Rethinking the AI Startups creation business and management model

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***Abstract*— We present the OVD-SaaS business MVP-centered model for startup creation in an effective, optimal, and efficient integration and articulation of the main artificial intelligence ecosystem actors. It allows for an accelerated technological transfer between labs and industry and enables AI/ML reproducible research. It includes the design of a technological platform for the coordination, connection, and articulation of sectors as well as implementing policies for the AI/ML industry. Finally we present a real case of study in the biomedical field.**

Keywords—Lean startup, Agile, Customer Development, MVP, Customer Validation, business model

I. INTRODUCTION

Traditionally, the creation and management of AI businesses is presented in a disjoint way between the actors of the AI ecosystem (entrepreneurs, scientific community, academia, governments, or technology manufacturers, to cite some of the many). Even within close geographical regions, there is sometimes a significant disparity in their economies, competitive advantages, and technological capabilities to develop businesses around artificial intelligence.

The development models of startups in artificial intelligence (AI) are based on the particular effort of small groups of creative and innovative entrepreneurs who strive and take risks in a fierce competition to raise venture capital and actually implement their business [1]. Silicon Valley is one of the iconic example where an entrepreneur's dreams become reality. The stories of technological unicorns are real, but usually the bankruptcies due to failed ideas are little discussed. It is well known that 60% [2] [3] of startups will fail and this percentage varies depending on their location and other factors.

In this context, a startup can be seen as a temporary entity that follows a scalable and repeatable business model in an environment of extreme uncertainty [3], aiming for swift growth. Unlike larger companies, startups are newly established, with no prior history, and excel in rapid decision making and adaptability, giving them a competitive edge in responding to market changes and opportunities.

Startups use the Minimum Viable Product (MVP) approach, which enables maximum data collection for both learning and hypothesis testing at the lowest possible cost. The purpose of developing an MVP is to gather as much information as possible while minimizing risks and avoiding unnecessary expenses. Also defined in [3] as "a version of the product that enables a full turn of the Build-Measure-Learn loop with a minimum amount of effort and the least amount of development time." The MVP does not need to be a flawless, fully developed, or scalable product at that stage.

On the other hand, from the perspective of governments, the typology known as a startup has played a significant role in the rapid economic growth observed in certain countries where scientific and technological advancements increasingly drive the development of innovative economies. This has led to numerous systemic changes in many developed nations worldwide. This trend has also drawn considerable attention from various countries eager to replicate the model, as demonstrated by the rise of incubators, accelerators, and substantial investments in State Innovation Finance and Credit Institutions. These efforts aim to attract both external and internal credit and investment resources, channeling them into financing innovative and strategic projects, as well as fostering new founders and business ideas. There are investments in broad studies in which multiple proposals have been drawn up for years to promote the economic development of developing regions such as Latin America [4] and the Caribbean (L&C) based on startup creation. However, these perspectives and opportunities usually propose initiatives aimed for the short-term, focus on traditional economic sectors, and barely mention AI as a driver of economic development [5].

Many of these initiatives aim to replicate well-known successful models from around the world and attempt to imitate the startup ecosystems, many times taking the one of Silicon Valley as a reference. However in some instances, these efforts result in failed adaptations due to the unique conditions of each country. This often occurs because they focus on establishing entities that become overly bureaucratic, offering only advisory support (legal, financial, organizational) to entrepreneurs through a PUSH strategy. Products or services are pushed into the market something without the adequately understanding of the consumer's demand. In contrast, the Customer Development and Customer Validation methods emphasize a PULL strategy, which prioritizes creating value for the customer by thoroughly considering their needs and requests and gradually adapting to them [6]. Here, the primary

focus is on developing the optimal MVP before addressing the administrative aspects of formalizing the startup.

In this century we are witnessing the revolution of AI and the great technological development in computer science, particularly the emergence of Large Language Models (LLM), which as become a fierce competition between development and research centers around the world for giant computing companies. However, this boom is somehow based on financial speculation that might lead to a bubble in the AI sector [7].

Typically an entrepreneur starts with a business idea, and with their own resources (seed capital) or crowdfunding they must reach an MVP, a prototype or proof of concept, which convinces venture capital investors to grow the company in investment rounds (series A, B, C) until consolidating a profitable commercial product.

In this sense, we propose a new startup business and management development MVP-centered model. In fact, our OVD SaaS approach proposes a proper articulation of synergies between the different players in the AI industry. OVD-SaaS is a project financed by BPI-France and Region Ile de France to help the development of technological startups in the region, managed by Centre Borelli of ENS Paris-Saclay.

From an approach to academia and computer science, this work draws attention to the optimal, efficient, and effective management of AI scientific projects. This enables to technologically support entrepreneurial researchers in achieving an optimal MVP with a PULL strategy.

OVD-SaaS aims at integrating, articulating and creating added-value synergies between Academia and Industry around AI and machine learning (ML). The model comprises a set of policies, methodologies, strategies, platform technology, and recommendations for good practices to establish effective synergies between academia and industry.

The key is to achieve efficiency and effectiveness of MVPs with scarce resources through optimization and a collaborative environment. It is a very different approach with respect to what some governments typically propose to increase resource investments in education and technology, incubators, accelerators [8], which for small entrepreneur teams will hardly be comparable to the investments of larger corporations [3] with greater financial capability. The proposal is based on Open, Reproducible, and Trustworthy Science principles.

The OVD-SaaS methodology, architecture, and business model generalization and extrapolation are described in Section II. To illustrate the general idea and case, use the example explained in implementing the OVD-SaaS strategic model in the health sector in Section III. Finally, Section IV concludes the paper and presents ideas for future work.

II. The AI/ML model of OVD-SaaS for business development in startups

Several studies describe successful business models based on collaboration (GDPs) [9] [10] and technology (e.g. Airbnb, Uber) as a successful way to build technological startups [11]. However, there are still several opportunities for innovation and open research challenges [12] regarding digital platforms, especially as a basis for the creation of technology-based startups.

Platforms are often characterized as multi-purpose market places, where value is generated for all participants in the network. The primary function of a platform is to enable the exchange of products or services. The essence of platforms lies in simplifying and streamlining the process of participants connecting and exchanging, leading them to be described as matchmakers [13] that link one group of customers with another, thereby minimizing the obstacles that prevent mutually beneficial interactions. However, true innovation in platform design goes beyond simple matchmaking using data-driven algorithms to improve connections between buyers and sellers. To ensure that this core interaction becomes permanent, the platform must focus on attracting users, establishing a solid infrastructure, and defining principles of interaction governance. This approach enables the platform company to facilitate co creation value and effectively match the most compatible users.

In our particular case, OVD-SaaS is a platform that matches and connects authors of ML/AI scientific research with the needs and requirements [14] [15] of industry and commercial companies, promoting and accelerating the creation of startups around highly specialized scientific business niches. This relation is proposed in [16] with the methodology for publication efficiency calculated as part of the collaboration between industry staff and academic researchers. It is a highly specialized medium to promote, boost, and leverage AI/ML technology transfer from research labs to successful realities. Naturally, no recipe guarantees that a particular startup will be successful, which is why it is an open field of study in management engineering.

The main barrier faced by small teams of entrepreneurs (researchers who want to create a company based on their scientific research in our context) when creating startups is that they must use their own resources to build their MVP [17]. Therefore, mitigating this problem is essential for the success of startups [18]. Among these, there is a strong need of technological support in small startups [19] for collaborative innovation.

One main and differential feature of OVD-SaaS is that it offers a technological platform that boosts the development of these MVP prototypes and, at the same time, gives proper value to scientific research artifacts. This changes the traditional paradigm model of the development and creation of startups.

By using the same platform and methodology for both purposes, the same work is required to both obtain research results and the MVP prototype of the startup. Likewise, this process takes place in a collaborative Co-startup [3] environment of trust [20] between stakeholders to achieve agility and a successful MVP with Lean startup methodology [6] adapted to computational scientific research.

OVD-SaaS has a strong orientation towards reproducible research to move towards credibility, trustworthiness in the

research results and their claims, thus reinforcing the startup trust model [20].

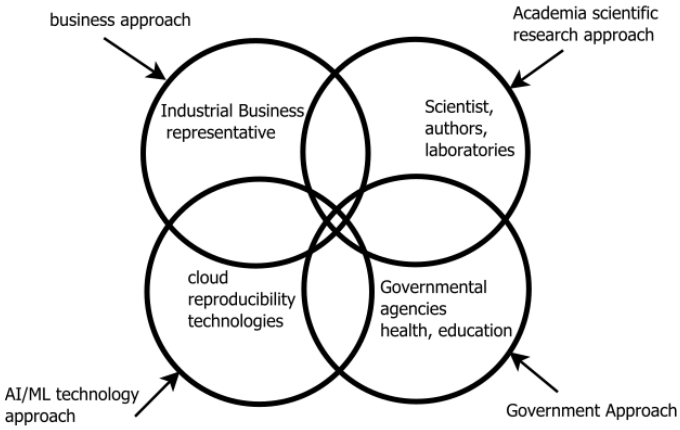

Fig. 1. The OVD-SaaS model for startup creation. It is a multi-sector approach which invovles industry, academia, technological actors, and regulators

As a high-level overview, we could summary that OVD SaaS is intended to bridge the gap between four dissimilar sectors: academia, government, industry, and AI/ML Technology (see Figure 1). It tries to optimally align all actors in the ecosystem towards the same high-value objective. It is specified at a high corporate level regarding mission, vision, principles, policies, and methodologies. It defines as well a low-level architectural design for the platform.

In the following we shall discuss on how OVD-SaaS approaches these different actors: Academia, Industry, Technology providers, and Regulators.

A. *To Academia*

One of the objectives of the OVD-SaaS is to promote the collaboration between academia and industry. Reliable scientific research needs to follow the principles of reproducible research (RR) and free and open source software (FOSS) in order to reach credibility and trustworthiness of the research artifacts. We refer the reader to our work [21] to this purpose, which also includes a complete survey answered by several scientific publishers.

The principles of RR and FOSS allow all the community to improve lines of research, by reusing knowledge and software publicly available. In particular, it can be considered as a first step to move from opaque black boxes to verifiable and truly scientific data science.

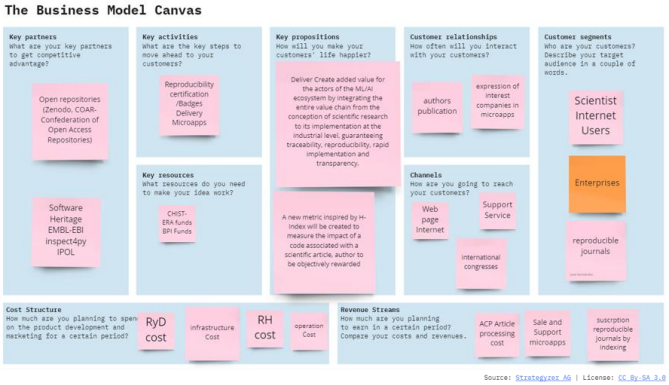

Fig. 2. The canvas business model of OVD-SaaS, tailored for the Ide-de France region.

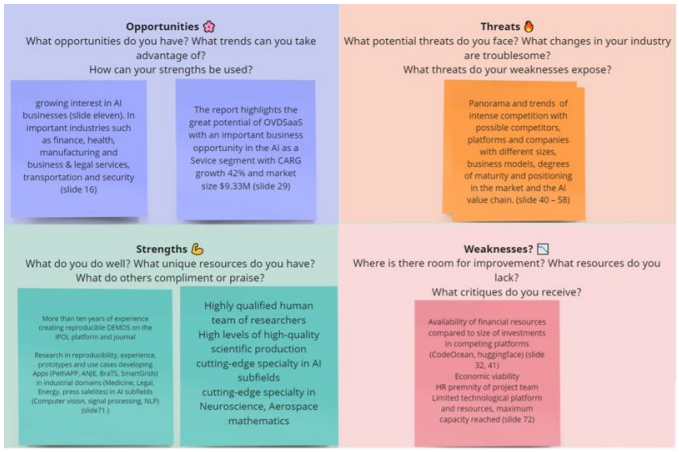

Fig. 3. SWOT analysis of OVD-SaaS, focused on the Ide-de-France region.

B. *To industry*

The NTTDATA study [22] presents challenges and relevant opportunities of artificial intelligence in Latin America, with an extensive survey in different countries [1] However, once again, it focuses on the consumption of artificial intelligence and the needs of the sectors that can be covered by this technology.

In that sense, these needs, challenges, and opportunities are disjointed from the development ecosystem. Once again, these are gaps in the industry that are being covered by large companies (typically GAFA) with their proprietary commercial solutions and economic force that overshadows the efforts of startup creators.

OVD-SaaS tries to integrate the entire AI ecosystem along with its different actors involved. It is done by identifying and establishing synergies and value creation relationships among them.

Each country must define its own model business canvas and SWOT (Strengths, Weakness, Opportunities, Threats),

[1] https://mexico.nttdata.com/insights/estudios/la-inteligencia-artificial-en-america-latina-2023

considering that each country its particular conditions and different positioning in terms of assimilation and development of AI/ML technologies.

In particular, for the Ile-de-France region we made its own canvas in Figure 2 along with a SWOT diagram in Figure 3.

C. To technology providers

The infrastructure of the OVD-SaaS and management system is RaaS (Reproducibility as a Service) oriented in the many AI/ML fields it tries to cover, such as computer vision, speech and signal processing, Natural Language Processing, decision-making systems, or robotics, to cite just a few of them.

The OVD-SaaS platform could be integrated with information systems for managing entrepreneurial projects and startups such as Pepitizy [2] and several journals publisher management systems, such as for example IPOL, ACM Digital Library

This approach allows researchers to be technologically supported at low cost in the creation of their optimal MVPs by reducing the possibility of their project failing because of the need to major developments instead of reusing existing technology. It also fosters reproducible scientific-industrial joint applications.

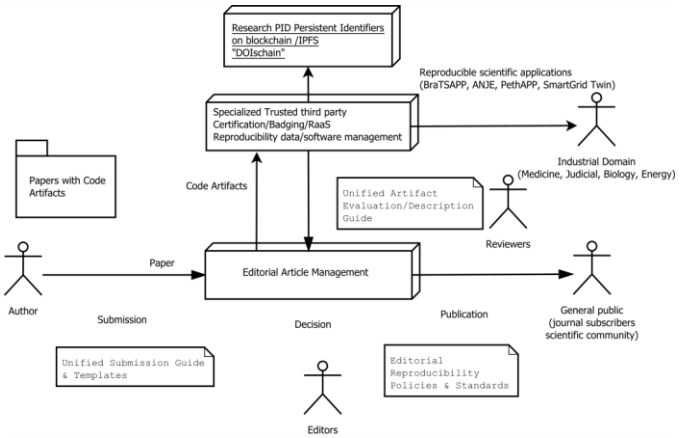

Fig. 4. Simplified OVD-SaaS functional diagram: Input: research products. Output: Online reproducible scientific application MVP. DOIschain controls the traceability of the research artifacts. Reproducibility of publications is encouraged by a badging system.

The OVD-SaaS project management system supports, guides, and provides advice on the creation and industrialization of applications, from laboratory research to fully developed end-to-end prototypes. It integrates principles of open science, along with policies, recommendations, and guidelines identified in our previous research [21], highlighting common patterns and needs. These findings underscore a gap in reproducibility and the challenges that come with it. To address this, OVD-SaaS tries to close the gap by approaching it from four distinct perspectives: academic institutions (authors, laboratories), publishers (journals, conferences, reviewers), the industrial business sector, and existing cloud technologies that support reproducibility. As shown in Figure 1, these four elements are represented on the OVD-SaaS homepage to foster the development of scientific applications that are Reproducible, Replicable, Repeatable, Reusable, Traceable, Verifiable, and Reliable, all aimed at solving industrial challenges. OVD-SaaS also promotes the formation of a scientific network community that connects industrial partners, publishers, reviewers, and researchers through these collaborative efforts.

In addition, OVD-SaaS employs or reuses the existing blockchain technology to assign perpetual persistent identifiers (PIDs), termed DOIschain [23]. It ensures the provenance, version control, lineage, and traceability of research outputs, including publications, software, and datasets. It rewards re producible research through a badging system and utilizes software engineering practices, such as user storytelling, to identify and refine user and industry needs within business logic. This is done through an iterative process we call model ready for business which is outlined using a high-level BPM language. The overarching technological management system is detailed in Figures 4 and 5, where scientific products are re viewed and developed into reproducible scientific applications linked to publications, thus promoting transparency, fairness, accountability, ethics (FATE), and adherence to the Findable, Accessible, Interoperable, Reusable (FAIR) principles [24], all through the use of cloud-agnostic and language-independent technologies.

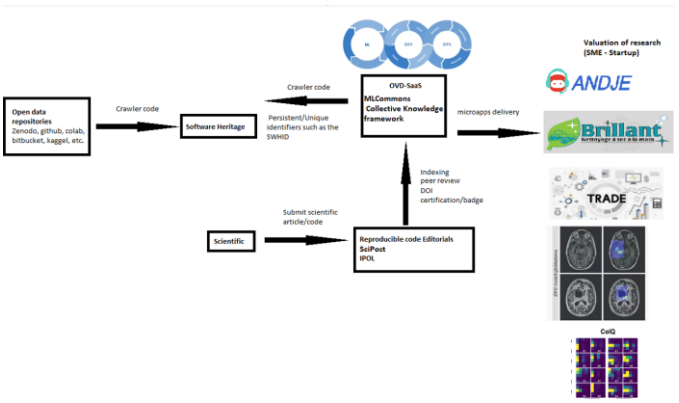

Fig. 5. Example of several OVD-SaaS modules interacting to build a MVP, along with some real proof-of-concept applications already running in the platform.

D. To regulators

As mentioned in the introduction, many governments make huge investments to promote startup creation ecosystems within their countries to foster accelerated economic development in the technology sector [8]. Incubators and accelerators, as well as public education and research policies, would benefit from the MVP-centered model that OVD-SaaS proposes for startup creation. There is no need to wait for researchers to reach the investment

[2] https://www.pepite-france.fr/pepitizy-pepite-france/

rounds (series A, B, C) with an MVP built with their own resources. Instead, all efforts and investments should be directed to supporting and facilitating the development of those MVPs, freeing the researchers from this burden not really related to their activity.

The OVD-SaaS approach has a positive impact as it gives relevance and coherence to the research topics and contents taught in the universities with respect to the current requirements and needs of the particular industry of each country by establishing a strong relationship and communication between these two actors. For example, particularly for AI, it is essential to create strengths in mathematics, programming, or data structures.

A specialized and advanced level is required to understand modern AI techniques and methods and to be able to generate innovative, highly specialized MVPs with a greater probability of success.

To this respect, interested parties can become experts in artificial intelligence with specialized courses, and OVD-SaaS can help in the design of specialized academic curricula in AI, as well as share its experience with regulators and policy makers.

Government Policies, joint actions and shared responsibilities: Large economic blocks such as the United State[3] European Union[4] and China[5] have already established an entire artificial intelligence policy and the main talent management policies around the industry. Meanwhile, in countries in the L&C region, the first drafts of roadmaps[6] barely appear independently; in some cases, a copy of those is issued in developed countries. Yet these policies are more oriented towards regulating AI ethics rather than an intensive and long term policy for developing AI industry. These policies regulate the consumption of AI, which is a black box from large private companies.

The quality of human talent in technology in the L&C region has always been highlighted. However, this talent ends up being ”brain drains” [3] that are favored precisely by immigration policies[7] aligned with the objective of developing AI technology.

The previous discussion only leads to the conclusion that if the L&C region truly wants to develop a productive industry in AI, they must act together in a joint block of close cooperation, common policies, and synergy of individual competitive capabilities. This has become a highly competitive industry with large investments considering the immensely expensive infrastructure to create and train large cutting-edge models (e.g., GPT-3 required US$4.6 million).

Many countries in general have government agencies based on scientific research that perform some of these OVD-SaaS functions, as for example the National Center for Scientific Research (CNRS) in France. There is also the CIFRE device (conventions industrielles de formation par la recherche) to promote the development of collaborative research between academia and companies for researchers who develop their PhD theses within a company, receiving a remuneration. However, OVD-SaaS will attempt a complete and tight interaction between academia, industry, regulators, and technological providers.

III. USE CASE

We briefly present a use case of OVD-SaaS and its business model that shows a good synergy between four key sectors: Academia (Borelli Center), Health (medical doctors and biomedical researchers), and AI technology (a neural network model from brain tumor segmentation), and a large public governmental project (the Paris-Saclay University).

The purpose of the application of this use case was to make a functional and complete AI/ML application for the segmentation detection of brain tumors in hospital environments, named BraTSApp.

Let us summarize it with a user story: “*As a radiologist, I wish to have updated and increasingly accurate neural network models available in emergency rooms to assist in interpreting brain magnetic resonance images. So, a diagnosis of the patient’s severity and treatment authorization is re quired very quickly*”.

By using the OVD-SaaS model, an proper relationship was established. On the health sector side, it was possible to interpret all the real requirements and needs of radiologists in a hospital environment and obtain the application in production. On the Academy side, all the capabilities of a multidisciplinary team of high-level researchers specialized in neuroscience, AI, Big Data, and cloud computing were exploited. The research results of this work are published and available [25].

The neural network architecture is 3D-Unet, which is implemented in an online IPOL[8] demo In such a way, an end-to-end application of segmentation of brain glioma was quickly built from storytelling in a business logic.

Finally, we have an end-to-end application (see Figures 6 and 7) which might be very useful in a healthcare domain context (hospital). With the help of the automatic tool, the medical doctors using their own clinical expertise can obtain relevant information to help the diagnostic or further actions. Indeed, the radiologist can attach three images in nii.gz format, send them to be analyzed by the inference model, and obtain a

[3] https://www.nitrd.gov/nitrdgroups/images/c/c1/American-AI-Initiative-One-Year-Annual-Report.pdf

[4] https://artificialintelligenceact.eu/ai-act-explorer/

[5] https://www.gov.cn/zhengce/content/2017-07/20/content_5211996.htm

[6] https://inteligenciaartificial.minciencias.gov.co/wp-content/uploads/2024/02/Hoja-de-Ruta-Adopcion-Etica-y-Sostenible-de-Inteligencia-Artificial-Colombia-1.pdf

[7] https://www.whitehouse.gov/briefing-room/presidential-actions/2023/10/30/executive-order-on-the-safe-secure-and-trustworthy-development-and-use-of-artificial-intelligence/

[8] https://ipolcore.ipol.im/demo/clientApp/demo.html?id=77777000461

final segmentation result. The radiologist can choose the slide and view the tumor's possible location in 3D, write a diagnosis report, and issue a treatment authorization.

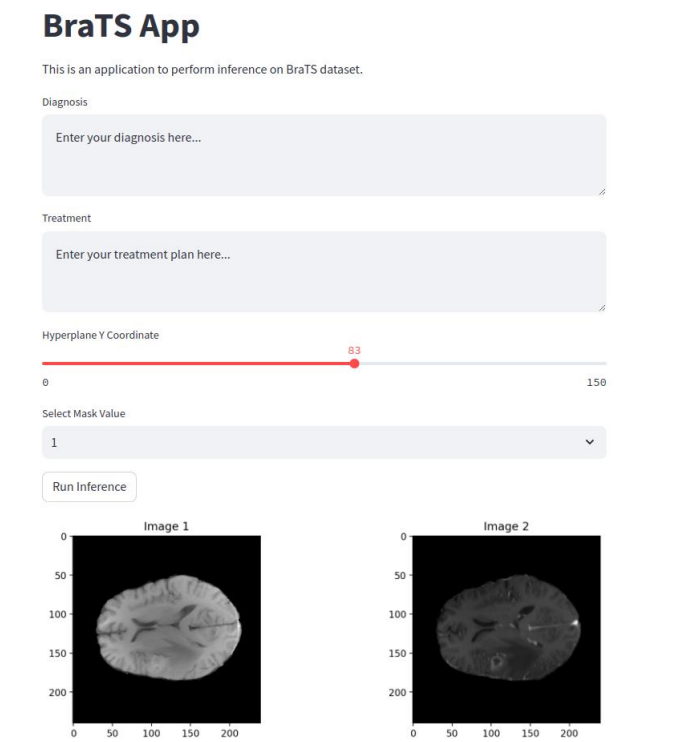

Fig. 6. A view of the BraTS App. The radiologist can choose the slide of interest, write a diagnosis and authorize any treatments.

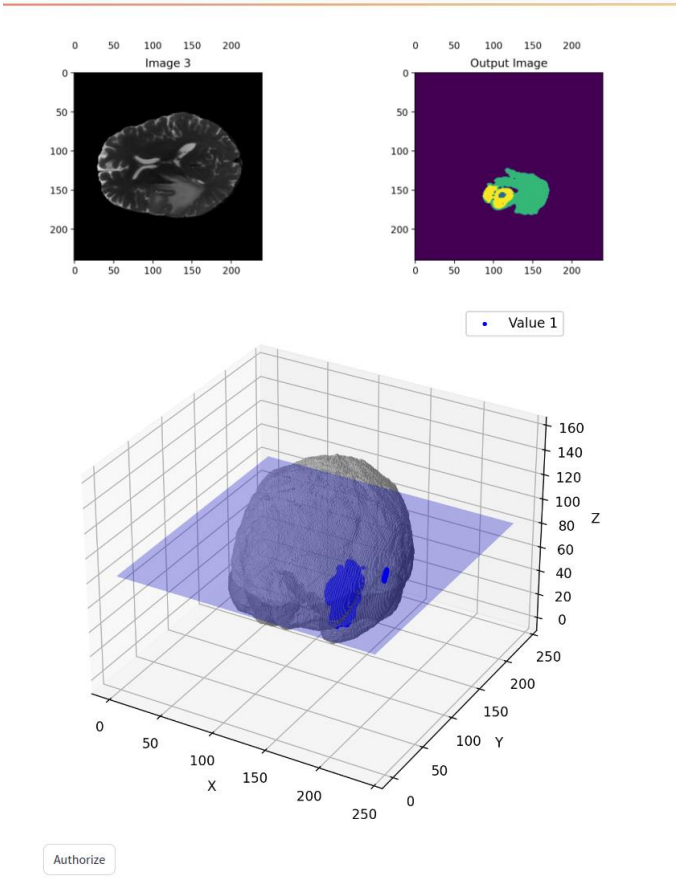

Fig. 7. The 3D BraTS App showing brain tumor location in space (XYZ).

IV. CONCLUSION

The OVD-SaaS project tries to put together academia, industry, technological providers, and regulators with the hope of obtaining verifiable and reliable scientific results with a direct industrial application.

Even if indeed there are currently platforms, incubators, and accelerators for managing business idea projects for the creation of startups (e.g., pepitizy), however there is a lack of technological tools focused on acceleration, management in the creation of MVPs, and technological transfer of trustworthy reproducible computer science research to the industry in applicable solutions. OVD-SaaS is presented as a business. model that bridges this gap and really accelerates the creation of startups.

The OVD-SaaS model and its information management system permits accelerated startup creation and thus generate high-impact economic development. However, the creation of a governmental AI/ML specialized agency that promotes OVD-SaaS policies, methodologies, and processes is still pending and required for a truly competitive entrepreneurial environment.

V. BIOGRAPHY

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