

# 2020, one contrasting yet beneficial year

**This Spring General Meeting was an opportunity to take stock of a year which forced Teratec to adapt its working methods that also made the European and French public authorities better aware of the importance of HPC and HPDA in order to emerge more quickly from the crisis with their consequences on health and economy. This was also an opportunity for Teratec to expand its relations across Regions to better disseminate these powerful and innovative technologies towards SMEs.**

As a preamble to the General Assembly, President of the Teratec Association, **Daniel Verwaerde**, held on reminding the audience such a special context due to the health crisis in 2020. « *Because of its exceptional scope and nature, this pandemic could not be dealt without new constraints and necessary adaptation for individuals and companies, as well as organizations such as Teratec. This crisis revealed weaknesses of the economies of our Western countries, both in terms of health and supplies (masks, drugs, vaccines...) but also in terms of industrial production facing blockages in the world trade system, and highlighting shortages for every goods no longer produced in the West.* »



## The importance of HPC and HPDA for revival

With HPC and HPDA bringing together many players around Teratec, we have witnessed role strengthening for these technologies facing the health crisis. This is particularly true in the health sector where the use of these technologies in biological, pharmaceutical and medical research has accelerated. This has led to greater awareness from French and European politicians about the importance of using these technologies to accelerate the development of medicines and vaccines.

The awareness of the power of HPC and HPDA will enable the implementation of solutions to design, develop and produce industrial goods faster and more efficiently, while optimizing resources dedicated to raw materials and energy. HPC and HPDA will therefore be essential tools for the revival of Western economies, while sharing European standards to better respect the environment.

## Spreading our regional actions in 2021

Nevertheless, in this very difficult context, 2020 will have been a satisfactory year for Teratec. First of all, it is worth mentioning the demonstrated solidarity between Teratec members to tackle the crisis. On Teratec's production side, the on ongoing projects collaboration between the **European Commission** and **EuroHPC** went on orderly, while three new projects were launched: **CASTIEL**, **FF4EuroHPC** and the **French HPC Competence Center** in association with **CERFACS** and **GENCI**, putting Teratec at the heart of deployment for uses of HPC and AI in the entire French economic framework.

Many Teratec members have been involved in making the **Teratec 2020 Forum** a success by contributing in the organization and animation of the workshops and as Exhibitor or Sponsor. In spite of organizational difficulties (shift from June to October, change from face-to-face to digital event), it is clear that the 2020 vintage was very good, thanks to the exceptional quality of the presentations and considering the number of participants maintained.

In terms of activity, 2021 will follow the path for 2020. Teratec will of course carry on with its current projects, while expanding its actions around two of its major initiatives: quantum computing (**TQCI**) and mobility. Similarly, having deployed its cooperation with the European Commission and EuroHPC, Teratec is going to increase its efforts by working with Regions, so that all French manufacturers and research laboratories can benefit.

## Cooptation of two new members: ENSIIE and VAST Data

The General Assembly is an opportunity to welcome new members.

The École Nationale Supérieure d'Informatique pour l'Industrie et l'Entreprise (**ENSIIE Paris-Evry**) comes as first new applicant. It is one of the oldest schools to deliver a computer science engineering degree. In 2018, ENSIIE celebrated its 50th anniversary and these are now more than 4,000 engineers trained who enrich all sectors of companies and industries.

Second new applicant is the start-up **VAST Data** which offers a storage solution that ends decades of complexity in the field. VAST consolidates all applications onto a full-flash storage system that meets most demanding performance requirements while making flash system affordable enough to store all data.

Membership of these two new members was unanimously approved by attendees at the GA.



## ACTIVITY REPORT 2020

Then Activity Report for 2020 was presented.

### Reinforcement of Teratec's European team

The Teratec team has grown in 2020, particularly for taking on European projects. **Paul d'Escoda de Boisse** (Business Development Engineer), **Lucile Garnier** (Project Specialist) and **Wafa Salandre** (Communication Manager) have joined the team, adding to **Karim Azoum** (Program Director), **Maïke Gilliot** (Project Manager), **Samir Ben Chaabane** (Project Director), **Marie-Françoise Gerard** (Project Manager), and **Hervé Mouren** (Teratec Director).

### Five new members in 2020

For the record, Teratec has endorsed five new memberships in 2020: **Amazon Web Services (AWS)**; the French National Space Research Center (**CNES**); **Do It Now HPC Services**; **GraphCore**; and **Qarnot Computing**. Each of these members being experts in their respective fields whose skills will enrich Teratec.

## European activities

Teratec's European activities revolve around EuroHPC with two main axes: one operational with concrete participation in projects, the other more political preparing the future through the Multi Annual Strategic Agenda (which defines the course of work for the next 10 years).

On the operational side, Teratec is participating in 6 projects within EuroHPC framework. Dating from end 2018, three of them are linked to the intent of a Center of Excellence, federating the best European experts in a field: **POP-2** (Code Analysis and optimization for parallel computing); **EXCELLERAT** (Adaptation of engineering computing codes to Exascale); **FocusCoE** (Coordination and animation of European HPC Centers of Excellence). Three other projects were launched in 2020: The **French HPC Competence Center**; **CASTIEL**; **FF4EuroHPC**.

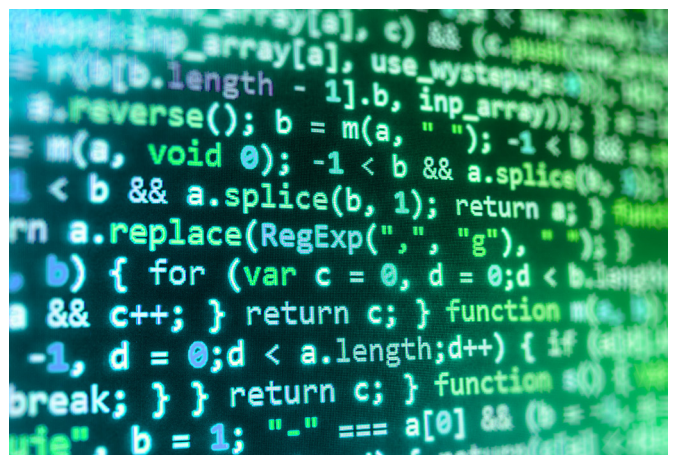
### • Centre of Excellence POP-2

Centre of Excellence **POP** (Parallel Performance Optimisation & Productivity)-([www.pop-coe.eu](http://www.pop-coe.eu)) has one horizontal reach in nature, focusing on performance analysis of application codes in all domains, as well as tools for their improvement. After the success of the first phase (POP-1 - 2015/2018), the European Commission has decided to launch a second phase (POP-2 - 2019/2021). Designed for developers, publishers, infrastructure operators and users alike, POP 2 provides highly efficient and high quality free services with remarkable results.

More than 100 analyses have been carried out since 2019, as well as about twenty "Proof of Concept". More than 20 training sessions and workshops have been held, as well as 20 webinars in fields as diverse as engineering (fluid mechanics, structural calculations, materials science, etc.), chemistry, earth sciences, energy, health, meteorology, data science and artificial intelligence. Performance gains average 50% and can go up to more than 300%. Considering the quality and gratuity of service as well as gains recorded, use of POP 2 is most recommended to improve the performance of your applications.

With POP 2 ending in November 2020, Teratec is currently reviewing the possibility of continuing this project with the European Commission.

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## • Centre of Excellence EXCELLERAT

Second project is the Excellerat Center of Excellence dedicated to digital simulation in engineering. Here again, results are good and the European Commission intends to ensure the «sustainability» of this project by offering future services on a paying basis, in order to secure this activity with a satisfactory economic model for the entire community concerned

With EXCELLERAT ending in November 2020, Teratec is currently reviewing the possibility of continuing this project with the European Commission.

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## • FF4EuroHPC Projet

The theme of FF4EuroHPC ([www.ff4eurohpc.eu](http://www.ff4eurohpc.eu)) is: «How to make HPC innovations useful to SMEs». This is a vast project with a funding budget of €10M, as it includes the creation of business applications portfolio (Experiments) that meet the needs of SMEs. Teratec has major responsibilities, both in the management of calls for applications and in the exploitation process to maximize the development and innovation potential of these experiments, all supported by a major communication component.

A first call for applications to develop business solutions was closed at the end of January. A set of 68 applications involving 150 entities from 25 European countries has been received and these are currently being reviewed. A second call for applications is planned during next summer. Resulting experiments will take place over 15 months. It will be a real technical and methodological support for the participating SMEs, until they get results in their business. Financing can go up to 200 k€ per project.

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## • Centre of Excellence FocusCoE

**Focus CoE** ([www.hpccoe.eu](http://www.hpccoe.eu)) est une action concertée pour l'ensemble des Centres d'excellence du HPC en Europe, dont l'objet est de voir comment améliorer l'efficacité de ces CoE au bénéfice des industries concernées. Cela nécessite de nombreuses réunions entre les CoE et les industriels, il a donc fallu s'adapter en passant en réunions virtuelles. C'est un domaine tout à fait intéressant puisque c'est une façon de regarder l'efficacité et l'apport de ces technologies numériques de puissance dans des domaines industriels extrêmement divers.

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## • CASTIEL coordination and support activity

**CASTIEL** ([www.castiel-project.eu](http://www.castiel-project.eu)) is the coordinating structure for the various national HPC Competence Centers. Even though animation of this structure is uneasy given the large number of actors (33), yet it allows the preparation of progressively unified visions and shared mapping for skills, training and expertise carried out locally by each of the national centers. It is also a platform for exchange and harmonization between the various centers.

Teratec is strongly involved in this project alongside our German friends from GCS and HLRS, our Spanish friends from BSC, our Italian friends from Cineca, and our friends from PRACE. Teratec is in charge of coordinating relations with the industrial world which allows us to see what is taking place outside France.

CASTIEL's primary mission is to produce maps. The first use will be to allow countries lacking certain skills to find them quickly in other countries. In view of a consolidation one day, it is likely that the European Commission will want to optimize the number of locations dealing with the same subject. Teratec being part of the CASTIEL management team in such context will allow the best promotion of French participants.

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## • The French Competence Centre for HPC

The creation of the **French HPC Competence Centre** is at the heart of Teratec's work for 2021. Launched last September for a period of two years as part of EuroCC ([www.eurocc-project.eu](http://www.eurocc-project.eu)), this project aims to set up the center structured around HPC, HPDA and Artificial Intelligence technologies. It is being deployed around two main activities with **CERFACS** and **GENCI** our two partners. **Teratec** is working with CERFACS on all aspects of mapping (training, skills, and service offerings) as well as on how to make them accessible via a dedicated «Marketplace», in a simple and efficient way. For its part, collaborating with the various meso-centers, GENCI supports SMEs in the use of these technologies, with logical continuity of their activities in the **SiMSEO** project.

In addition to presenting the various mappings carried out, the originality of the French proposal lies in all the actions and services being accessible through a «Marketplace» which will allow industrialists and academics to easily reference and update their training and service offers, thanks to general regulations and transparent selection criteria. The «Marketplace» will also allow simple multi-criteria search on all offers referenced. A first version of this «Marketplace» will be available during the summer.

The importance for Teratec members being well represented in this «Marketplace» is underlined here. Moreover, the work done by Teratec and its partners to create this «Marketplace» raised the interest of several neighbor countries asking for the possibility of using all or part of what has been developed.



This «Marketplace» could therefore become a reference tool in terms of HPC, HPDA and AI in several countries, and even across whole of Europe.

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## Working with the European Commission

Daniel Verwaerde has largely contributed to the drafting of the **Multi Annual Strategic Agenda (MASA)**, which defines the agenda that will structure the action of EuroHPC, and therefore of the European Commission, in terms of strategic choices and investments in the fields of HPC, HPDA and AI for the next 10 years. Carrying the French vision both in the Advisory Group of about thirty people steering MASA is clearly important, yet it is essential as well to count among the four writers of this document in order to best promote the interests of French companies. Three major axes of this document are: the equipment policy for supercomputers; the creation of a European supply chain; and security.



As far as equipment is concerned, after the eight petaflops machines that are being acquired and installed this year, we must prepare for the arrival of exaflops machines by 2023/2025.

For the time being, EuroHPC plans to finance two of them which we would like to see installed in France and Germany, since we did not apply for the petaflop machines in the past. We have defined their usage requirements with future users, as well as necessary technical characteristics. We also determined all associated policies in terms of access and security to guard against any hostile or malicious acts.

Regarding the creation of a European Supply Chain with related production capacity for supercomputers in Europe, it is not intended to produce 100% of components in Europe (for instance, memories could not be readily produced in Europe). Yet, the objective is to achieve one Calculator 100% designed and built in Europe with large part of European-made components. Along with Marya Gabriel indicating that for 1/3 of Supercomputers purchased by Europe, it should be its own capacity to produce 1/3 of world market equivalent in budget spending.

Such will for reasonable European sovereignty goes hand in hand with the desire to extend cooperation with all major nations involved in HPC (USA, Japan, etc.). This cooperation will be much easier if we can rely on shared level of advanced technology.

Data and networks security are very important issues and Europe must integrate this component into these projects, including for academic networks.

«As we prepare the future of HPC in Europe, we want to be awarded one of the two upcoming exascale supercomputers in France and we will do everything possible to ensure that one of these two machines is produced in Europe, if possible by Teratec members. We are convinced that promoting our ideas at the European level will help you - producing here - to keep aligned with Europe's needs» said Daniel Verwaerde.

## Industrial initiatives

Despite the health crisis, **Teratec** continued its work in 2020 on major industrial initiatives it has launched (Quantum Computing; Autonomous Systems; Materials).

About **Quantum Computing**, Teratec was present in January 2020 at the presentation of Parliamentary report by Minister **Paula Forteza** on the development of quantum in France, transposed into the **Quantum Action Plan** launched by the President of French Republic in January 2021. Today, Teratec gets all elements to ensure that contributions of Teratec members to the Teratec Quantum Computing Initiative (TQCI) are taken into account.

The coordinator of this Quantum Action Plan just being appointed is **Neil Abroug**, who spoke at the General Assembly in February 2020, while responsible, among other things, for monitoring work on HPC and quantum computing, at the **General Directorate for Enterprises** of the **Ministry of Economy and Finance**. Therefore, he is familiar with Teratec's involvement in Quantum Computing and its TQCI initiative.

On the side of **Autonomous Systems**, a number of actions are underway to produce a common platform for certification through digital simulation of these specific systems.

Teratec also wishes to launch industrial initiatives targeting two other subjects: **Exploitation of spatial data** to optimize the use of **natural resources**; **Health and personalized medicine** for which Teratec has been solicited by the French and European public authorities already, in order to make proposals for the use of HPC in these areas with an associated roadmap.



Finally, it should be noted that these industrial initiatives are also of great interest to certain regions that wish to become involved. This is the case, for example, for Ile-de-France Region with Quantum Computing and Mobility & Autonomous Systems.



## Teratec Forum 2020

The Teratec 2020 Forum came up both different and in line with previous editions. Contrasting because it was the first digital edition, yet a real success compared to the **1,500 participants** attending.

- The **Plenary session** of the Teratec Forum was an opportunity for speakers to show how HPC and digital simulation - often coupled with Artificial Intelligence applications - can help fight against the pandemic by anticipating its development and accelerating the development of new drugs. Many other examples in the defense and energy sectors were also presented. Finally, this edition was an opportunity for European Commissioner **Thierry Breton** to reaffirm Europe's desire to become a world leader in terms of HPC by equipping with supercomputers among the most powerful in the world and by developing the necessary technologies in Europe, be it processors, software, exascale architectures or quantum machines.

With contributions from:

- **Thierry Breton**, European Commissioner
- **Florence Parly**, Minister of French Armed Forces
- **Alain Rousset**, President, Regional Council of Nouvelle-Aquitaine
- **Xavier Ursat**, Executive Director, EDF Group
- **Marie-Noëlle Semeria**, R&D Director, Total Group
- **Trish Damkroger**, Vice President, Intel Data Center Group
- **Kevin D. Kissell**, CTO, Google
- **Eric Genevois-Marlin**, Global Head of R&D Digital and Data Sciences, Sanofi

- A Roundtable moderated by Julien Bergounhoux, editor-in-chief of **L'Usine Digitale**, was devoted to digital technologies (HPC / HPDA) in the field of health with an important focus on COVID-19, and participation of the major sponsors of the Teratec 2020 Forum (**Atos**, **DDN**, **Dell technologies**, **HPE**, **Intel**, **CEA** and **Do It Now**)

• This digital edition of the Teratec Forum offered **6 technical and application workshops** to fully understand the contributions of HPC, digital simulation, Big Data and data-driven machine learning (AI) for the competitiveness of companies.

- **Digital twin in medicine:** Are we [im]patients
- **Quantum Computing:** What's new in QuBits?
- **Satellite data and the environment:** From the proliferation of applications to the emergence of structured responses
- **Cloud Computing and HPC:** Complementarity to service of new uses
- **AI and scientific computing:** Accelerating innovation in academic and industrial fields
- **Do you speak Exascale?** Unrealistic hopes or, real leap forward?

• **Virtual exhibition** during the Teratec Digital Forum 2020 presented solutions offers from over 60 exhibitors and arranged for more than **3,200 business meetings**.

**Europa Village** brought together some 20 centers of excellence, competence centers, European research projects, infrastructures and service platforms, associations and institutional bodies working to develop the European supercomputing infrastructure and to ensure the success of European technological innovation in the field of HPC and related areas such as Big Data and AI, particularly focused in the context of the Horizon 2020 program.

This 100% digital exhibition allowed our community to create exchanges, to meet partners and new suppliers in order to carry on their activity.

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## Communication

In addition to the Forum, Teratec also strongly communicated in the course of 2020 both on its **websites** ([www.teratec.eu](http://www.teratec.eu) , [www.campus-teratec.com](http://www.campus-teratec.com) ) and via a dozen **newsletters** from January to December 2020. Mainly dedicated to the activities of Teratec and its members and to the Teratec Forum, this bilingual newsletter is distributed to 20,000 French and foreign contacts.

Teratec is also active on **social networks** through its LinkedIn and Twitter accounts.

Teratec has participated in **Webinars** allowing it to continue to organize and participate in events while respecting current sanitary standards.

Throughout the year, Teratec has been in contact with French and European **journalists** dealing with innovative digital technologies.

Teratec also contributed to the publication of Simulation, usual special issue of *L'Usine Nouvelle*, *L'Usine Digitale* and *Industrie & Technologies* dedicated this year to the era of digital twins.

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After thanking the Teratec team for its involvement throughout this difficult year of 2020 and indicating that the Annual Report will be available this year in both digital and paper form, Daniel Verwaerde asked participants to vote regarding its Activity Report that were just being presented by Hervé Mouren.

It went as well for the Financial Report presented by **Hélène Bringer-Garlain**, Treasurer of the association based on certification by **Jonathan Marion**, Auditor at Crowe Fideliante.

## Outlook 2021

The outlook for 2021 is in line with that for 2020. Teratec will continue its European action, whether it be project management or representation at the European Commission, where the President of Teratec will represent France on infrastructure issues, alongside **CERFACS**, **Atos** and the **CEA** for research issues until the end of his mandate at the end of 2021, when he will be a candidate for a second mandate if public authorities wish so.

The three projects launched in 2020 (the **French Competence Center**; **CASTIEL**; **FF4EuroHPC**) will go on.

The three Centers of Excellence in which Teratec participates (**POP-2**; **EXCELLERAT**; **FocusCoE**) will come to an end on December 1. Teratec is currently working on preparing the follow-up of these projects, as planned by the European Commission.

In terms of industrial initiatives, Teratec is expected to start plans defined with all partners involved in **Quantum Computing** and **Autonomous Systems**.

Teratec also wishes to launch three new initiatives, each with own specificity. The most obvious applies for use of **Satellite imagery** to better exploit **natural resources**, as several Teratec members already have experience in this field. It now remains to find the right industrial partners as well as regional, national or European support to finance this work.

**Cybersecurity** is a sprawling, highly technical subject that is constantly evolving. Here too, Teratec has a wealth of expertise that will enable us to prepare for the future without duplicating what others are already doing very well.

Finally, **Personalized Medicine** will benefit from the awareness created by the pandemic and the power of HPC and HPDA to help research and even personalize treatments for patients. This will result in writing a practical roadmap while searching for a number of key actors in the medical world.

On the side of **Quantum**, Teratec is in contact with all major users involved in TQCI, in order to be ready to respond to a call for proofs of concept that has been launched by the Ile-de-France Region, on the one hand, for which Teratec should propose a certain number of topics. On the other hand, Teratec will also respond to a very strong demand for large systems of partial differential equations, particularly in fluid mechanics, probably by proposing a national or even European scope project.

On **Autonomous Systems**, the objective is to set up a National Autonomous Vehicle Resource Center (CRVA) by the end of the year.

On these subjects Teratec is working on somewhat new approaches with large regions. Just as 2020 enabled Teratec to develop its European projects, which it will continue doing this year, so Teratec wants to establish an operational relationship with some French Regions on specific initiatives in 2021. Teratec has already had specific exchanges with the Ile-de-France Region (Quantum; Autonomous Systems; Digitization of SMEs) and the Grand-Est Region (DIH; Agriculture, agronomy and food; Cybersecurity).



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### Teratec 2021 Forum

The **16th edition of the Teratec Forum** will take place on June **22, 23 and 24, 2021** in a 100% digital format.

**One performing, intuitive and interactive digital platform;** Capitalizing on feedbacks from the Teratec 2020 Forum, the digital platform and communications have been redesigned to ensure maximum interaction between visitors, exhibitors and speakers.

→ **Keynotes, Plenary Sessions and Round Tables** will take place on the morning of June 22, 23 and 24. They will focus on technological challenges of high-performance simulation and on diversity of uses of HPC with participation of personalities from the political, economic and academic worlds, leading international industrial users and solution providers in these technologies.

→ On the afternoons of June 22, 23 and 24, **technical and application workshops** will follow one another, led by main players in the market, recognized experts and major users. They will focus on emerging technologies and new application areas in Simulation, HPC/HPDA, Data-Driven Learning (DLL) and Quantum Computing around six main themes: Quantum Computing, Storage, Cybersecurity, Health, Autonomous Systems and Space Data & Environment.

→ Les Along three days of June 22, 23 and 24, a **virtual exhibition** will bring together main players in the digital sector. Manufacturers and publishers, suppliers and integrators of hardware, software and services, universities and research laboratories, competitiveness clusters and public bodies will present their latest innovations in high-performance digital technologies.

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### Provisional budget 2021

HClosing our meeting, H l ne Bringer Garlain came back to present the 2021 budget forecast. The General Assembly then unanimously adopted two resolutions concerning the renewal of membership fee at 2 000   for 2021 and the approval of the 2021 budget presented by the Treasurer.

The General Assembly ended with a speech by Herv  Mouren about the HPC Data Center that is to be built in the neighboring woods from Teratec. Projectworks on this project will start this coming May, with delivery and start-up scheduled for the end of the year. The project leaders also expressed their desire to join Teratec (to be announced).

**Daniel Verwaerde then closed this 31st General Assembly.**