

Inria

RESEARCH CENTER
Grenoble - Rhône-Alpes

FIELD

Activity Report 2019

Section Highlights of the Team

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ARIC Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

Florent Bréhard, jointly with Mioara Joldes and Jean-Bernard Lasserre (CNRS LAAS) received the Distinguished paper award at ISSAC 2019 for *On Moment Problems with Holonomic Functions*.

Alice Pellet-Mary was an awardee of the L'Oréal-Unesco scholarship for Women and Science.

BEST PAPERS AWARDS :

[16]

F. BRÉHARD, M. JOLDES, J.-B. LASSERRE. *On Moment Problems with Holonomic Functions*, in "ISSAC 2019 - 44th International Symposium on Symbolic and Algebraic Computation", Pékin, China, July 2019, p. 66-73, <https://hal.archives-ouvertes.fr/hal-02006645>

CASH Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

4.1.1. Awards

In January 2019, the paper “Static Analysis Of Binary Code With Memory Indirections Using Polyhedra” resulting from a collaboration with colleagues from Lille University, has received a best paper award of the VMCAI 2019 conference.

The paper “Godot: All the Benefits of Implicit and Explicit Futures” received the distinguished artefact at ECOOP’19.

BEST PAPERS AWARDS :

[5]

C. BALLABRIGA, J. FORGET, L. GONNORD, G. LIPARI, J. RUIZ. *Static Analysis Of Binary Code With Memory Indirections Using Polyhedra*, in "VMCAI'19 - International Conference on Verification, Model Checking, and Abstract Interpretation", Cascais, Portugal, LNCS, Springer, January 2019, vol. 11388, p. 114-135 [DOI : 10.1007/978-3-030-11245-5_6], <https://hal.archives-ouvertes.fr/hal-01939659>

[8]

A. CHARIF, G. BUSNOT, R. MAMEESH, T. SASSOLAS, N. VENTROUX. *Fast Virtual Prototyping for Embedded Computing Systems Design and Exploration*, in "RAPIDO2019 - 11th Workshop on Rapid Simulation and Performance Evaluation: Methods and Tools", Valence, Spain, January 2019, p. 1-8 [DOI : 10.1145/3300189.3300192], <https://hal.archives-ouvertes.fr/hal-02023805>

CONVECS Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

Frédéric Lang, together with Franco Mazzanti from CNR-ISTI/FMT (Pisa, Italy), won all the gold medals for the “Parallel CTL” and “Parallel LTL” tracks of the RERS’2019 (*Rigorous Evaluation of Reactive Systems*) challenge⁰. The goal of these two tracks was to verify 180 properties expressed in the branching-time temporal logic CTL and 180 properties expressed in the linear-time temporal logic LTL. These properties had to be evaluated on various complex systems, having up to 70 concurrent processes and 234 synchronization actions. To attack such difficult problems, Lang and Mazzanti decided to join forces, and managed to evaluate all the 360 properties correctly, by designing new verification algorithms and exploiting the compositional verification techniques of CADP.

⁰<http://rers-challenge.org/2019>

CORSE Project-Team (section vide)

DATASPHERE Team (section vide)

PRIVATICS Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

PRIVATICS members have written several position documents for policy makers: a report on facial recognition, algorithmic decision-making, pseudonymisation and a white book on cybersecurity.

SPADES Project-Team (section vide)

ELAN Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Creation of Graphyz, a new graphics-physics workshop

- F. Bertails-Descoubes, together with B. Audoly (École Polytechnique), has founded, chaired and organized the first graphics-physics workshop, **Graphyz**, held at Inria Montbonnot on October 24-25 2019. An outstanding **scientific program**, gathering 15 international experts from both Computer Graphics and Physics, originally combined talks from both communities around various topics ranging from viscous thread coiling to snow avalanches. The workshop was entirely funded by the ERC GEM. Being a high success, it will be organized again in 2021, in Paris.

5.1.2. Keynote at Eurographics 2019

- Florence Bertails-Descoubes was a **Keynote speaker** at **Eurographics 2019** held in May 2019 in Genova, Italy.

5.1.3. Awards

BEST PAPERS AWARDS :

[7]

R. CHARRONDIÈRE, F. BERTAILS-DESCOUBES, S. NEUKIRCH, V. ROMERO. *Modélisation numérique de rubans en éléments de haut degré*, in "JF.IG.RV 2019 - Journées Françaises d'Informatique Graphique et de Réalité Virtuelle", Marseille, France, November 2019, p. 1-7, <https://hal.archives-ouvertes.fr/hal-02384170>

MISTIS Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

New appointments:

- Florence Forbes has been appointed as a member of the advisory committee of the Helmholtz AI Cooperation Unit <https://helmholtz.ai/>.

Data Challenges

- Pixyl winner of the Société Française de Radiologie Data Challenge 2019
Pixyl, a Grenoble-based start-up originating in the team and Inserm, accompanied by a team of neuroradiologists and academics, distinguished itself in the AI challenge held during the 2019 edition of the Journées Francophone de Radiologie, which took place from 11 to 14 October in Paris. The Challenge was about prediction of multiple sclerosis patient disability from a single MRI image

5.1.1. Awards

- Meryem Bousebata received the second best presentation award at the “10th conference of the international society for Integrated Disaster Risk Management (IDRiM)” organized by CNRS-University of Nice and AFPCN and held from 16 to 18 October 2019 in Nice.
- Mariia Vladimirova received the best poster award for her work [45] at the “12th Conference on Bayesian Nonparametrics”, Oxford University, UK, June 24-28, 2019.

BEST PAPERS AWARDS :

[52]

M. BOUSEBATA, G. ENJOLRAS, S. GIRARD. *Bayesian estimation of natural extreme risk measures. Application to agricultural insurance*, in "IDRiM 2019 - 10th conference of the international society for Integrated Disaster Risk Management", Nice, France, October 2019, <https://hal.archives-ouvertes.fr/hal-02276292>

NANO-D Team

4. Highlights of the Year

4.1. Highlights of the Year

- The work on first-principle simulation has been completed. The aim was to use the restrained dynamical model ARPS previously developed by the team to speed-up dynamical simulations using a first-principle interaction model. We have chosen Orbital-Free Density Functional Theory (OF-DFT), a fast scheme of DFT, as interaction model. We have developed a new OF-DFT code adapted to restrained particle simulations and have compared the accuracy and speed of our method to the state of the art OF-DFT code, PROFESS. The results were published in the Journal of Computational Chemistry [11] and the code is available in SAMSON. The thesis at the origin of this research has been defended in October.
- The proof-of-concept orientation-dependent potential for small molecules was developed and tested.
- With the advance of experimental procedures, obtaining sparse experimental data of proteins in solution (chemical crosslinking and small-angle scattering) is becoming a fast and routine practice. These can greatly enhance the accuracy of protein structure modeling. We participated in reviewing the current state of the art in modeling protein structures with the assistance of experimentally determined chemical crosslinks and small-angle scattering profiles within the framework of the 13th meeting of Critical Assessment of Structure Prediction approaches [2], [4].

NECS Team

5. Highlights of the Year

5.1. Highlights of the Year

- C. Canudas-de-Wit was the General Chair of IEEE Conference on Decision and Control 2019 (CDC) in Nice (11-13 Dec. 2019).
- H. Fourati was elected as member of CNU61 (Conseil national des universités, Génie informatique, Automatique et Traitement du Signal), 2020-2023.
- H. Fourati has co-edited the book “Cooperative Localization and Navigation: Theory, Research and Practice”, by Taylor and Francis Group LLC.

TRIPOP Project-Team (section vide)

AIRSEA Project-Team (section vide)

BEAGLE Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

Last year our highlights were focused on remarkable publications. This year the main events are on organizations and grants applications.

- We have been in charge of organizing the Scientific Days of Inria in July 2019 <https://project.inria.fr/journeesscientifiques2019/>
- We were awarded two exploratory actions by Inria in 2019, one on high performance computing, the other in agro-ecology
- We were auditioned for an ERC synergy grant call (very last step in the many steps for the grant obtention)
- We organized MMEE <https://mmee2019lyon.sciencesconf.org/> in Lyon

DRACULA Project-Team (section vide)

ERABLE Project-Team (section vide)

IBIS Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

A publication on the use of mixed-effects models for the analysis of the inheritance and variability of gene expression parameters along lineage trees was published in a special issue of *Bioinformatics* and presented at the major bioinformatics conference ISMB/ECCB 2020. A publication in *BMC Bioinformatics* accompanied the release of the new version of the web application WELLINVERTER for the analysis of fluorescent reporter gene data. IBIS member Michel Page launched his start-up ProLeads (<https://proleads.fr/>), a specialized business search engine.

MOSAIC Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

- MOSAIC has been promoted to Inria project-team in July 2019.
- In collaboration with CNRS (LIRMM and CRBM units in Montpellier), the team published a new web browser-based computational tool, Morphonet, to interactively explore complex 3D+time biological structures in silico, [8].

NUMED Project-Team (section vide)

STEPP Project-Team (section vide)

AGORA Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- Walid Bechkit holds the PEDR (2017-2021).
- Khaled Boussetta holds the PEDR (2018-2022).
- Hervé Rivano holds the PEDR (2017-2021).
- Razvan Stanica holds the PEDR (2016-2020).
- Razvan Stanica obtained his HDR from the University Lyon 1 / INSA Lyon, in November 2019.

5.1.1. Awards

- Ahmed Boubrima is runner-up (*accessit*) for the Gilles Kahn thesis prize 2019.

AVALON Project-Team (section vide)

CTRL-A Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

The Ctrl-A team co-organised, in cooperation with the Gipsa-lab laboratory, the 40th International Summer School in Grenoble, with a special topic on Control of Computing Systems, on 9-13th of September 2019.

Invited speakers were international specialists of the field, from USA, Europe and France. Full information and programme are available : <http://www.gipsa-lab.fr/summerschool/auto2019>

DANTE Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

Dante is member of the following new projects accepted in 2019, for funding by ANR:

- **DataRedux** Big data reduction for predictive computational modelling. Consortium: Dante (ENS de Lyon), Centre Physique Théorique Marseille (CNRS), Pierre Louis Institute of Epidemiology and Public Health (INSERM).
- **Darling** Distributed adaptation and learning over graphs. Consortium: Observatoire Côte d'Azur (U. Nice), Dante & LP (ENS de Lyon), L2S (Centrale Supélec).
- **CCS 2021** Márton Karsai and IXXI obtained the right to organise Conference on Complex Systems in Lyon in 2021.

5.1.1. Awards

- Article [10] has been highlighted as the cover page article of the journal MDPI.

BEST PAPERS AWARDS :

[25]

R. FONTUGNE, E. BAUTISTA, C. PETRIE, Y. NOMURA, P. ABRY, P. GONÇALVES, K. FUKUDA, E. ABEN. *BGP Zombies: an Analysis of Beacons Stuck Routes*, in "PAM 2019 - 20th Passive and Active Measurements Conference", Puerto Varas, Chile, Springer, March 2019, p. 197-209, Best paper award. [DOI : 10.1007/978-3-030-15986-3_13], <https://hal.inria.fr/hal-01970596>

DATAMOVE Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- Pierre Neyron received the Médaille de Cristal CNRS 2019 (<http://www.cnrs.fr/fr/personne/pierre-neyron>)
- Denis Trystram leading the Edge Intelligence chair of the new Institute of Artificial Intelligence of Univ. Grenoble Alpes (MIA@Grenoble-Alpes).
- Best Paper Awards at CCGrid 2019
- Outstanding Paper Award at HPCS 2019

BEST PAPERS AWARDS :

[12]

D. CARASTAN-SANTOS, R. Y. DE CAMARGO, D. TRYSTRAM, S. ZRIGUI. *One can only gain by replacing EASY Backfilling: A simple scheduling policies case study*, in "CCGrid 2019 - International Symposium in Cluster, Cloud, and Grid Computing", Larnaca, Cyprus, IEEE, May 2019, p. 1-10 [DOI : 10.1109/CCGRID.2019.00010], <https://hal.archives-ouvertes.fr/hal-02237895>

[15]

F. ZANON BOITO, R. NOU, L. LIMA PILLA, J. LUCA BEZ, J.-F. MÉHAUT, T. CORTES, P. O. NAVAUX. *On server-side file access pattern matching*, in "HPCS 2019 - 17th International Conference on High Performance Computing & Simulation", Dublin, Ireland, IEEE, 2019, p. 1-8, outstanding paper award, <https://hal.inria.fr/hal-02079899>

MARACAS Team

5. Highlights of the Year

5.1. Highlights of the Year

Over the last year, the MARACAS team has made a number of significant contributions in the form of journal publications and international conference proceedings, invited lectures in international conferences and schools, as well as contributions in the form of organization of international conferences and editorial roles in international IEEE journals. These include 9 high quality journal publications and over 10 international conference proceedings, spanning many areas of communication and information theory as well as signal processing. In particular, these results contribute to the ongoing development of 5G wireless communication systems and also to emerging areas of communications in the form of the smart grid and molecular communications.

5.1.1. Awards

- Samir Perlaza: Visiting Research Collaborator (Honorific Position), Term 2019 - 2020, at the Department of Electrical Engineering, Princeton University. Annual Renew under evaluation of a Departmental Committee.
- Samir Perlaza: Fellowship of The Finnish Society of Sciences and Letters for visiting the School of Energy Systems at Lappeenranta University of Technology, Finland. April, 2019.
- Bayram Akdeniz: 2nd place in the Molecular MIMO Competition at the IEEE Communication Theory Workshop.
- Cyrille Morin: 1st place in the Machine learning challenge at the 6th Training School on Machine and Deep Learning Techniques for (Beyond) 5G Wireless Communication Systems.

POLARIS Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- N. Gast received an ANR JCJC grant.
- The team was highly involved in the 3IA institute MIAI @ Grenoble Alpes: P. Loiseau is co-holder of the chair “Explainable and Responsible AI” of which N. Gast and B. Pradelski are members; and P. Mertikopoulos is a member of the chair “Optimization & Learning”.
- Arnaud Legrand participated in the writing of a book [39] on Reproducible Research, which aims at helping students and engineers and researchers to find efficient and accessible ways leading them to improve their reproducible research practices.

5.1.1. Awards

- The paper “Privacy Risks with Facebook’s PII-based Targeting: Auditing a Data Broker’s Advertising Interface” by P. Loiseau and co-authors (IEEE S&P ’18) was runner up for the 2019 Caspar Bowden Award for Outstanding Research in Privacy Enhancing Technologies.
- The paper “Investigating ad transparency mechanisms in social media: A case study of Facebook’s explanations” by P. Loiseau and co-authors (NDSS ’18) was runner up for the 2019 CNIL-Inria Award for Privacy Protection.

ROMA Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- Jean-Yves L'Excellent co-created the MUMPS technologies start-up and left the team to work full time for MUMPS technologies.
- Grégoire Pichon joined the team as an Associate Professor of University Claude Bernard, Lyon 1.
- Anne Benoit was elected chair of the IEEE Technical Committee on Parallel Processing.
- Anne Benoit received on February 2019 the award for Editorial Excellence as Associate Editor of the IEEE Transactions on Parallel and Distributed Systems during 2018.
- Yves Robert received the 2020 IEEE-CS Charles Babbage Award *for contributions to parallel algorithms and scheduling techniques*. This award covers all aspects of parallel computing including computational aspects, novel applications, parallel algorithms, theory of parallel computation, parallel computing technologies, among others. Further information about the award, including a list of past recipients, may be found at <https://www.computer.org/web/awards/charles-babbage>. The award consists of a \$1,000 honorarium, certificate, and the invitation to present a paper and/or presentation at the annual IEEE-CS International Parallel and Distributed Processing Symposium (IPDPS).

5.1.1. Awards

BEST PAPERS AWARDS :

[16]

F. DUFOSSÉ, K. KAYA, I. PANAGIOTAS, B. UÇAR. *Effective heuristics for matchings in hypergraphs*, in "SEA2 2019 - International Symposium on Experimental Algorithms - Special Event", Kalamata, Greece, Springer, 2019, p. 248-264 [DOI : 10.1007/978-3-030-34029-2_17], <https://hal.inria.fr/hal-02417475>

SOCRATE Project-Team (section vide)

CHROMA Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- Success for European H2020 ICT Robotics project application 'BugWright2' (9M€), led by C. Pradalier (CNRS, GeorgiaTech Metz). O. Simonin leads the multi-robot systems Work-Package (funding for Chroma & Agora teams 600K€). Domain : Autonomous Robotic Inspection and Maintenance on Ship Hulls and Storage Tanks.
- Success for several ANR project applications in the field of Artificial Intelligence :
 - ANR JCJC 'PLASMA' led by J. Dibangoye (250K€)
 - ANR 'DELICIO' led by C. Wolf (510 K€), Chroma is partner.
 - AI Chair led by C. Wolf (520 K€), Chroma is partner (O. Simonin, J. Dibangoye).
- Success for several project applications in the field of Autonomous Vehicles : 2 multi-annual R&D projects with Toyota Motor Europe, a PSPC project ES3CAP led by Kalray (3 years), and an EU ECSEL project CPS4EU (3 years).
- Our team LyonTech obtained the 3rd place at the Robocup@Home Pepper league in the 2019 RoboCup competition organized in Sydney (July).
- O. Simonin co-chaired with F. Charpillat (Inria Nancy) the JNRR'2019 bi-annual conference, gathering the French Robotic community (GDR Robotique) (~ 200 pers.).
- New book by A. Martinelli : "Observability: A new theory based on the group of invariance". To be edited by SIAM on year 2020.
- Exploitation Licenses of CMCDOT have respectively been sold to Toyota and to a French company in the field autonomous vehicles (confidential), with an engineer support for the related transfer of technology.

5.1.1. Awards

BEST PAPERS AWARDS :

[43]

J. SARAYDARYAN, R. LEBER, F. JUMEL. *People management framework using a 2D camera for human-robot social interactions*, in "RoboCup 2019 - 23rd Annual RoboCup International Symposium", Sydney, Australia, Robocup 2019: Robot World Cup XXIII, July 2019, p. 1-13, <https://hal.archives-ouvertes.fr/hal-02318916>

IMAGINE Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

Maxime Garcia, Amélie Fondevilla and Geoffrey Guingo defended their PhD theses.

We published two papers [16], [20] at ACM Transaction on Graphics (Proceedings of SIGGRAPH) which is the most prestigious and selective conference in computer graphics.

5.1.1. Awards

Mélina Skouras was elected Eurographics Junior Fellow in May 2019.

Stefanie Hahmann was elected SMA Fellow (Solid Modeling Association) in June 2019.

MAVERICK Project-Team (section vide)

MOEX Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

- We published our work on relational concept analysis applied to link key extraction in *Discrete applied mathematics* [5].
- Jérôme Euzenat was invited to deliver a keynote talk at the International semantic web conference (ISWC), in Auckland (NZ). The title of the talk was a call to brains: *For knowledge!*
- The teams leads the *Knowledge communication and evolution* chair of the Multidisciplinary Institute of Artificial Intelligence awarded in Grenoble.

MORPHEO Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

BEST PAPERS AWARDS :

[15]

R. KLOKOV, J. VERBEEK, E. BOYER. *Probabilistic Reconstruction Networks for 3D Shape Inference from a Single Image*, in "BMVC 2019 - British Machine Vision Conference", Cardiff, United Kingdom, September 2019, p. 1-15, <https://arxiv.org/abs/1908.07475> - Awarded with Best Science Paper Honourable Mention Award at BMVC'19., <https://hal.inria.fr/hal-02268466>

PERCEPTION Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

4.1.1. IEEE Senior Member.

Xavier Alameda-Pineda has become an IEEE Senior Member on February 1st, 2019. The grade of Senior Member requires experience reflecting professional maturity as an engineer, scientist, educator, technical executive, or originator in IEEE-designated fields for a total of 10 years and have demonstrated 5 years of significant performance.

4.1.2. H2020 Project SPRING

(1 January 2020 – 31 December 2023) is a research and innovation action (RIA) with eight partners: Inria Grenoble (coordinator), Università degli Studi di Trento, Czech Technical University Prague, Heriot-Watt University Edinburgh, Bar-Ilan University Tel Aviv, ERM Automatismes Industriels Carpentras, PAL Robotics Barcelona, and Hôpital Broca Paris.. The main objective of SPRING (Socially Pertinent Robots in Gerontological Healthcare) is the development of socially assistive robots with the capacity of performing multimodal multiple-person interaction and open-domain dialogue. In more detail:

- The scientific objective of SPRING is to develop a novel paradigm and novel concept of socially-aware robots, and to conceive innovative methods and algorithms for computer vision, audio processing, sensor-based control, and spoken dialog systems based on modern statistical- and deep-learning to ground the required social robot skills.
- The technological objective of SPRING is to create and launch a brand new generation of robots that are flexible enough to adapt to the needs of the users, and not the other way around.
- The experimental objective of SPRING is twofold: to validate the technology based on HRI experiments in a gerontology hospital, and to assess its acceptability by patients and medical staff.

Website: <https://spring-h2020.eu/>

4.1.3. ANR JCJC Project ML3RI

(1 March 2020 – 28 February 2024) has been awarded to Xavier Alameda-Pineda. Multi-person robot interaction in the wild (i.e. unconstrained and using only the robot's resources) is nowadays unachievable because of the lack of suitable machine perception and decision-taking models. *Multi-Modal Multi-person Low-Level Learning models for Robot Interaction* (ML3RI) has the ambition to develop the capacity to understand and react to low-level behavioral cues, which is crucial for autonomous robot communication. The main scientific impact of ML3RI is to develop new learning methods and algorithms, thus opening the door to study multi-party conversations with robots. In addition, the project supports open and reproducible research.

4.1.4. MIAI Chair.

The Multidisciplinary Institute in Artificial Intelligence (MIAI) is one of the four AI French institutes launched in 2019 by the French government. MIAI is structured around several chairs, each chair gathering 3-6 researchers as well as postdocs and PhD students. Team members Radu Horaud and Xavier Alameda-Pineda are co-chairs of the *Audio-visual machine perception and interaction for companion robots* chair. The development of methods and algorithms for enabling socially-aware robot behavior with the specific goal of interacting with humans is the core topic. The emphasis is put on unsupervised and weakly supervised learning with audio and visual data, based on Bayesian methods, deep learning and reinforcement learning. It is planned to develop challenging proof-of-concept implementations and demonstrators.

PERVASIVE Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

James Crowley was named to the Chair on Intelligent Collaborative Systems.

THOTH Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

- Cordelia Schmid received the Royal Society Milner Award, 2019.
- Julien Mairal received the test-of-time award at the International Conference on Machine Learning (ICML), 2019.
- The paper [21] authored by Roman Klokov, Jakob Verbeek, Edmond Boyer [Inria Morpheo] won the “Best Science Paper Award Honourable Mention” at BMVC 2019.
- Jakob Verbeek was awarded as an outstanding reviewer at ICLR 2019.
- Adria Ruiz Ovejero was awarded as an outstanding reviewer at ICCV 2019.

5.1.2. Dissemination

- The team co-organized PAISS 2019, an international AI summer school in Paris. This is the second edition of the school that was first organized in Grenoble in 2018. The 2019 edition brought together over 200 participants. We also provided scholarships to 21 students to encourage diversity among the attendees.

TYREX Project-Team (section vide)