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TechBio\_COMPANION PROJECT

INTELLIBIO B.V.

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### The company background

IntelliBio BV, founded in July 2024, is an AI-first Software-as-a-service Techbio company. With this venture, the founders pursue the vision; "To revolutionize the research landscape by creating a future where AI agents are part of each science and R&D team."

The company was born out of the recognition that significant productivity gains from Generative AI applications in biotech research are not achieved through incremental tools, but through transformative AI solutions.

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### Relevance of the project for IntelliBio

The **TechBio\_Companion** project is pivotal to IntelliBio’s mission of revolutionizing biotech research through AI. Serving as a proof of concept, it validates on-premise Generative AI for researchers, tailored to meet the unique needs of biotech SMEs. This project provides us with a strong market entry point, as we will be working with one or a few launching customers to develop the product. TechBio\_Companion positions IntelliBio as a leader in AI-driven biotech solutions.

A person looking at a computer screen

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# Problem

**The effective implementation of various uses of generative AI in biotech teams requires privacy-sensitive, secure, and cost-effective options. The current, largely cloud-based solutions are not sufficient from a privacy and cost perspective, for generative AI driven processes in biotech. An AI-native workspace would enable biotech R&D teams to capture much more of the value of generative AI applications. Yet, at present, such an AI-native (on-premise) solution, with specific value for biotech teams is not available.**

## Readiness for Generative AI within Biotech is increasing

In assessing the AI readiness of biotech SMEs in the EU, we find that the average score stands at a "medium" level, depending on the use of AI/ML within the teams and the way data is handled (eg. ELN and LIMS integration). However, despite this moderate level of readiness, there is a strong push within the industry to leverage AI capabilities more extensively. Indeed, extensive investments in AI-first companies in the biotech space suggest that expectations are high on the transformative power of generative AI on the sector.

This means that the sector is poised for significant growth in AI adoption, with biotech SMEs increasingly recognizing the value that generative AI can bring to their R&D processes. While many companies are still in the early stages of readiness, the momentum of investment and the demonstrated potential of AI-driven tools suggest a rapidly evolving landscape. As AI technologies mature and become more accessible, biotech SMEs are likely to accelerate their adoption, particularly for tasks like experimental design, data analysis, and protocol optimization. This growing investment underscores a clear trend: generative AI is seen as a strategic enabler for enhancing productivity, reducing time-to-market, and driving innovation in biotech, positioning AI-ready firms to gain competitive advantages in a knowledge-driven, fast-paced sector.

## How can Generative AI transform Biotech Research efficiency?

Analyzing the investments and use cases where generative AI is successfully transforming business processes, five areas of substantial (potential) value stand out. Alongside the profoundly impactful use cases where generative AI is being used in the design of e.g. therapeutic small molecules and functional proteins, biotechnology teams can capture value by implementing AI into areas of problem-solving and workflow augmentation, like Literature Search & Knowledge Acquisition, Experimental Design, Bioinformatics workflows and -troubleshooting, Protocol Optimization, Data Visualization, and many other content-creation tasks. We will also see a rise of use cases where companies develop their own (foundational) generative AI model, such can create specific value over the models developed by big tech companies due to specific training and use.

To better understand the solution that Intellibio is pursuing, we here go into the five uses cases.

**Value for biotech, using Generative AI;**

* **Workflow Support**: Researchers may use AI assistants that seamlessly integrate into biotech workflows to create the right outcomes, formats, content.

*Generative AI’s ability to automate and optimize biotech workflows has significant potential to reduce costs and improve efficiency. According to a report by McKinsey (2021)[[1]](#footnote-1), integrating AI into R&D workflows in the life sciences sector could reduce R&D costs by 20-30%. This is driven by AI’s capability to automate repetitive tasks, streamline documentation, and improve protocol accuracy. In the biotech space, AI assistants could enable researchers to focus more on high-value activities, ultimately accelerating innovation and reducing time-to-market for new therapies and products. By 2030, the global economic impact of AI-driven workflow automation in biotech is projected to reach between $10 billion and $15 billion, as more companies adopt AI-powered solutions.*

* **Faster Problem Solving**: Day-to-day research challenges—like writing bioinformatic code or troubleshooting immune assays—slow teams down. Researchers may apply generative AI that cut through the manual work and speed up results boosting skills and know-how, not disrupting it.

*The application of generative AI to solve routine research challenges can drive substantial productivity gains. For instance, automating tasks like bioinformatics coding or assay troubleshooting could cut the time researchers spend on these activities by up to 50%, based on findings from Deloitte’s Life Sciences report (2022)[[2]](#footnote-2). This boost in productivity allows teams to allocate more resources to experimental design and analysis, improving overall research outcomes. By enabling faster problem resolution, AI could add $5 billion in value by 2030, particularly in biotech firms where labor costs are high.*

* **‘Talking’ to your data**: Biotech teams may use generative AI to dive into and pull insights from their vast datasets, fast. Current methods are too slow and fragmented.

*Generative AI’s data processing and analytical capabilities can allow biotech companies to unlock insights from their extensive datasets, reducing the data fragmentation issues currently faced by many research teams. According to a report by Markets and Markets (2023)[[3]](#footnote-3), AI-driven data analytics in biotechnology is expected to grow at a CAGR of 34% through 2030. The economic impact of this could be substantial, as AI-enhanced data processing enables faster decision-making and more informed R&D directions. Over the next decade, the added value from generative AI for data insights is estimated to be between $20 billion and $25 billion globally, with biotech companies particularly benefiting from improved data accessibility and actionable insights.*

* **Molecular design/engineering**: GenAI already shows value, with companies offering models for tasks like small molecule design or protein-function engineering.

*Generative AI already shows significant potential in molecular design, allowing for quicker iterations in drug discovery and bioengineering. For example, companies such as Insilico Medicine and Exscientia have demonstrated that AI can reduce the time needed to discover new drug candidates by more than 50%, with a potential cost savings of €100 million per drug, as highlighted in a PwC report (2022)[[4]](#footnote-4). As AI-driven molecular design becomes more sophisticated, it could add upwards of €50 billion in value to the biotech industry by 2030, as it reduces development costs and improves innovation pipelines.*

* **Model development**;In some instances, the development of an own model for eg. diagnostics can be considered by biotech companies.

*Developing proprietary AI models, particularly in diagnostics, presents an opportunity for biotech firms to differentiate themselves and create tailored solutions that meet specific needs. Gartner (2023)[[5]](#footnote-5) predicts that AI model development will play an increasingly important role in diagnostics, where custom models can improve the accuracy and speed of disease detection. For biotech companies, this could mean new revenue streams, especially in precision medicine, with an estimated market impact of €10 billion by 2030. Developing in-house models also enhances data privacy and IP protection, crucial factors for biotech SMEs.*

## Persistent challenges in the use of Generative AI for Biotech

The picture is clear, generative AI will have a profound effect of the biotech sector. Yet, most SMEs are currently not equipped to effectively and responsibly adopt the full potential of generative AI applications. The biotech industry faces critical challenges in accessing secure and private AI compute resources, limiting the potential of breakthrough research.

**1. Resource Constraints**

Biotech SMEs operate on limited budgets, often with rigid structures that restrict large-scale investment in external AI resources. Unlike larger corporate biotech firms, they lack the in-house capabilities to build custom AI agents tailored to specific R&D tasks. An on-premises AI workstation offers a cost-effective, centralized resource that SMEs can control and customize for their own requirements. By avoiding high recurring cloud costs, SMEs can optimize their investments in AI while enhancing their competitive position.

**2. Data Privacy and Security**

Privacy is paramount in biotech, where companies handle sensitive proprietary data, often including genetic information and IP-protected research. External AI platforms typically require data transfer to third-party servers, raising concerns about data exposure and compliance with privacy regulations. An on-premises AI workstation ensures that all data remains securely within the company’s infrastructure. This significantly reduces the risk of data breaches and allows biotech SMEs to comply with stringent privacy regulations without sacrificing access to powerful AI tools.

**3. Computational Demand and Costs**

An obvious constraint on demand is in AI-driven tasks like protein-function engineering and drug discovery simulations that are highly compute-intensive. Yet, also increasing utilization of less compute-heavy external generative AI applications incurs ongoing costs related to compute power and token usage. These costs will become unsustainable for biotech SMEs, particularly when generative AI is applied across multiple functions. An on-premises workstation with dedicated, high-performance computing resources can meet these computational demands at a predictable cost, without the need for ongoing subscriptions to external services. By controlling compute resources internally, SMEs gain cost efficiency and reduce the long-term financial burden.

**4. Integration with Existing Applications and Workflows**

Many biotech SMEs rely on existing software like ELNs and LIMS, and these systems are often not optimized to integrate with external generative AI solutions. Implementing generative AI in a way that complements rather than disrupts current workflows is essential to drive productivity.An on-premises AI workstation can be tailored to work together with existing systems, enabling efficient integration that enhances workflow without requiring major changes. This allows researchers to augment their work with AI without a steep learning curve or workflow disruption.

**5. Custom Model Creation**

Certain biotech applications require bespoke AI models trained on specific, sensitive data. Traditional large language models (LLMs) may not be viable for these needs due to data sensitivity and lack of control over model customization. Additionally, building custom models with proprietary data on external platforms poses significant security risks. With an on-premises workstation, biotech SMEs have the ability to create and train custom generative AI models securely. This in-house capability enables companies to tailor AI solutions to their unique data and research needs, maintaining control over model development while ensuring compliance with security protocols.

**Overall, capturing the value of generative AI in biotech requires more than companies that develop models or applications thereof. It requires a new way of working. Such transitions are difficult, but a targeted solution that overcomes some of the key bottlenecks will help biotech R&D teams to adopt solutions as they come.**

# Solution

By offering an on-premises AI solution, IntelliBio empowers biotech SMEs to leverage generative AI without the typical barriers. We provide a secure, high-performance AI platform that aligns with existing workflows, reduces long-term costs, and facilitates breakthrough research in a controlled, compliant environment.

## TechBio\_Companion: The On-Premises AI Agent for Biotech Research

As pointed out above, Biotech SMEs face significant barriers to adopting generative AI, including limited budgets, stringent data privacy needs, high computational costs, integration challenges with existing workflows, and the requirement for secure, custom AI models tailored to specific research needs.

TechBio\_Companion is IntelliBio’s answer to these challenges. Designed specifically for biotech SMEs, our solution brings generative AI directly into their secure environment, empowering researchers without compromising data integrity or budget constraints.

## Key Features of TechBio\_Companion

1. **On-Premises Deployment**: Our AI assistant operates securely within the company’s infrastructure, ensuring compliance with industry-specific regulations and protecting sensitive data.
2. **AI-Powered Research Assistance**: Tailored to enhance productivity in non-experimental R&D tasks, TechBio\_Companion supports researchers with literature reviews, data analysis, protocol optimization, and hypothesis generation, streamlining their cognitive workload.
3. **Collaborative Dashboard**: A user-friendly interface facilitates seamless collaboration between researchers and the AI agent, allowing teams to work within a cohesive, intuitive environment.

**Additional Benefits** TechBio\_Companion integrates effortlessly with existing research workflows and databases, acting as a productivity companion that respects researchers' unique methodologies. Its human-in-the-loop design enables tailored content creation, while continuous learning capabilities enhance its effectiveness over time. The workstation adapts to individual users’ needs, ensuring that AI support is both relevant and flexible across diverse biotech applications.

## Summary of intended value proposition

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| --- | --- | --- |
| Use Case | Biggest Bottleneck(s) | Bottlenecks Addressed by On-Premises Solution |
| Workflow Support | Data integration, regulatory compliance, change management | Enables integration, maintaining compliance and reducing change management challenges |
| Faster Problem Solving | Access to quality data, expertise gap, problem specificity | Provides a controlled environment for accessing high-quality, in-house data to solve specific research problems without external dependencies |
| 'Talking' to Your Data | Data privacy, data quality and standardization, computational demands | Enhances data privacy and control, allowing researchers to extract insights quickly without risking data security |
| Molecular Design/ Engineering | Computational costs, data for specific targets, regulatory hurdles | Provides affordable compute resources for complex molecular simulations, lowering long-term costs |
| Model Development | Resource constraints, niche data limitations, maintaining model accuracy | Allows for secure development of custom models, addressing data sensitivity and specialized R&D needs |

# TechBio\_Companion Project

In 2025, IntelliBio will develop the on-premise AI together with at least one biotech SME (**discussions ongoing with several interested Dutch SME**). For the proof-of-concept (PoC) project, the core focus is on demonstrating the AI agent’s value in a real-world biotech research environment while addressing the unique challenges of our early (launching) customers.

### Elements that will be developed and tested:

**1. High-Performance Compute Capabilities**

A powerful, localized compute setup designed to handle the computational demands of complex AI-driven tasks. This setup should balance cost with performance, possibly using GPU-accelerated systems or edge AI hardware to keep operational costs manageable. Biotech tasks, such as protein-function engineering or drug discovery simulations, are compute-intensive. Relying on external compute resources can be costly and unsustainable.

#### Initial specs for the hardware components:

|  |  |
| --- | --- |
| Hardware Element | Key Specs to Discuss |
| Processing Power | GPUs (e.g., NVIDIA A100/V100), powerful CPUs (e.g., Intel Xeon), optional FPGA |
| Memory (RAM) | 128GB minimum, scalable to 512GB or 1TB, DDR4/DDR5 |
| Storage | NVMe SSDs, 2TB-8TB capacity, RAID configuration for redundancy |
| Networking | 10GbE NIC, support for VPNs or firewalls |
| Data Security | Hardware-based encryption (AES-NI), TPM, Secure Boot |
| Scalability | Modular design, cluster-ready capabilities |
| Cooling & Power | Advanced cooling (liquid for GPUs), efficient power supply (80 Plus Platinum) |
| Physical Security | Rack-mount locks, access control compatibility |

**2. Customizable Small Language Model (SLM)**

A small language model (SLM) optimized for biotech tasks, trained on specific task-related data and fine-tuned with the company's in-house data. This allows the agent to understand and generate insights relevant to specific research contexts and needs, from literature review to experimental design. Many biotech tasks require domain-specific knowledge and the ability to handle proprietary data without relying on massive, generic LLMs.

**3. Integration Layer for Existing Biotech Tools (ELNs, LIMS)**

An integration layer that connects the AI agent to ELNs, LIMS, and other essential tools, enabling researchers to access AI features directly within their existing platforms. This layer should support data exchange and enable workflows that span both traditional tools and the AI assistant. Biotech researchers heavily rely on tools like Electronic Lab Notebooks (ELNs) and Laboratory Information Management Systems (LIMS), which are rarely integrated with AI solutions. Integration is essential for AI to add value without disrupting existing workflows.

**4. Data Privacy and Security Framework**

A robust security infrastructure that ensures data remains on-premises and is accessible only by authorized users. This includes encryption, secure access controls, and compliance with industry standards like GDPR. Privacy and security are top priorities in biotech due to the sensitive nature of data (e.g., genetic information, IP-protected research). External cloud solutions often don't meet these stringent requirements.

### Innovative Aspects and TRL

TechBio\_Companion revolutionizes biotech research with four key innovations:

1. **On-Premise Generative AI:** Ensures data security and regulatory compliance.
2. **Specialized AI Agent:** Tailored for biotech workflows, seamlessly integrating with existing processes.
3. **Small Language Model:** Optimizes performance and resource use in specialized domains.
4. **Novel Use Cases:** Pioneers new Generative AI applications in biotech research.

Our core innovation is developing a methodology to build this specialized AI agent, addressing biotech challenges while utilizing the potential of Generative AI. Advancing from TRL 3 to TRL 5, we'll enhance our solution's real-world applicability.

In the context of IntelliBio's **TechBio\_Companion**, reaching TRL 5 means:

* The AI system's core functionalities (e.g., workflow-driven assistance, secure integration, and personalized AI modules) have been developed and tested together.
* The technology has been validated through simulated testing environments that mimic the biotech research use cases, ie. experimental design or literature search tasks.
* Performance metrics (such as uptime, AI response accuracy, and productivity improvement) are measured and assessed, ensuring the system works as intended under near-realistic conditions.

1. McKinsey & Company. (2021). "How Artificial Intelligence Will Transform the Future of R&D in Life Sciences." *McKinsey Digital Report*. Available at: [McKinsey.com](https://www.mckinsey.com/). [↑](#footnote-ref-1)
2. Deloitte. (2022). "Unlocking Productivity in Life Sciences with AI: Reducing R&D Costs and Enhancing Outcomes." *Deloitte Life Sciences Report*. Available at: [Deloitte.com](https://www2.deloitte.com/). [↑](#footnote-ref-2)
3. Markets and Markets. (2023). "AI in Biotech Market Size and Forecast, 2023–2030." *Markets and Markets Biotechnology Report*. Available at: [MarketsandMarkets.com](https://www.marketsandmarkets.com/). [↑](#footnote-ref-3)
4. PwC. (2022). "The Economic Impact of AI in Drug Discovery." *PwC Pharma Report*. Available at: [PwC.com](https://www.pwc.com/). [↑](#footnote-ref-4)
5. Gartner. (2023). "Future of Diagnostics: Custom AI Model Development in Biotech." *Gartner Healthcare and Biotech Forecast*. Available at: [Gartner.com](https://www.gartner.com/). [↑](#footnote-ref-5)