/>

SCOTCH KEYWORDS : Mesh partitioning - Domain decomposition - Graph algorithmics - High-performance calculation - Sparse matrix ordering - Static mapping

FUNCTIONAL DESCRIPTION : Scotch is a graph partitioner. It helps optimise the division of a problem, by means of a graph, into a set of independent sub-problems of equivalent sizes. These sub-problems can also be solved in parallel.

- Participants : François Pellegrini, Sébastien Fourestier, Jun-Ho Her, Cédric Chevalier and Amaury Jacques
- Partners : Université de Bordeaux - IPB - CNRS - Region Aquitaine
- Contact : François Pellegrini
- URL : <http://www.labri.fr/~pelegri/scotch/>

H-Revolve KEYWORDS : Automatic differentiation - Gradients - Machine learning

FUNCTIONAL DESCRIPTION : This software provides several algorithms (Disk-Revolve, 1D-Revolve, Periodic-Disk-Revolve,...) computing the optimal checkpointing strategy when executing a adjoint chain with limited memory. The considered architecture has a level of limited memory that is free to access (writing and reading costs are negligible) and a level of unlimited memory with non-negligible access costs. The algorithms describe which data should be saved in the memory to minimize the number of re-computation during the execution.

- Authors : Guillaume Aupy and Julien Herrmann
- Contact : Guillaume Aupy
- URL : <https://gitlab.inria.fr/adjoint-computation/H-Revolve>

College + KEYWORDS : Neurosciences - Health - Autism - Mobile application

FUNCTIONAL DESCRIPTION : College+ is an iPad app gathering an assistance module and a training module for school inclusion in of children with autism spectrum disorders and children with intellectual disabilities in mainstream classrooms. The assistance module, used in mainstream classroom, comprises 3 functionalities :

- emotion regulation,
- classroom routines,
- verbal communication.

The training module, used on a daily basis at home or in special education classroom, comprises two functionalities, presented as serious games :

- attention training,
- emotion identification training.

All contents of College+ app can be modified, to fit the unique needs of each student.

- Participants : Alexandre Spriet, Charles Fage, Damien Martin Guillerez and H  l  ne Sauz  on
- Contact : Charles Consel
- URL : <http://phoenix.inria.fr/research-projects/school>

DiaSuite KEYWORDS : Pervasive computing - Code generation - Specification language

FUNCTIONAL DESCRIPTION : DiaSuite is developed as a research project by the INRIA/LaBRI Phoenix research group. The DiaSuite approach covers the development life-cycle of a pervasive computing application. It takes the form of a methodology, supported by (1) a high-level design language and (2) a suite of tools covering the development life-cycle of a pervasive computing application. Specifically, we have developed a design language dedicated to describing pervasive computing systems and a suite of tools providing customized support for each development stage of a pervasive computing system, namely, implementation (e.g., programming support), testing (e.g., unit test, 2D simulator), and deployment (e.g., distribution platforms like SIP and Web Services).

- Participants : Adrien Carteron, Alexandre Spriet, Charles Consel, Milan Kabac, Paul Van Der Walt and Quentin Barlas
- Partner : INP Bordeaux
- Contact : Charles Consel
- URL : <http://phoenix.inria.fr/software/diasuite>

DiaSuiteBOX KEYWORDS : Dedicated langage - Iot - Orchestration - Toolbox - Development tool suite

FUNCTIONAL DESCRIPTION : DiaSuiteBOX proposes an application store that gathers the devices deployed at home. This store is open and available online such as an application store for Smartphone.

- Participants : Adrien Carteron, Bertran Benjamin, Bruneau Julien, Consel Charles, Damien Cassou, Damien Martin Guillerez, Eugène Volansch, Hélène Sauzéon, Joan Rieu, Julien Durand, Ludovic Fornasari, Milan Kabac, Quentin Barlas and Quentin Enard
- Partners : Université de Bordeaux - INP Bordeaux
- Contact : Charles Consel
- URL : <https://domassist.bordeaux.inria.fr/>

DomAssist *Home digital assistance*

KEYWORDS : Health - Mobile application - Persons attendant - Home care

FUNCTIONAL DESCRIPTION : 3 mobile applications for assistive living :

- DiAndroid : Interface for the main tablet with the DiaSuiteBox applications including those for the daily activities, the meetings scheduling, etc. and for home and personal safety
- Accueil : home screen restraining the use of a secondary tablet and offering communications and social activities applications with simplified communication means (ie. eMail), collaborative games, etc.
- eMail : mail client made for older people

Other Vera gateway tools :

- Controlling connected objects to the Vera home automation gateway from Android
- Vera push plugin to domassist cloud : vera plugin to communicate sensor information associated with the gateway directly to DomAssist servers
- Vera HeartBeat Plugin : Regular sending of a frame to know that the gateway is still online
- Participants : Alexandre Spriet, Quentin Barlas, Charles Consel, Hélène Sauzéon and Julien Durand
- Partners : Université de Bordeaux - CNRS - IPB
- Contact : Charles Consel
- URL : <http://phoenix.inria.fr/research-projects/homeassist>

1.5 Développements instrumentaux et méthodologiques

Olivier Coulaud est responsable de PLAFRIM, une plateforme expérimentale de recherche et développement en modélisation, simulation et de calcul haute performance. Cette plateforme a été mise en place à partir de 2009 sous l'impulsion de l'Inria Bordeaux Sud-Ouest en collaboration avec des laboratoires d'informatique et de mathématiques, respectivement LaBRI et IMB avec un fort soutien de la région Aquitaine. Le but de la plateforme est de proposer aux chercheurs et aux ingénieurs un outil interactif et attractif de recherche et de développement de capacité suffisante, sachant que la phase d'exploitation continuera à se faire sur les grands centres de calcul pilotés par le GENCI. Elle regroupe différents types de ressources informatiques à des fins de recherche et développement. Les technologies les plus récentes en matière de processeurs, de mémoires et d'architecture sont ajoutées lorsqu'elles

sont disponibles sur le marché. Ce sont désormais plus de 3 000 cœurs (hors GPU et Xeon Phi) qui sont disponibles. Les équipes du LaBRI qui utilisent la plateforme sont principalement les équipes Combi-Algo, Image et Son et Satanas.

Nathalie Furmento fait partie de l'équipe technique de PLAFRIM, dans une limite de 20% de son temps de travail.

Dans le cadre des activités de GENCI, Jean Roman est membre pour Inria du Groupe de liaison France pour PRACE, ainsi que des Comités Technique et d'Orientation Stratégique de GENCI.

Grid'5000 est un outil dédié à l'expérimentation en informatique parallèle et distribuée. À Bordeaux il n'y a plus de cluster de calcul Grid'5000 depuis 2015, mais Emmanuel Jeannot continue à participer au comité des responsables de sites et ce site est grandement ouvert aux chercheurs du LaBRI (19 comptes actifs à ce jour).

1.6 Autres produits propres à une discipline

L'équipe n'a pas d'autre produit à décrire dans cette section.

1.7 Activités éditoriales

1.7.1 Participation à des comités éditoriaux

Les recherches menées par les membres de l'équipe ont permis la création d'une nouvelle startup : ProMyze¹. Lors de la dernière évaluation, la startup NFC-i avait été créée ; cette startup s'appelle maintenant Preditic² et a plus d'une dizaine d'employés. 6.14.

Tableau 6.1 : Édition, équipe Satanas

Rôle	Nom de la revue	Période	Membre
Associate Editor in Chief	Journal of Parallel and Distributed Computing (JPDC)	2019–	Olivier Beaumont
Associate Editor	Int. Journal of Parallel, Emergent Distributed Systems	2010–	Emmanuel Jeannot

1. <https://www.promyze.com>

2. <https://preditic.com/>

1.7.2 Éditeur invité, numéro spécial

Les recherches menées par les membres de l'équipe ont permis la création d'une nouvelle startup : ProMyze³. Lors de la dernière évaluation, la startup NFC-i avait été créée ; cette startup s'appelle maintenant Preditic⁴ et a plus d'une dizaine d'employés. 6.14.

Tableau 6.2 : Édition de numéros spéciaux, équipe Satanas

Rôle	Nom du numéro spécial	Année	Membre
Associate Editor, Invite	Int. CCPE, special issue	2018	Olivier Aumage

1.7.3 Direction de collection et de séries

1.8 Activités d'évaluation

1.8.1 Evaluation d'articles

Tableau 6.3 : Comités de programme de conférences internationales, équipe Satanas

Rôle	Nature	Intitulé	Année	Membre
Program committee chair	Conference	Networking & Architecture area of SuperComputing	2020	B. Goglin
Program committee chair	Conference	Application, Algorithms, and Libraries area of IEEE International Conference on Cluster Computing (CLUSTER)	2020	E. Jeannot
Program committee chair	Conference	International Conference on Parallel Processing (ICPP)	2019	E. Agullo
Program committee chair	Conference	HIPC	2018	A. Guermouche
Program committee vice-chair (Algorithm)	Conference	HIPC	2017	O. Beaumont
Program committee co-vice-chair (Algorithm)	Conference	ACM/IEEE Conference on High Performance Computing (Supercomputing) (SC)	2017	O. Beaumont

3. <https://www.promyze.com>

142. <https://preditic.com> Production de connaissances et activités concourant au rayonnement et à l'attractivité scientifique

Program committee chair	Conference	European Conference on Parallel Processing (Euro-Par)	2016	S. Thibault
Program committee co-vice-chair (Algorithm)	Conference	International Conference on Parallel Processing (ICPP)	2016	O. Beaumont
Program committee member	Conference	IEEE International Parallel and Distributed Processing Symposium (IPDPS)	2015–2019	au moins membre un parmi E. Jeannot, O. Beaumont, L. Eyraud-Dubois, R. Namyst, L. Giraud
Program committee member	Conference	ACM/IEEE Conference on High Performance Computing (Supercomputing) (SC)	2018–2020	au moins membre un parmi S. Thibault, E. Jeannot, E. Saillard, R. Namyst, G. Mercier
Program committee member	Conference	ACM/IEEE Conference on High Performance Computing (Supercomputing) (SC) - Tutorials committee	2020	F. Zanon Boito
Program committee member	Conference	ACM/IEEE Conference on High Performance Computing (Supercomputing) (SC) - Workshop committee	2018	E. Saillard
Program committee member	Conference	ACM/IEEE Conference on High Performance Computing (Supercomputing) (SC) - Poster committee	2016–2019	E. Agullo, B. Goglin, A. Guermouche, L. Giraud
Program committee member	Conference	European Conference on Parallel Processing (Euro-Par)	2019–2020	au moins un membre parmi O. Beaumont, O. Aumage
Program committee member	Conference	European Conference on Parallel Processing (Euro-Par)	2015	S. Thibault
Program committee member	Conference	International Conference on Parallel Processing (ICPP)	2017–2019	au moins un membre parmi B. Goglin, A. Guermouche, O. Aumage, E. Agullo, E. Jeannot
Program committee member	Conference	IEEE International Conference on Cluster Computing (CLUSTER)	2015–2020	au moins un membre parmi F. Zanon Boito, A. Denis, O. Aumage, B. Goglin, R. Namyst, M. Faverge

Program committee member	Conference	CCGRID	2016–2020	au moins un membre parmi O. Aumage, A. Denis, R. Namyst, E. Jeannot, B. Goglin, G. Mercier
Program committee member	Conference	International Conference on Parallel and Distributed Systems (ICPADS)	2019–2020	O. Aumage
Program committee member	Conference	SC Asia	2018–2020	au moins un membre parmi O. Aumage, R. Namyst
Program committee member	Conference	HPML	2019–2020	O. Beaumont
Program committee member	Conference	AlgoCloud	2019–2020	O. Beaumont
Program committee member	Conference	HIPC	2015–2019	au moins un membre parmi R. Namyst, L. Giraud, A. Guermouche, A. Denis
Program committee member	Conference	ISC High Performance Computing	2018–2020	au moins un membre parmi E. Agullo, R. Namyst
Program committee member	Conference	ISC High Performance Computing - Poster committee	2018	E. Saillard
Program committee member	Conference	Parallel Processing and Applied Mathematics (PPAM)	2019	E. Saillard, R. Namyst
Program committee member	Conference	Parallel Processing and Applied Mathematics (PPAM)	2015	R. Namyst
Program committee member	Conference	International Symposium on Formal Approaches to Parallel and Distributed Systems (4PAD)	2019	E. Saillard
Program committee member	Conference	EuroMPI	2016–2019	au moins un membre parmi B. Goglin, R. Namyst, G. Mercier
Program committee member	Conference	Hot Interconnects	2019	B. Goglin

Program committee member	Conference	OMASE	2019	E. Saillard
Program committee member	Conference	ICCS	2019	R. Namyst
Program committee member	Conference	PDSEC	2015–2019	au moins un membre parmi O. Coulaud, M. Faverge, L. Giraud
Program committee member	Conference	IEEE PDP	2015–2019	J. Roman
Program committee member	Conference	SPPA	2019	O. Beaumont
Program committee member	Conference	IEEE International Conference Collaboration and Internet Computing	2016–2018	C. Consel
Program committee member	Conference	IEEE International Conference on Cloud Computing (CLOUD)	2018	C. Consel
Program committee member	Conference	IEEE International Conference on Software Engineering	2018	C. Consel
Program committee member	Conference	Computing Frontiers	2018	D. Barthou
Program committee member	Conference	SBAC-PAD	2017–2018	M. Faverge
Program committee member	Conference	High Performance Computing Simulation Conference	2017–2018	au moins un membre parmi D. Barthou, G. Mercier
Program committee member	Conference	European Conference on Parallel Processing (Euro-Par)	2016–2017	au moins un membre parmi D. Barthou, R. Namyst
Program committee member	Conference	CARLA	2015–2017	B. Goglin
Program committee member	Conference	UCHPC	2017	D. Barthou

Program committee member	Conference	PACT	2017	D. Barthou
Program committee member	Conference	SAC/MUSEPAT	2016	R. Namyst
Program committee member	Conference	PARENG	2015	P. Ramet
Program committee member	Conference	ROSS	2015	R. Namyst
Program committee member	Conference	RESPA	2015	R. Namyst

Tableau 6.4 : Comités de programme de conférences nationales, équipe Satanás

Rôle	Nature	Intitulé	Année	Membre
Program committee chair	Conference	Compas	2019	E. Saillard, E. Agullo
Program committee member	Conference	Compas	2015–2020	au moins un membre parmi S. Thibault, O. Beaumont, E. Saillard, P. Ramet, A. Denis
Program committee member	Conference	Simposion em Sistemas Computacionais (WSCAD-SSC, Brazil)	2020	F. Zanon Boito
Program committee member	Conference	Brazilian Thesis Competition on Computer Architecture and HPC (WSCAD-CTD)	2019–2020	F. Zanon Boito

Tableau 6.5 : Comités de programme d'ateliers internationaux, équipe Satanás

Rôle	Nature	Intitulé	Année	Membre
Program committee chair	Workshop	Compiler-assisted Correctness Checking and Performance Optimization for HPC (C3PO)	2020	Emmanuelle Saillard

Program committee chair	Workshop	HCW	2017	Emmanuel Jeannot
Program committee member	Workshop	IEEE International Workshop on Parallel and Distributed Scientific and Engineering Computing	2020	Mathieu Faverge, Olivier Coulaud, Luc Giraud
Program committee member	Workshop	HCW	2016–2020	Samuel Thibault
Program committee member	Workshop	RADR	2019–2020	au moins un membre parmi Brice Goglin, Raymond Namyst
Program committee member	Workshop	COLOC	2015–2020	Brice Goglin
Program committee member	Workshop	TBAA	2020	Samuel Thibault
Program committee member	Workshop	Third International Workshop on Software Correctness for HPC Applications	2019	Emmanuelle Saillard
Program committee member	Workshop	OMASE	2019	Emmanuelle Saillard
Program committee member	Workshop	ROME	2018–2019	Brice Goglin
Program committee member	Workshop	ExaComm	2015–2019	Brice Goglin
Program committee member	Workshop	PAW-ATM	2019	Olivier Aumage
Program committee member	Workshop	P3MA	2016–2018	Samuel Thibault
Program committee member	Workshop	MuCoCos	2016	Samuel Thibault
Program committee member	Workshop	UCHPC	2016	Denis Barthou

Program committee member	Workshop	Heteropar	2015	Alexandre Denis
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1.8.2 Evaluation de projets de recherche

Tableau 6.6 : Evaluation de projets de recherche, équipe Satanas

Rôle	Nature	Intitulé	Année	Membre
Expert	Autres	ERC Starting Grant evaluator	2020	Denis Barthou
Expert	ANR	CES Axe8 - HPC, Big Data, Simulation	2019	Olivier Aumage
Expert	ANR	Évaluation projet	2018	Olivier Aumage
Expert	ANR	Évaluation projet	2018	Samuel Thibault
Expert	Autres	Evaluation de Projet -PRACE-6IP	2018	Samuel Thibault
Member	Autres	Commission Evaluation INRIA	2017	Emmanuel Jeannot
Expert	Fondations Scientifiques	Evaluation de Projet - Kingdom of Saudi Arabia	2017	Samuel Thibault
Expert	Autres	OpenMP ARB Consortium	2017–2020	Olivier Aumage
Expert	Autres	Khronos OpenCL advisory panel	2017–2020	Raymond Namyst
Expert	Autres	FET OPEN RIA program (EIC)	2016–2020	Olivier Beaumont
Expert	ANRT	Expert pour thèses CIFRE	2015	Denis Barthou
Expert	ANR	HPC/simulation call	2015	Denis Barthou

1.8.3 Evaluation de laboratoire

Nathalie Furmento a participé à l'évaluation du laboratoire IRIF (Institut de Recherche en Informatique Fondamentale) pour l'HCERES en 2018.

1.9 Contrats de recherche financés par des institutions publiques ou caritatives

Le tableau suivant présente les montants des projets portés par l'équipe, il montre aussi la diversité des financements obtenus.

Tableau 6.7 : Contrats de l'équipe Supports et AlgoriThmes pour les Applications Numériques hAutes performanceS, en k€

	2015	2016	2017	2018	2019	2020	Total

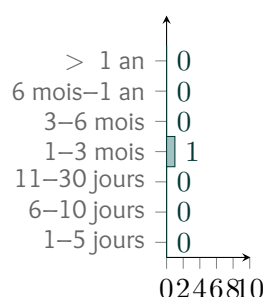
International, dont Europe	494	110	50	521	100	0	1275
National	1241	50	282	313	448	0	2334
Régional	572	61	0	720	0	0	1353
Industrie	425	523	196	58	463	0	1665
Autres	32	86	32	0	0	0	150

Montant total des contrats pour l'équipe Supports et AlgoriThmes pour les Applications Numériques hAutes performanceS : **6777 k€**.

1.10 Post-doctorants et chercheurs accueillis

Nous présentons, dans les tableaux suivants, uniquement les visiteurs de longue durée (> 1 mois) dans l'équipe. L'équipe accueille régulièrement des chercheurs étrangers qui viennent en France ou en Europe lors d'une conférence et qui profitent de ce déplacement pour participer à un séminaire dans l'équipe. Leur séjour est alors généralement limité de quelques jours à une semaine.

1.10.1 Chercheurs étrangers invités



Nombre d'invités étrangers de l'équipe Satanas

Les recherches menées par les membres de l'équipe ont permis la création d'une nouvelle startup : ProMyze⁵. Lors de la dernière évaluation, la startup NFC-i avait été créée ; cette startup s'appelle maintenant Preditic⁶ et a plus d'une dizaine d'employés. 6.14.

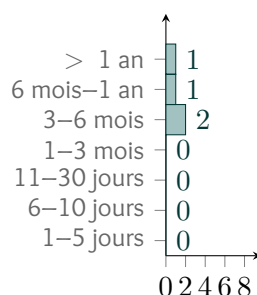
Tableau 6.8 : Accueil chercheurs, équipe Satanas (international, ≥ 30 jours)

Invité	Institution	Pays	Annee	Durée	Invitant
Dana Akhmetova	KTH	Sweden	2018	31	Samuel Thibault

5. <https://www.promyze.com>

6. <https://preditic.com/>

1.10.2 Chercheurs français invités



Nombre d'invités français de l'équipe Satanás

Les recherches menées par les membres de l'équipe ont permis la création d'une nouvelle startup : ProMyze⁷. Lors de la dernière évaluation, la startup NFC-i avait été créée ; cette startup s'appelle maintenant Preditic⁸ et a plus d'une dizaine d'employés. 6.14.

Tableau 6.9 : Accueil chercheurs, équipe Satanás (national, ≥ 30 jours)

Invité	Institution	Annee	Durée	Invitant
Jean-René Poirier	INP Toulouse	2018	182	Luc Giraud
Jean-René Poirier	INP Toulouse	2017	182	Luc Giraud
Amina Guermouche	Telecom Sud-Paris	2017	240	Denis Barthou
Guillaume Sylvand	Airbus Central R & T	2015	1825	Luc Giraud

Jean-René Poirier, MdC à l'IRIT Toulouse, a effectué deux délégations de 6 mois dans l'équipe HiEPACS en 2017 et 2018. Il s'est en particulier impliqué dans le groupe de travail sur les tenseurs organisé par Olivier Coulaud.

Guillaume Sylvand, chercheur chez Airbus, est détaché dans l'équipe HiEPACS suite à une convention signée en 2012 entre Airbus, Inria et la région Aquitaine. Il apporte une forte expertise dans la simulation numérique parallèle et est un expert des solveurs FMM et H-matrix. Il joue un rôle actif dans les activités scientifiques de l'équipe et permet de renforcer l'interaction entre la recherche universitaire appliquée et la recherche industrielle.

1.11 Indices de reconnaissance

Nous avons organisé la 9ème édition de la conférence internationale PMAA [<https://pmaa16.sciencesconf.org/>] en 2016. La conférence était composée de 4 présentations plénières invitées et de 76 présentations régulières. Environ 120 personnes ont participé à la conférence, dont 70% étaient originaires d'Europe, 20% d'Amérique du Nord, 7% d'Asie, et plus de 25% étaient des étudiants. Nous avons pu offrir les inscriptions gratuites aux étudiants grâce au parrainage que nous avons obtenu d'Airbus, du CEA, du CERFACS, de Clustervision, du Labex CPU, de DELL, d'EDF, d'IBM et de Total, qui a contribué à équilibrer notre budget.

7. <https://www.promyze.com>

8. <https://preditic.com/>

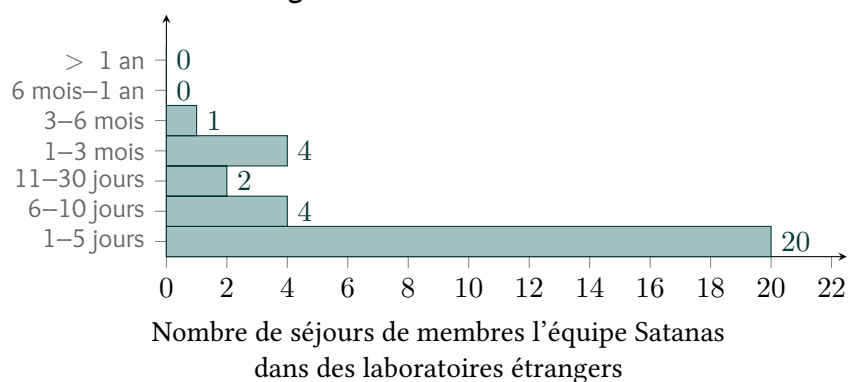
Tableau 6.10 : Organisations de colloques ou congrès internationaux, équipe Satanas

Rôle	Nature	Intitulé	Année	Membre
Organizing committee member	Workshop	15th Scheduling for Large Scale Systems Workshop	2020	M. Faverge, O. Beaumont, G. Aupy
Organizing committee member	Workshop	2nd Workshop on Resource Arbitration for Dynamic Runtimes (RADR)	2020	E. Jeannot
Organizing committee member	Conference	SIAM Conference of parallel processing in scientific computing (SIAM PP20)	2020	O. Beaumont
Publicity co-chair	Conference	27th European MPI Users' Group Meeting	2020	G. Mercier
Organizing committee member	Workshop	14th Scheduling for Large Scale Systems Workshop	2019	M. Faverge, O. Beaumont, L. Eyraud-dubois, A. Guermouche
Organizing committee member	Workshop	1st Workshop on Resource Arbitration for Dynamic Runtimes (RADR)	2019	E. Jeannot
Organizing committee member	Workshop	3rd workshop on data locality (COLOC)	2019	E. Jeannot
Organizing committee member	Workshop	Fifth Workshop on Programming Abstractions for Data Locality (PADAL'19)	2019	B. Goglin, E. Jeannot
Organizing committee member	Workshop	OpenMP Language Committee	2019	O. Aumage
Organizing committee member	Workshop	Inria National Scientific Days	2019	R. Namyst
Organizing committee member	Conference	SIAM Conference of parallel processing in scientific computing (SIAM PP18)	2018	L. Giraud
Organizing committee member	Conference	10th International Workshop on Parallel Matrix Algorithms and Applications (PMAA'18)	2018	L. Giraud
Organizing committee member	Workshop	2nd workshop on data locality (COLOC)	2018	E. Jeannot

Organizing committee member	Workshop	1st workshop on data locality (COLOC)	2017	E. Jeannot
Organizing committee member	Workshop	HCW'17	2017	S. Thibault
Organizing committee member	Workshop	9th International workshop on Parallel Matrix Algorithms and Applications	2016	E. Agullo, O. Coulaud, A. Esnard, M. Faverge, L. Giraud, A. Guermouche, P. Ramet, J. Roman
Organizing committee member	Conference	The 22nd European MPI Users' Group Meeting	2015	E. Jeannot, G. Mercier, A. Denis, B. Goglin, F. Tessier
Publicity co-chair	Conference	Computing Frontiers	2015	R. Namyst

De nombreux autres workshops plus confidentiels ont été organisés, dans le cadre d'animation d'ANR notamment.

1.11.1 Séjours dans des laboratoires étrangers



Les recherches menées par les membres de l'équipe ont permis la création d'une nouvelle startup : ProMyze⁹. Lors de la dernière évaluation, la startup NFC-i avait été créée ; cette startup s'appelle maintenant Preditic¹⁰ et a plus d'une dizaine d'employés. 6.14.

Tableau 6.11 : Séjours, équipe Satanas (international, ≥ 5 jours)

Institution	Pays	Année	Description	Durée	Membre
University of Illinois at Urbana-Champaign	États-Unis	2019	Professeur invité	64	Charles Consel

9. <https://www.promyze.com>

10. <https://preditic.com>

Oregon Health and Science University [Portland]	États-Unis	2019	Professeur invité	62	Charles Consel
National Laboratory [Berkeley]	États-Unis	2019	Visite de travail et exposé scientifique, dans le cadre de l'équipe associée Inria COHPC	8	Emmanuelle Saillard
National Laboratory [Berkeley]	États-Unis	2019	Visite de travail et exposé scientifique, dans le cadre de l'équipe associée Inria COHPC	8	Denis Barthou
Stanford University [Stanford]	États-Unis	2018	Invitation	7	Pierre Ramet
Argonne National Lab	États-Unis	2018	Invitation	7	Emmanuel Jeannot
University of Illinois at Urbana-Champaign	États-Unis	2017	Conférence invitée et visite de travail	13	Charles Consel
Joint Laboratory on Extreme Scale Computing	États-Unis	2017	JLESC workshop	5	Samuel Thibault
Department of Computer Science [Stonybrook - NY]	États-Unis	2017	OpenMP Language Committee Face-to-Face Meeting	5	Olivier Aumage
Intel Deutschland GmbH	Allemagne	2017	OpenMP Language Committee Face-to-Face Meeting	5	Olivier Aumage
ARM Ltd [Cambridge]	Angleterre	2017	OpenMP Language Committee Face-to-Face Meeting	5	Olivier Aumage
Innovative Computing Laboratory [Knoxville]	Etats Unis	2016	Chercheur invité	180	Mathieu Faverge
RIKEN	Japon	2016	Collaboration dans le cadre du JLESC	14	Alexandre Denis
IBM Watson Research Center	États-Unis	2016	OpenMP Language Committee Face-to-Face Meeting	5	Olivier Aumage
Université des sciences et technologies du roi Abdallah (KAUST) [Jeddah]	Arabie Saoudite	2015	Chercheur invité	60	Mathieu Faverge
Innovative Computing Laboratory [Knoxville]	Etats Unis	2015	Chercheur invité	48	Mathieu Faverge

1.11.2 Récompenses et prix

Sur la période, l'équipe a obtenu les prix et distinctions suivants :

- Prix IEEE TCHPC Early Career Researchers Award for Excellence in High Performance Computing en 2019. Ce prix met en avant chaque année trois jeunes chercheurs du domaine calcul haute-performance pour leur vision, ainsi que leurs contributions remarquables. Il est remis lors de la conférence phare du domaine, Supercomputing 2019, à Guillaume Pallez.
- Best paper award IEEE UIC'2016, Kabáč, Milan, et Charles Consel : *Designing parallel data processing for large-scale sensor orchestration*, 2016 Intl IEEE Conferences on Ubiquitous Intelligence & Computing (UIC).
- Prix APAJH 2016 de l'accessibilité universelle : *Application Web "C'est ma vie, je la choisis"* pour l'aide la prise de décision et à l'élaboration d'un projet de vie pour les personnes avec Trisomie 21. Application développée en collaboration avec l'université de Mons et l'association Trisomie 21. Novembre 2016, Paris.

1.11.3 Participation à des jurys de prix

Les recherches menées par les membres de l'équipe ont permis la création d'une nouvelle startup : ProMyze¹¹. Lors de la dernière évaluation, la statup NFC-i avait été créée ; cette startup s'appelle maintenant Preditic¹² et a plus d'une dizaine d'employés. 6.14.

Tableau 6.12 : Participation à des jurys de prix, équipe Satanas

Rôle	Description	Période	Membre
Membre	Prix de la thèse GDR GPL	2016	Charles Consel

2 Interaction de l'équipe avec l'environnement non académique

2.1 Brevets, licences et déclarations d'invention

2.1.1 Brevets

L'équipe Supports et AlgoriThmes pour les Applications Numériques hAutes performanceS n'a pas de membre ayant participé à la création d'une start-up.

2.2 Interactions avec les acteurs socio-économiques

Seules les thèses financées sur des contrats CIFRE, et dont la date de début fait partie de la période d'évaluation, sont mentionnées dans la liste ci-dessous. A noter que l'équipe Satanas a également encadré 6 thèses sur financement CEA associées à des contrats d'accompagnement.

11. <https://www.promyze.com>

12. <https://preditic.com/>

2.2.1 Thèses CIFRE

Les recherches menées par les membres de l'équipe ont permis la création d'une nouvelle startup : ProMyze¹³. Lors de la dernière évaluation, la startup NFC-i avait été créée ; cette startup s'appelle maintenant Preditic¹⁴ et a plus d'une dizaine d'employés. 6.14.

Tableau 6.13 : Thèses CIFRE, équipe Satanas

Doctorant	Titre	1 ^{re} année	Société	Encadrant
COYE Baptiste	Construction et ordonnancement de graphe de tâches par composition	2020	UBISOFT	BARTHOU Denis, NAMYST Raymond
AITKACI Tassadit Célia	Analyse et optimisations pour les applications HPC à mémoire distribuée et adressable globalement	2019	BULL ATOS	BARTHOU Denis, SAILLARD Emmanuelle
DENOYELLE Nicolas	Placement de tâches des applications parallèles sur les nouvelles architectures à mémoire hiérarchique	2018	BULL CONSULTANCY AGENCY (ATOS)	GOGLIN Brice, JEANNOT Emmanuel
LORENDEAU Benjamin	Amélioration des performances via un parallélisme multi-niveaux en maillage non-structuré pour un code de CFD	2015	EDF - Electricité de France	JEANNOT Emmanuel

2.2.2 Création de start-up

Les recherches menées par les membres de l'équipe ont permis la création d'une nouvelle startup : ProMyze¹⁵. Lors de la dernière évaluation, la startup NFC-i avait été créée ; cette startup s'appelle maintenant Preditic¹⁶ et a plus d'une dizaine d'employés. 6.14.

Tableau 6.14 : Start-up, équipe Satanas

Nom société	Année de création	Domaine	Participants
UT4H	2018	Edition de logiciels applicatifs	Charles CONSEL, Hélène SAUZEON
IQSPOT	2015	Programmation informatique	Julien BRUNEAU (thèse INRIA), Quentin ENARD (INRIA)

2.3 Activités d'expertise scientifique

Raymond Namyst et Pierre Ramet sont conseillers scientifiques pour le domaine du HPC au CEA.

Jean Roman est membre du Conseil Scientifique du CEA DAM. Durant la période, il a expertisé les activités de la DAM concernant le HPC (programme TERA et évolutions pour l'exascale) et concernant la prise en compte des incertitudes dans les simulations complexes. Au niveau européen, Jean Roman est en tant que représentant d'Inria

13. <https://www.promyze.com>

14. <https://preditic.com/>

15. <https://www.promyze.com>

16. <https://preditic.com/>

membre du board d'ETP4HPC (European Technology Platform for High Performance Computing). Dans le cadre des activités de GENCI, il est membre pour Inria du Groupe de liaison France pour PRACE, ainsi que des Comités Technique et d'Orientation Stratégique de GENCI (expertise dans le cadre du choix des calculateurs nationaux). Depuis début 2019, il représente Inria au Groupe Miroir France EuroHPC piloté par le MESRI et participe à la préparation du dossier Exascale France pour la candidature de la France à l'acquisition d'un ordinateur de niveau exaflopique.

Jean Roman a été jusqu'à fin 2019 au sein de la Direction Générale déléguée à la Science (DGD-S) d'Inria adjoint au directeur en charge au niveau national du domaine scientifique "Mathématiques appliquées, Calcul et Simulation" ainsi que des activités HPC & HPDA.

3 Implication de l'équipe dans la formation par la recherche

Le parcours PRCD (Parallélisme Régulation et Calcul Distribué) a permis de fédérer l'enseignement du calcul parallèle sur le site Bordelais et a contribué à la formation de nombreux d'ingénieurs en HPC qui ont irrigué le tissu industriel.

Depuis la rentrée 2019, il est remplacé par un nouveau master CISD (Calcul Intensif et Sciences des données) qui a pour objectif de proposer une double compétence calcul et données. Il est piloté par Raymond Namyst et Mathieu Favre, il s'adresse aux élèves de l'ENSEIRB-MATMECA et du master informatique de Bordeaux qui souhaitent devenir des experts en calcul et en traitement et analyse des données hautes performances. La simulation numérique est devenue un pilier incontournable de la science. Elle permet notamment de simuler des phénomènes impossibles à observer en laboratoire, dans les domaines de la Physique, la Chimie, la Mécanique, la Climatologie, l'Astrophysique, la Biologie, et bien d'autres. La précision et l'efficacité de ces simulations reposent sur une exploitation performante de moyens de calcul parallèles, et nécessitent un large spectre de compétences en matière de modélisation, d'algorithmique et de programmation. Cette quête de performance est partagée par les applications destinées à extraire de l'information depuis de gros volumes de données, qui doivent faire face à des flux toujours plus imposants provenant de capteurs, de grands équipements, d'objets connectés ou de simulations numériques... La convergence entre calcul intensif et traitement des données massives est désormais un axe de développement prioritaire au niveau international. L'objectif de cette formation est précisément de former les futurs ingénieurs dans ce domaine.

En novembre 2019, nous avons organisé l'école d'automne "HPC School" avec une quarantaine de participants, piloté par Emmanuel Agullo (HIEPACS), Héloïse Beaugendre (CARDAMON) et Julien Diaz (MAGIQUE3D). Cette école visait à simuler un problème physique, de sa modélisation à sa mise en œuvre dans un cadre de calcul haute performance. L'école proposait à la fois des cours pléniers et des sessions pratiques auxquelles participaient de nombreux membres des trois équipes. Le problème physique considéré était la propagation des ondes harmoniques. La première journée a été consacrée à la modélisation du problème et à sa discrétisation à l'aide d'un schéma Galerkin discontinu. Les deux jours suivants ont été consacrés à l'algèbre linéaire pour la résolution de grands systèmes creux. La session pratique a été menée sur la machine de la plateforme fédérative de recherche en informatique et en mathématiques (PlaFRIM) dans un environnement reproductible (guix-hpc).

Enfin, les membres de l'équipe Satanas organisent régulièrement des formations au calcul intensif, dans le cadre du PATC (Prace Advanced Training Centers) piloté par la Maison de la Simulation, en particulier plusieurs éditions des formations intitulées 'Parallel Sparse Linear Algebra' et 'Runtime systems for heterogeneous platform programming'.

3.1 Produits des activités pédagogiques et didactiques

EasyPAP [<https://gforgeron.gitlab.io/easypap/>]. Il s'agit d'un logiciel destiné à faciliter l'apprentissage de la programmation parallèle en offrant aux étudiants un cadre dans lequel ils peuvent développer des noyaux de calcul 2D, visualiser interactivement les résultats obtenus, localiser plus rapidement les bugs « courants », mesurer les performances et tracer des courbes avec une démarche rigoureuse, observer la répartition des calculs, analyser l'impact de multiples paramètres d'exécution, inspecter et comparer différentes traces d'exécution de manière interactive. Cet environnement, co-développé par Raymond Namyst, Pierre-André Wacrenier et des stagiaires talentueux, est le fruit de notre expérience de recherche en analyse et visualisation du comportement des programmes parallèles, et de 20 ans d'enseignement du parallélisme. Il a été présenté en mai 2020 au workshop EduPar, en marge de la conférence internationale IPDPS. EasyPAP est utilisé dans le cadre des enseignements de Programmation Système (L3) et Programmation Parallèle (M1) à l'Université de Bordeaux, et en Programmation Multicœur et GPU en seconde année à l'ENSEIRB-MATMECA.

C'est également un outil de vulgarisation scientifique qui nous permet de sensibiliser de manière attractive les collégiens et lycéens aux problématiques de la simulation numérique et du calcul parallèle (voir par exemple [Mandelbrot parallèle](#)).

Médiation scientifique. Brice Goglin est chargé de médiation scientifique du centre Inria Bordeaux Sud-Ouest. A ce titre, il organise avec le service communication différentes manifestations à destination du grand public et des classes. Il est intervenu devant ces publics de nombreuses fois pour présenter la recherche en informatique, le calcul haute performance, et les carrières scientifiques. Il a également participé à la création des MOOC ICN et SNT pour former les professeurs aux options informatiques apparues dans les programmes de lycée depuis 2015 (MOOCs suivis par plusieurs dizaines de milliers de personnes).

3.2 Productions scientifiques (articles, ouvrages, etc.) issues des thèses

Les productions scientifiques issues des thèses sont distinguées dans la liste des publications en soulignant les noms des doctorants pour chacune de leur contribution. Leur nombre est résumé dans le tableau suivant.

Tableau 6.15 : Production des doctorants, équipe Supports et AlgoriThmes pour les Applications Numériques hAutes performanceS

	Doctorants	Total équipe	Pourcentage
Conférences	42	142	29%
Revues	27	75	32%

3.3 Formation

Ces dernières années, de nombreux membres de l'équipe Satanas se sont impliqués dans la responsabilité des principales filières de formation en informatique, à tous les niveaux, sur le site bordelais. On peut en particulier mentionner :

- Denis Barthou est responsable de la filière informatique de l'Institut Polytechnique de Bordeaux (ENSEIRB-MATMECA).

- Guillaume Mercier est responsable de la première et seconde année de la filière télécom de l'Institut Polytechnique de Bordeaux (ENSEIRB-MATMECA).
- Raymond Namyst et Mathieu Faverge sont responsables du master CISD (Calcul Intensif et Sciences des données) ouvert en 2019 et fédère des étudiants de l'ENSEIRB-MATMECA, informatique et MATMECA, ainsi que du master informatique de l'université de Bordeaux, en lien avec nos activités recherche, autour du calcul et du traitement et de l'analyse des données hautes performances. Mathieu Faverge est également responsable des stages pour la filière informatique de l'ENSEIRB-MATMECA.
- Abdou Guermouche est responsable du master CSI (Cryptologie et Sécurité Informatique), il est également responsable du module d'initiation à la recherche et responsable des stages pour le master en informatique.
- Pierre-André Wacrenier est responsable de la troisième année de licence en informatique.
- Aurélien Esnard est responsable de seconde année de licence en informatique.
- Samuel Thibault est responsable de la première année informatique et licence professionnelle ADSILLH (Administrateur-riche et Développeur-euse de Systèmes Informatiques à base de Logiciels Libres et Hybrides).

Quatrième partie

Listes exhaustives

1

**Production de connaissances et
activités concourant au rayonnement et
à l'attractivité scientifique**

1 Publications en revue, 80%

Équipe Combinatoire et Algorithmique: Journaux 80 %

- [CA-J1] Pierre ABOULKER, [Marthe BONAMY](#), Nicolas BOUSQUET, and Louis ESPERET. “Distributed Coloring in Sparse Graphs with Fewer Colors.” In: *Electron. J. Comb.* 26.4 (2019), P4.20. URL: <https://www.combinatorics.org/ojs/index.php/eljc/article/view/v26i4p20>.
- [CA-J2] N. ADRIANOV and [Alexander ZVONKIN](#). “Weighted Trees with Primitive Edge Rotation Groups.” In: *Journal of Mathematical Sciences* 209.2 (Aug. 2015), pp. 160–191. DOI: 10.1007/s10958-015-2494-2.
- [CA-J3] Messaouda AHMANE, Isma BOUCHEMAKH, and [Éric SOPENA](#). “On the broadcast independence number of caterpillars.” In: *Discret. Appl. Math.* 244 (2018), pp. 20–35. DOI: 10.1016/j.dam.2018.03.017.
- [CA-J4] Michael ALBERT and [Mireille BOUSQUET-MÉLOU](#). “Permutations sortable by two stacks in parallel and quarter plane walks.” In: *Eur. J. Comb.* 43 (2015), pp. 131–164. DOI: 10.1016/j.ejcb.2014.08.024.
- [CA-J5] Vesna ANDOVA, Domen BLENKUŠ, Tomislav DOŠLIĆ, [František Kardoš](#), and Riste ŠKREKOVSKI. “On Diameter of Nanotubical Fullerene Graphs.” In: *MATCH Communications in Mathematical and in Computer Chemistry* 73.2 (2015), pp. 529–542. URL: <https://hal.archives-ouvertes.fr/hal-01415528>.
- [CA-J6] Vesna ANDOVA, [František Kardoš](#), and Riste ŠKREKOVSKI. “Sandwiching saturation number of fullerene graphs.” In: *MATCH Communications in Mathematical and in Computer Chemistry* 73.2 (2015), pp. 501–518. URL: <https://hal.archives-ouvertes.fr/hal-01416343>.
- [CA-J7] Heger ARFAOUI, Pierre FRAIGNIAUD, [David ILCINKAS](#), Fabien MATHIEU, and Andrzej PELC. “Deciding and verifying network properties locally with few output bits.” In: *Distributed Comput.* 33.2 (2020), pp. 169–187. DOI: 10.1007/s00446-019-00355-1.
- [CA-J8] [David AUBER](#), Nicolas BONICHON, Paul DORBEC, and [Claire PENNARUN](#). “Rook-drawings of Plane Graphs.” In: *J. Graph Algorithms Appl.* 21.1 (2017), pp. 103–120. DOI: 10.7155/jgaa.00402.
- [CA-J9] [Jean-Christophe AVAL](#) and François BERGERON. “Interlaced rectangular parking functions.” In: *Seminaire Lotharingien de Combinatoire* (2020). URL: <https://hal.archives-ouvertes.fr/hal-02491597>.
- [CA-J10] [Jean-Christophe AVAL](#) and François BERGERON. “Rectangular Schröder parking functions combinatorics.” In: *Seminaire Lotharingien de Combinatoire* (2018). URL: <https://hal.archives-ouvertes.fr/hal-02333312>.
- [CA-J11] [Jean-Christophe AVAL](#) and Frédéric CHAPOTON. “Poset structures on $(m+2)$ -angulations and polynomial bases of the quotient by G^m -quasisymmetric functions.” In: *Seminaire Lotharingien de Combinatoire* (2016). URL: <https://hal.archives-ouvertes.fr/hal-02491581>.
- [CA-J12] [Jean-Christophe AVAL](#), Michele D’ADDERIO, Mark DUKES, and [Yvan LE BORGNE](#). “Two operators on sandpile configurations, the sandpile model on the complete bipartite graph, and a Cyclic Lemma.” In: *Adv. Appl. Math.* 73 (2016), pp. 59–98. DOI: 10.1016/j.aam.2015.09.018.
- [CA-J13] Christine BACHOC, [Thomas BELLITTO](#), Philippe MOUSTROU, and [Arnaud PÊCHER](#). “On the Density of Sets Avoiding Parallelhedron Distance 1.” In: *Discret. Comput. Geom.* 62.3 (2019), pp. 497–524. DOI: 10.1007/s00454-019-00113-x.

- [CA-J14] Evangelos BAMPAS, Davide BILÒ, Guido DROVANDI, Luciano GUALÀ, [Ralf KLASING](#), and Guido PROIETTI. “Network verification via routing table queries.” In: *J. Comput. Syst. Sci.* 81.1 (2015), pp. 234–248. DOI: 10.1016/j.jcss.2014.06.003.
- [CA-J15] Evangelos BAMPAS, Lélia BLIN, Jurek CZYŻOWICZ, [David ILCINKAS](#), Arnaud LABOUREL, Maria POTOP-BUTUCARU, and Sébastien TIXEUIL. “On asynchronous rendezvous in general graphs.” In: *Theor. Comput. Sci.* 753 (2019), pp. 80–90. DOI: 10.1016/j.tcs.2018.06.045.
- [CA-J16] Evangelos BAMPAS, Jurek CZYŻOWICZ, [David ILCINKAS](#), and [Ralf KLASING](#). “Beachcombing on strips and islands.” In: *Theor. Comput. Sci.* 806 (2020), pp. 236–255. DOI: 10.1016/j.tcs.2019.04.001.
- [CA-J17] Evangelos BAMPAS and [David ILCINKAS](#). “On mobile agent verifiable problems.” In: *Inf. Comput.* 260 (2018), pp. 51–71. DOI: 10.1016/j.ic.2018.03.003.
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