4G CLINICAL

Innovation Remembered

What the Last Decade Has Taught Us

Innovation does not happen by accident. It evolves through pressure, persistence, and a willingness to challenge industry assumptions. This white paper reflects on the moments that shaped 4G Clinical's technology philosophy and the evolution of Prancer RTSM®, examines the forces redefining today's digital trial ecosystem, and highlights how emerging capabilities, including AI, are poised to influence the next era of speed, scale, and patient experience.

Over the past decade, clinical trial technology has undergone transformative change.

At 4G Clinical, innovation has always been driven by a willingness to challenge conventions and embrace bold ideas. From pioneering the use of natural language processing (NLP) in RTSM builds to anticipating the role of AI in clinical trial delivery, our journey has been one of experimentation, learning, and impact.

This white paper captures a candid conversation between our Director of Product Strategy and Director of Software Engineering.

Jonathan

*Director of
Product Strategy*

Maxime

*Director of
Software Engineering*

Together, Jonathan and Maxime reflect on pivotal milestones, share stories that shaped the company's approach, and explore what the future holds. Their dialogue offers not just technical insights but also personal reflections, giving us a window into how curiosity, experimentation, and persistence drive sustainable innovation.

Beginnings and Early Excitement

How a shared vision took root and set the tone for innovation.

J *Max, ten years ago, where were you and what were you working on?*

M *I was just starting with 4G. I remember meeting one of the founders while I was traveling in Bangkok. He told me about the company he was starting with Ed and asked if I knew anyone who could code in Python and Angular. I said, "Yes—me," even though I was planning to spend the next six months surfing in Bali. They said that was fine, and that's how I joined.*

What excited me most back then was our decision to go fully cloud-based from the start. Connecting Ed's business logic models, the interpreter, and my UI work to create something dynamic—that was the moment everything came together. It felt like magic.

J *I can relate. Coming from industries where everything was custom-coded, the ability to configure instead of hard-code was a game-changer. It meant we could go faster, but it also meant we could adapt. That early innovation set a tone for what 4G became.*

By the Numbers

RTSM systems initially relied heavily on legacy technologies, with over 70% using telephone integration as of 2015 [1]. Over the next few years, incremental adoption of cloud functionality began to emerge, so that by 2015 only 18% of systems were fully cloud-enabled [2], reflecting the early stages of digital transformation in trial management.

Patient Impact

Cloud-first meant fewer delays, faster site activations, and ultimately, quicker access for patients waiting on trial treatments.

Lessons Learned

Early decisions matter. By choosing cloud-first and embracing configurability, 4G built a foundation that made future innovation possible.

"That early innovation set a tone for what 4G became."

Shifts in Technology

Legacy systems, cloud scalability, and the AI future.

J *Looking over the past decade, what's the biggest technological shift you've seen?*

M *For me, it's been the decline of phone-based systems and the rise of web interfaces. That shift fundamentally changed how people interacted with RTSM systems. But if we look at today and tomorrow, it's definitely artificial intelligence. AI has the potential to transform clinical trials as much as electricity transformed society. It's still early, but I'm convinced it will reshape everything.*

J *I've been experimenting with different AI tools myself. Some are messy, but the analytical capabilities are impressive. Your comparison to electricity is apt—AI is powerful, but it comes with infrastructure and energy challenges we need to address. It reminds me of the early cloud conversations. At first, people were skeptical, but once adoption began, it became the new normal.*

By the Numbers

AI adoption in clinical trial operations has progressed from experimentation toward operational use, with 11% of organisations reporting AI in active use and a further 22% reporting partial implementation by late 2024 [3]. In parallel, interactive response workflows have transitioned decisively away from telephone-led systems toward web-based use, with a multi-country study showing that 98% of site users prefer web interfaces over telephone interaction [4], reflecting the broader industry transition from IVRS-first to web-based RTSM models.

Patient Impact

AI promises to accelerate site support, reduce administrative burden, and enable faster trial adjustments—directly improving patient access and reducing waiting times.

Lessons Learned

Major shifts start small. The early days of cloud adoption foreshadow today's AI journey—initial skepticism, gradual adoption, and eventual transformation.

"AI has the potential to transform clinical trials as much as electricity transformed society."

Decentralization and Patient Impact

Where technology directly changes the trial experience.

J — *Has there been a technology that you thought would change clinical trials significantly? Were you right?*

M — *Decentralized trials have had a real impact on patients—they don't always have to travel to sites to participate. That's huge. For many patients, participation is no longer about geography. That's real progress.*

At the time, I also thought NLP would be a revolution for us. While it sped up study builds, it didn't transform the industry the way I imagined. Today, every provider can build studies quickly, so that competitive edge has narrowed.

J — *I'd challenge you a little there. In the early years, NLP gave us a real advantage. I remember a sponsor saying they couldn't believe their study went live in a fraction of the time. It forced the rest of the industry to catch up. Even if it feels less unique today, it shaped the way the market evolved.*

M — *Fair point. But it does show how we must keep innovating and not rely on past achievements, since competitive advantage only lasts as long as we continue to push the boundaries of what's possible.*

By the Numbers

By 2022, nearly 40% of clinical trials incorporated some decentralized elements [5]. This shift aligns with regulatory guidance, as the FDA encouraged decentralized trial approaches in 2020, and the EMA published recommendations under the ACT EU initiative in 2022, noting that such models can expand trial access and reduce patient drop-out rates by up to 20% [6,7].

Patient Impact

Decentralized trials lowered the barrier for patients in rural or underserved areas, making participation feasible without long travel.

Lessons Learned

Innovation only matters if it changes patient experience. Speed (through NLP) and access (through decentralization) reshaped expectations.

"For many patients, participation is no longer about geography."

Building Better Tools

Empathy and usability as drivers of system design.

J — *What's been the most enjoyable thing for you to develop?*

M — *The Smart Editor, which is the authoring environment inside Prancer RTSM that allows users to build, edit and validate study configurations through structured fields rather than specification documents. After spending time trying to use it myself, I realized it needed major improvements. Making it more intuitive, with features like auto-complete, turned it into something much more powerful for our users. I see it as the IDE for CSLs, giving real-time feedback and reducing dependency on technical teams.*

J — *That resonates. As someone without a coding background, improvements like that make the system more accessible. I have heard stories of people struggling with older RTSM systems where even simple changes required complex steps. This change has been like night and day for them. It's a great example of empathy in design—building tools that don't just function but actually feel intuitive.*

By the Numbers

Industry benchmarks show that configurable RTSM platforms accelerate study build timelines by minimising bespoke programming and reducing the need for repeated rebuild cycles compared with fully custom-coded approaches [8]. In parallel, sponsor selection data points to a clear preference for usability and autonomy, with 65% of sponsors reporting that self-service RTSM capabilities are a priority when choosing vendors [9].

Patient Impact

More intuitive tools mean studies can launch faster and with fewer errors, getting treatments to patients sooner.

Lessons Learned

Empathy drives innovation. Building tools that empower non-technical users reduces bottlenecks and improves trial efficiency.

"The Smart Editor became the IDE for CSLs, reducing dependency and empowering users."

Challenges That Remain

Why interoperability and data accessibility are still frontiers to conquer.

J *If you could change one thing about modern RTSM, what would it be?*

M *Interoperability. Too much time is wasted making different systems talk to each other. Standards and seamless communication between platforms would make a huge difference. Reporting is another area—we can do more to make data accessible and meaningful. I'm particularly excited about using AI prompts to allow users to query data naturally, just like they would with Google.*

J *That's a powerful vision. I've seen sponsors get frustrated not because the data wasn't there, but because they couldn't access or interpret it quickly enough. Helping them understand not just what their system is doing, but why, could fundamentally change how studies are run.*

By the Numbers

Industry surveys consistently identify interoperability and system integration as among the most significant barriers to operational efficiency in clinical trials [10]. Poor integration between clinical systems contributes directly to trial delays, driven in part by manual data reconciliation and fragmented reporting workflows [11,12]. Reflecting this pressure, sponsor investment priorities increasingly centre on interoperability, with a majority identifying it as a key technology focus area for the coming years [13].

Patient Impact

When systems don't connect, patients wait longer for drug supply adjustments or site activations—delays that directly affect access to treatments.

Lessons Learned

Interoperability is no longer optional. Systems must not only collect data but share it seamlessly to drive patient impact.

"Interoperability would make a huge difference."

Looking Ahead
The next decade of possibilities.

J *Final question—what excites you most about the future?*

M *AI-driven data access and interpretation. Natural language queries that make complex trial data easy to understand. That, and greater integration across systems. These will both drive the next wave of innovation in clinical trials.*

J *I agree. The evolution of clinical technology is not just about speed but about clarity, accessibility, and ultimately, improving the patient experience. Imagine a world where trial sponsors, sites, and patients can all interact with systems in ways that feel natural and intuitive. That's where we're heading.*

By the Numbers

Industry outlooks indicate that AI-enabled capabilities, including natural language interfaces, are increasingly factoring into mainstream clinical software platform strategies [14]. In parallel, AI is taking on a growing share of data-intensive trial activities, with organisations expecting measurable gains in efficiency, decision speed, and data quality as adoption matures [15]. Reflecting this momentum, a growing number of pharmaceutical executives report that AI is expected to contribute meaningfully to efforts to accelerate time-to-market for new therapies [16].

Patient Impact

Faster, more accessible trial data means more informed decisions, fewer delays, and trials designed with the patient at the center.

Lessons Learned

The future of RTSM will be defined not just by technological advancement but by how well those advancements translate into better patient outcomes.

"The future of RTSM will be defined by clarity, accessibility, and patient-centered design"

Conclusion

The past ten years have been defined by bold choices—embracing the cloud, pioneering NLP, and continuously refining the user experience. Along the way, lessons were learned, systems were improved, and sponsors and patients alike benefited.

The next decade will be shaped by AI, interoperability, and patient-centered innovation. As Jonathan and Maxime's conversation shows, the journey of clinical technology is far from complete, and the opportunities ahead are as exciting as ever.

The power of innovation lies not just in technology, but in collaboration.

At 4G Clinical, we remain committed to shaping the next decade of trials—together with sponsors, sites, and patients. Every step forward is a step closer to improving patient lives.

4G CLINICAL

Bringing crucial medicines to those who need them, *faster.*

Biography

Jonathan
Director of Product Strategy

As Director, Product Growth and Market Strategy at 4G Clinical, Jonathan drives sales and product growth within the Randomization and Trial Supply Management (RTSM) market. His proven track record is built on extensive operational and sales leadership across the clinical trials ecosystem, specifically in Medical Devices, Biostatistics, and Contract Research Organizations (CROs). His data-driven strategies are instrumental in identifying market opportunities and advancing innovative medical solutions.

Maxime
Director of Software Engineering

Maxime, currently Senior Director of Software Engineering at 4G Clinical, has over seventeen years of experience delivering software solutions across multiple industries. His career spans roles in design, development, and testing across diverse architectures and platforms, fostering broad and adaptable technical expertise. For the past ten years, he has been leading the design and development of multi-tier web architectures at 4G Clinical.

Learn More About Our Purpose at 4GClinical.com

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