TISSIUM

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TECHNOLOGY & PARTNERSHIP OVERVIEW

Programmable Biomaterial 3D Printing Platform for Next-Generation Biomedical Devices

Enabling tunable device mechanics through integrated biomaterials, additive manufacturing, and specialized design.

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01 — EXECUTIVE OVERVIEW

A platform for implants engineered to **behave like tissue**

Advances in biomedical implant design are increasingly driven by the need to develop structures that can match the complex elastomeric mechanical behavior of human tissues and support tissue reconstruction while enabling minimally invasive delivery. Yet conventional manufacturing approaches limit the ability to engineer implants with tunable mechanical properties, controlled biodegradation, complex architectures, and adaptive functionality.

TISSIUM has developed a programmable, biocompatible and biodegradable 3D printing platform that fabricates implants with precisely controlled mechanical properties — already industrialized, and validated by a first FDA-authorized device, COAPTIUM® Connect, for atraumatic and sutureless peripheral nerve repair.

THREE CORE CAPABILITIES		COMBINED IN ONE INDUSTRIALIZED WORKFLOW
01	02	03
BIOMATERIAL	STRUCTURAL DESIGN	MANUFACTURING
Tunable biodegradable PGS-based elastomer	Architected geometries — lattice, auxetic, solid	High-resolution DLP additive manufacturing

By combining these capabilities, implant mechanics can be engineered across multiple levels — from material composition to manufacturing parameters and structural architecture. The elastomeric nature of the material, combined with tunable properties, opens a broad range of opportunities: implants that must endure repeated physiological stresses while supporting tissue remodeling, and deployable implants for minimally invasive procedures that must perform reliably in situ. COAPTIUM Connect and a proof-of-concept deployable stent are early examples of this breadth and demonstrate the platform's readiness to translate from research into commercially viable implants.

PLATFORM OVERVIEW

From three capabilities to **device families**

A tunable elastomeric biomaterial, high-resolution DLP additive manufacturing, and architected structural design converge in a single workflow — enabling distinct families of implants from one industrialized platform.

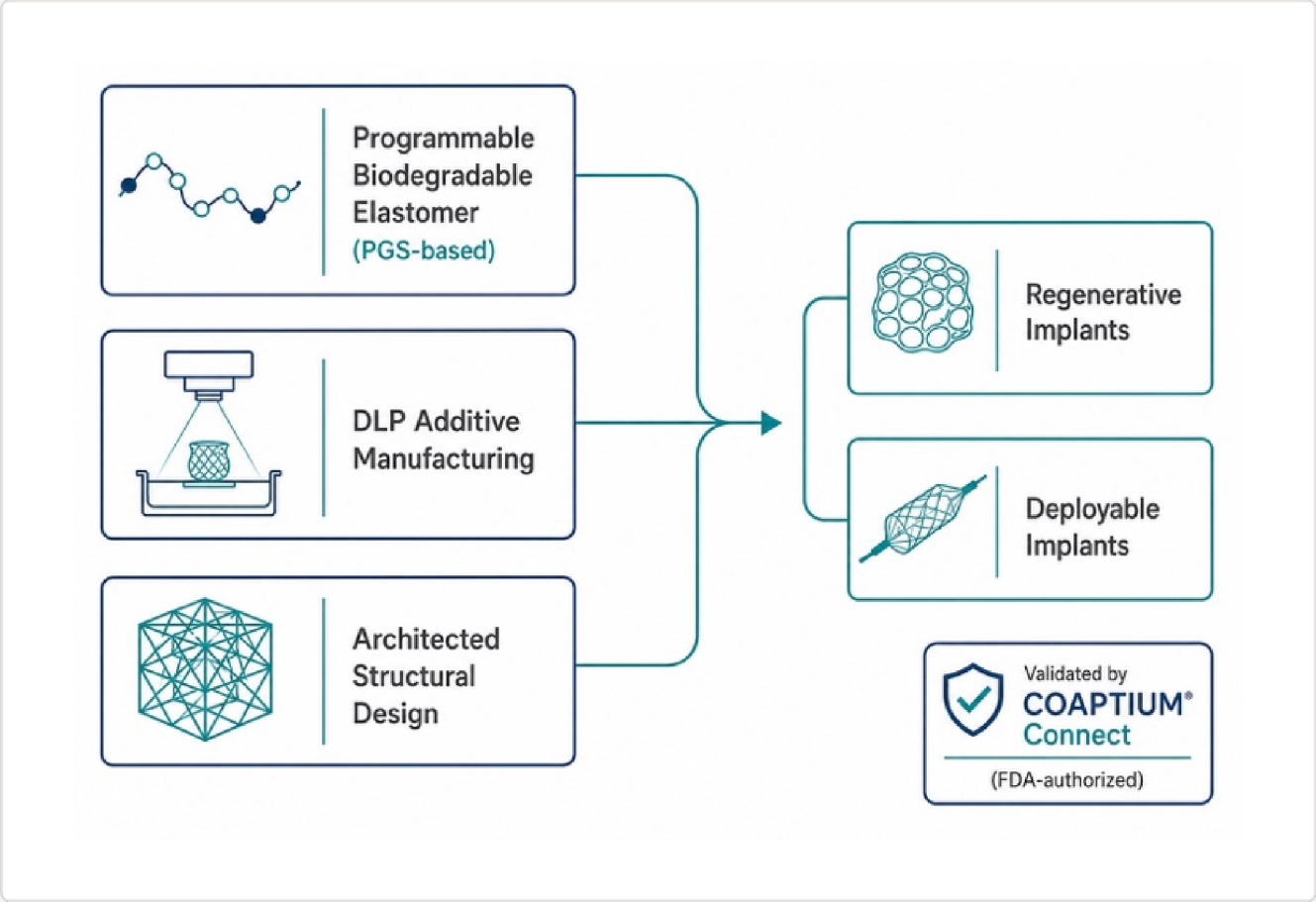


Figure 1 Three integrated capabilities enabling different device families — validated through a first FDA-authorized product, COAPTIUM® Connect.

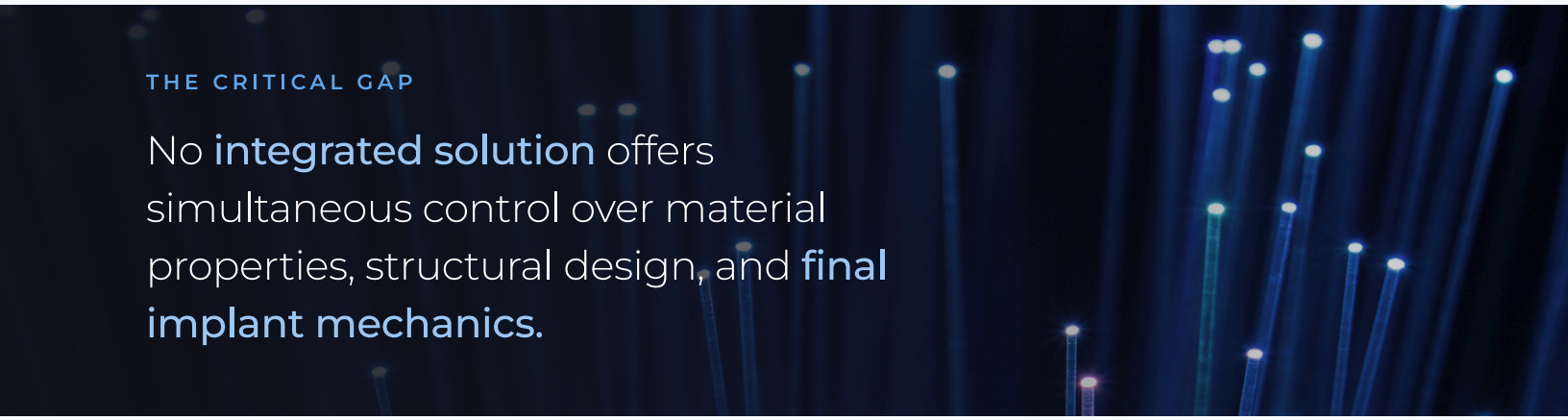
02 — INDUSTRY CHALLENGE

Conventional manufacturing forces a **compromise**

The development of next-generation biomedical implants increasingly requires precise control over mechanical behavior to achieve optimal clinical performance. Applications such as soft-tissue repair, minimally invasive implants, and regenerative scaffolds demand materials and structures that can deform, recover, biodegrade, and adapt under diverse physiological conditions.

Conventional manufacturing and standard 3D printing methods alike impose fundamental limitations on material selection and structural complexity. These approaches typically produce devices with uniform mechanical behavior, or with direction-dependent mechanical weaknesses — making them ill-suited for the spatially varied, micron-scale geometries, such as graded lattices or auxetic architectures, required for advanced physiological integration. Consequently, device designers are often forced to compromise between manufacturability and clinical performance.

Applications for tissue reconstruction require compliant, elastomeric implants with mechanical properties adapted to the target tissue environment, so they can withstand repeated physiological loading while guiding tissue remodeling. In parallel, there is growing demand for minimally invasive implants whose elastomeric behavior allows them to be delivered in a compact form and expand or adapt in situ. In both cases the common need is the same: a compliant, elastomeric material whose properties can be tailored to the biological environment and delivery pathway.



THE CRITICAL GAP

No **integrated solution** offers simultaneous control over material properties, structural design, and **final implant mechanics.**

03 — TECHNOLOGY PLATFORM

A unified **biomaterial** platform

To address these limitations, TISSIUM has developed a programmable, biodegradable biomaterial platform that integrates material design, additive manufacturing, and structural engineering into a unified approach for implant fabrication. The platform is industrialized and has already produced COAPTIUM® Connect — an FDA-authorized device for atraumatic and sutureless peripheral nerve repair — demonstrating that the approach translates from concept into a manufactured, regulatory-authorized product.

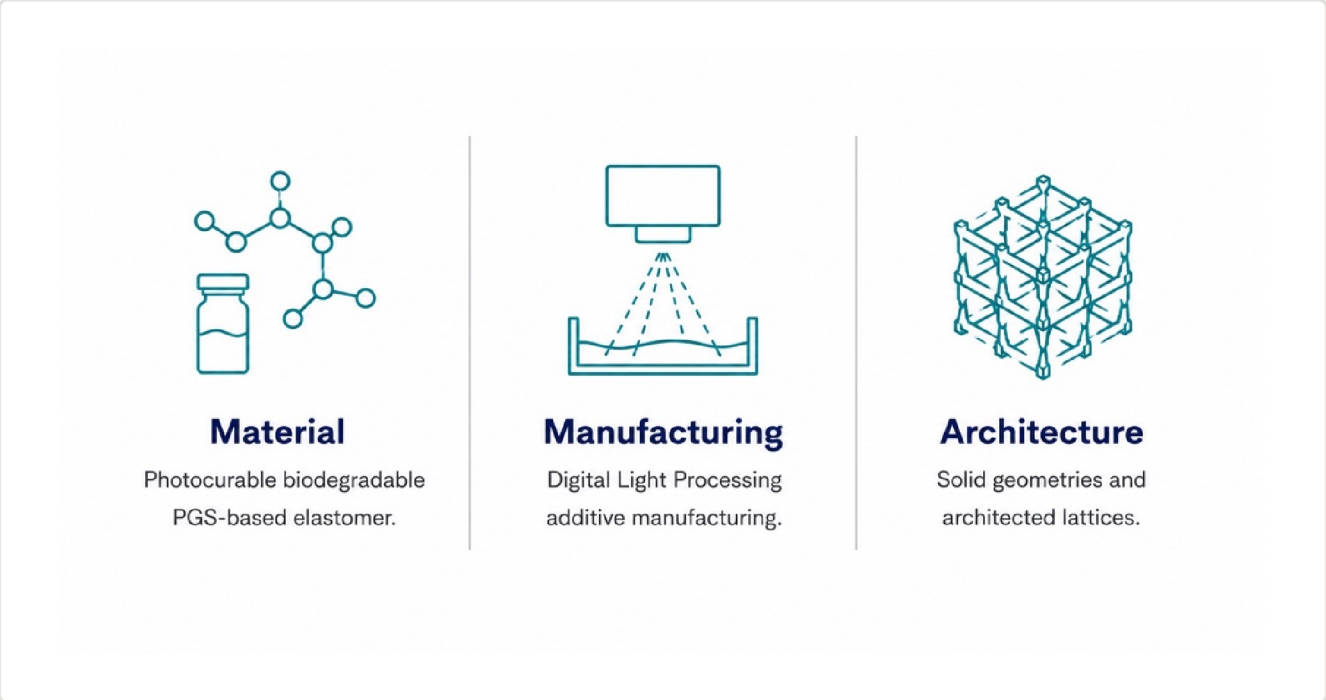


Figure 2 Material, manufacturing, and architecture — the three building blocks of TISSIUM's programmable platform.

At the material level, the platform uses a photocurable, biodegradable elastomer derived from poly(glycerol sebacate) (PGS) — a biocompatible polymer whose core building blocks, glycerol and sebacic acid, already exist in the body. Its elastomeric character is a key differentiator versus conventional rigid or brittle polymers: it recovers repeatedly under physiological loading, making it suitable for soft-tissue applications. The material can be tuned through polymer composition and architecture to provide a range of mechanical behaviors and biodegradation profiles.

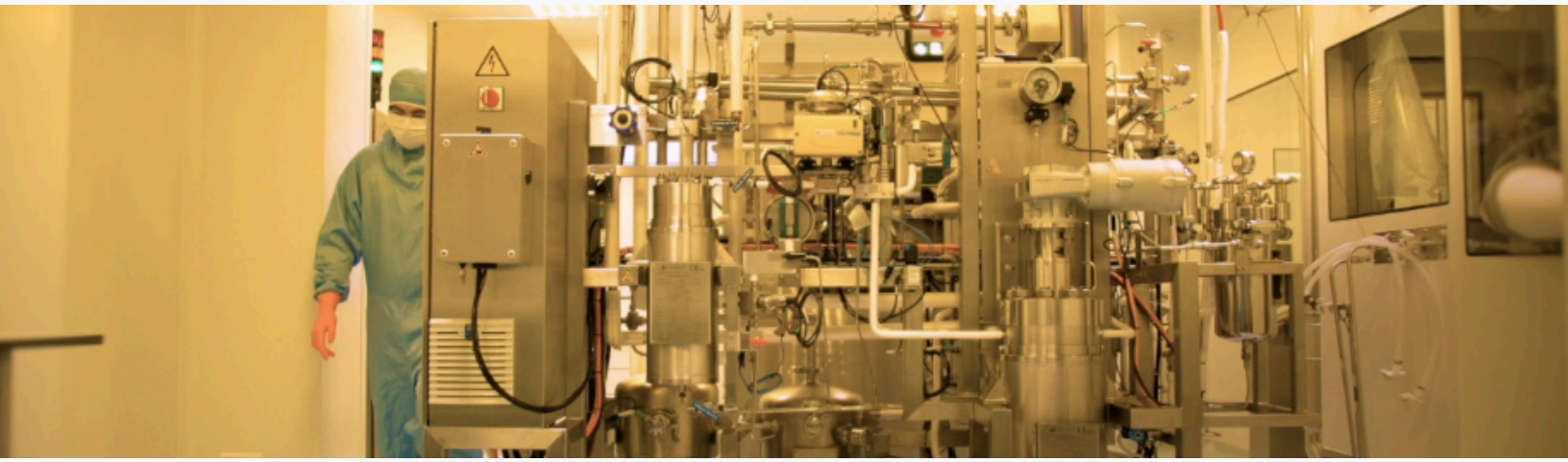


Figure 3 TISSIUM's own manufacturing facility in Roncq, France, where platform capabilities translate into commercial products.

Fabrication is achieved using digital light processing (DLP) additive manufacturing, which enables high-resolution, layer-by-layer construction of complex structures. This provides precise control over geometry and curing conditions, enabling structures that are difficult to achieve using conventional methods.

The platform integrates these capabilities with architected structural design. Architectures range from solid, conformable implant geometries — as used in COAPTIUM Connect — to lattice, auxetic, and other 3D-printed structures, selected to match the needs of the clinical application rather than a single structural motif.

AN INDUSTRIALIZED, VALIDATED PLATFORM

1st	143	27	3
FDA DE NOVO AUTHORIZATION	PATENTS GRANTED	PATENT FAMILIES FILED	CLINICAL STUDIES COMPLETED

04 — CORE CAPABILITIES

Programmable properties through **multi-level control**

A key differentiator of the platform is precise control over implant mechanics through multiple interconnected design parameters. Rather than relying on a single material or structural approach, mechanical and biodegradation properties are engineered through the combined influence of polymer composition, manufacturing parameters, and structural architecture.

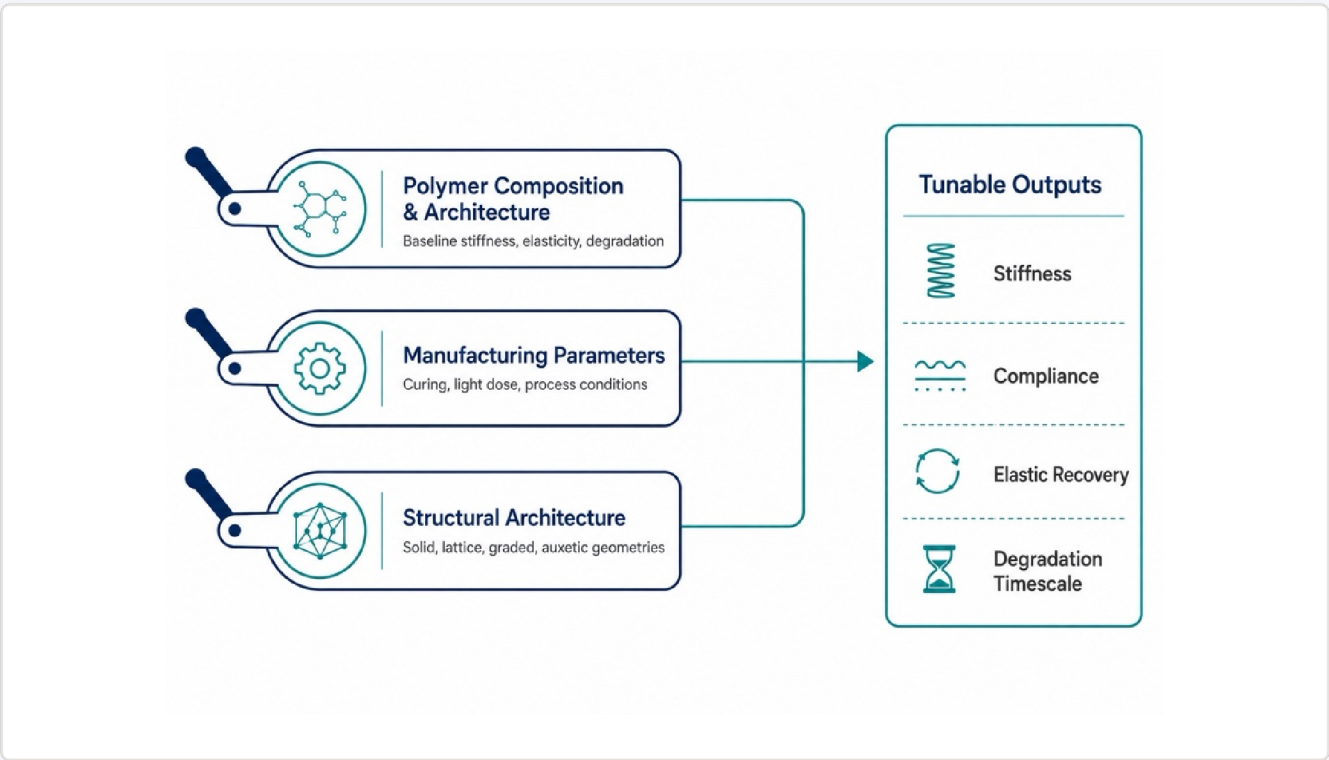


Figure 4 Three interconnected levers enabling precise, programmable control over implant mechanical properties.

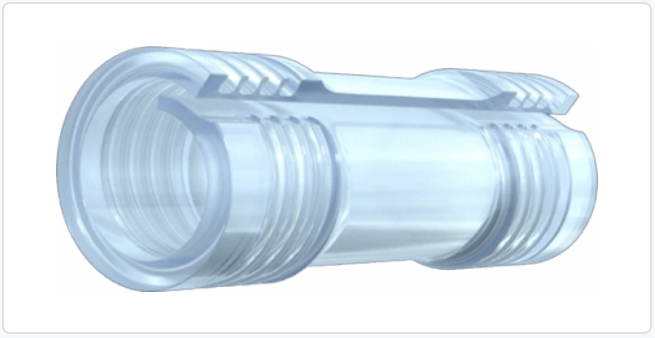
Material design provides baseline control over stiffness and elasticity; manufacturing parameters allow fine-tuning during fabrication; and structural architecture engineers mechanical behavior through geometry. Together, these three levels enable implants with programmable mechanical properties tailored to specific applications — spanning regenerative implants, soft-tissue reconstruction, and minimally invasive delivery.

05 — PLATFORM IN PRACTICE

From FDA-authorized device to **new concepts**

COAPTIUM® Connect is the first commercial and industrial expression of the platform — an FDA-authorized implant built from the same programmable, biodegradable elastomeric polymer and manufactured in TISSIUM's own facilities.

Figure 5 COAPTIUM® Connect — the platform's first FDA-authorized, commercially available product.



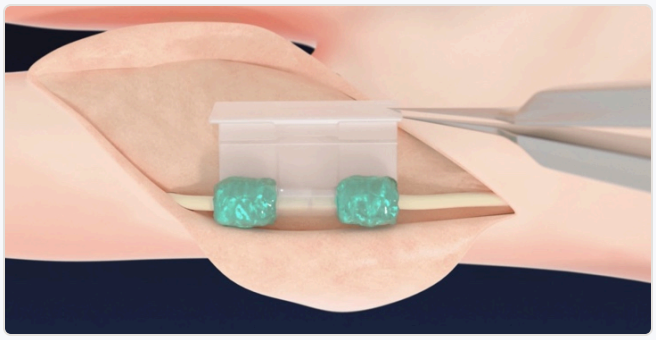


Figure 6 COAPTIUM® Connect in practice: from the 3DP-manufactured coaptation chamber (left) to a completed atraumatic, sutureless peripheral nerve repair (right).

05 — PLATFORM IN PRACTICE / CONTINUED

Extending to **new applications**

To illustrate how the same platform can address a very different application, a proof-of-concept deployable stent was developed using elastomeric biomaterials and architected lattice structures. The device incorporates auxetic geometry, enabling controlled deformation and expansion — one illustrative example rather than the only configuration the platform supports.

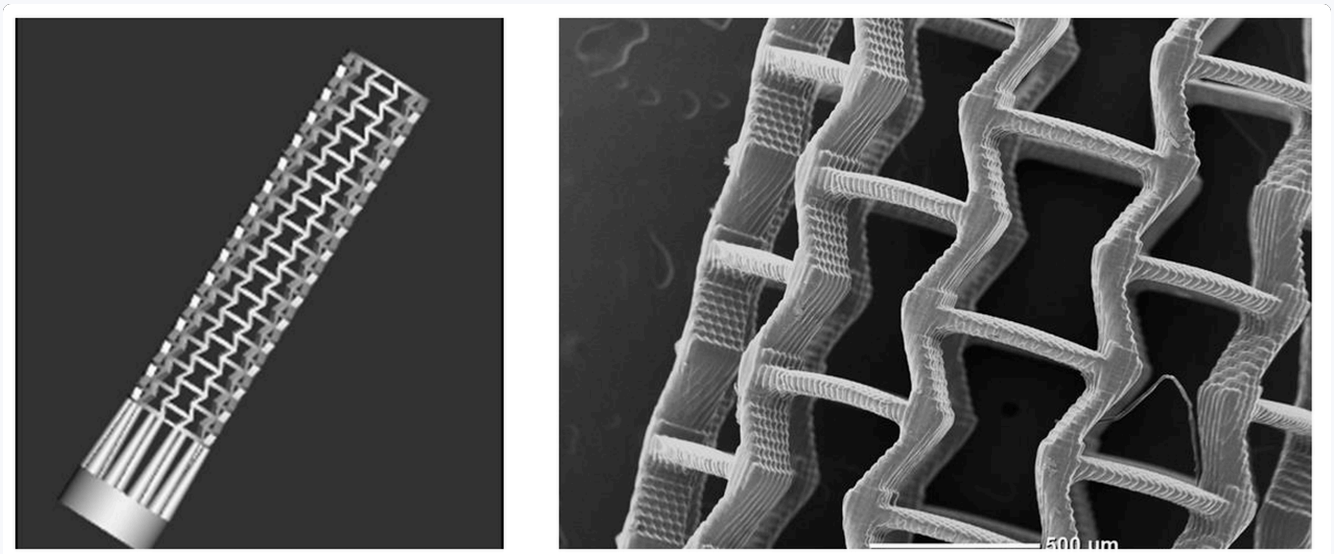


Figure 7 Proof-of-concept deployable stent fabricated on the TISSIUM 3DP platform (left), and a scanning-electron-microscopy image showing auxetic lattice geometry and DLP manufacturing precision (right).

This architecture lets the device be compressed into a compact form for delivery and expand upon deployment, supporting minimally invasive procedures. Beyond this example, the platform supports a wide range of geometries — from solid, conformable structures to architected designs with graded mechanical properties — enabling spatial control of stiffness, compliance, and deformation.

The proof-of-concept deployable stent described herein is a research device and is not approved or cleared by the U.S. FDA. COAPTIUM® Connect is FDA-authorized for sutureless peripheral nerve repair.

06 — DEVICE OPPORTUNITIES

Opportunities across **therapeutic areas**

The programmable biomaterial platform enables a broad range of biomedical implants that require tailored mechanical properties and complex structural architectures.

Key opportunity areas include — but are not limited to — regenerative implants that must withstand repeated physiological loading, soft-tissue implants with tissue-matched compliance, deployable implants for minimally invasive procedures, and implants requiring tailored biodegradation, demonstrating the platform's relevance across multiple therapeutic areas.

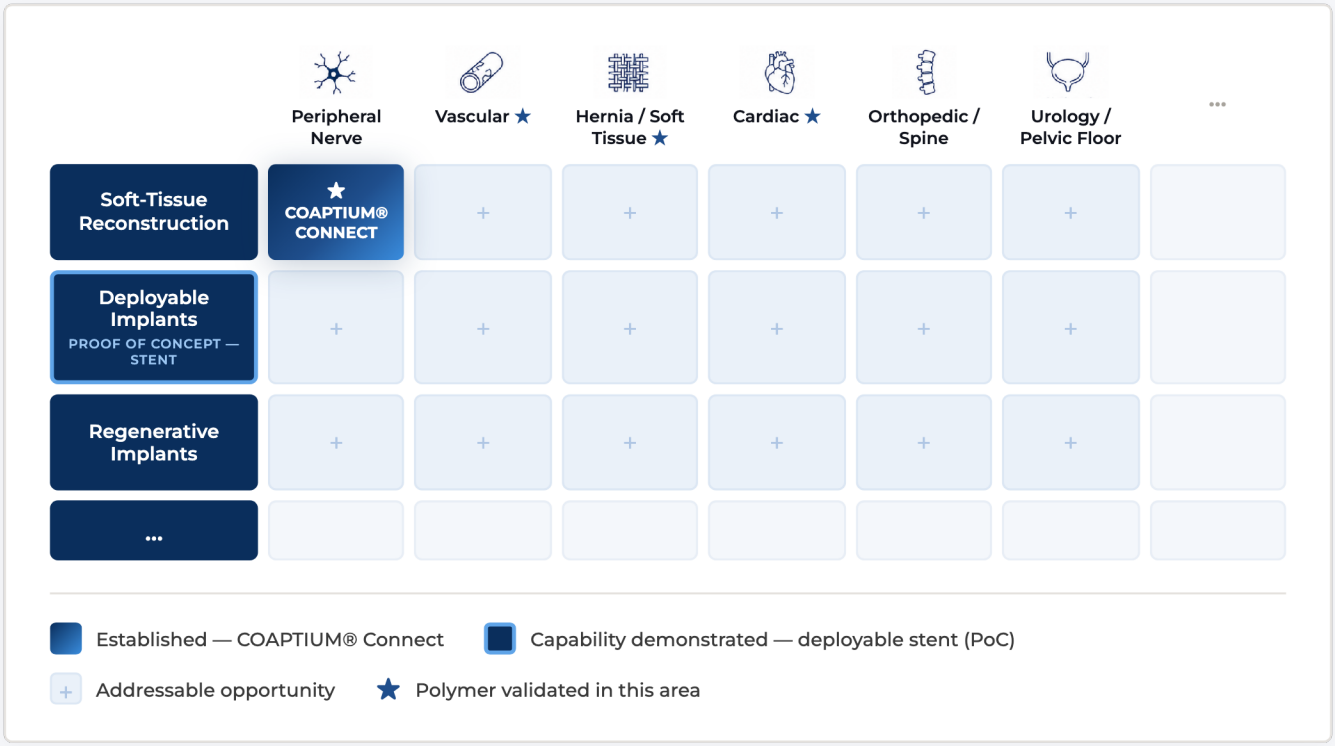


Figure 8 Platform opportunities spanning multiple device categories and therapeutic areas, anchored by an established commercial product. Areas and device archetypes are illustrative — the platform is not limited to these applications.

06 — PARTNERSHIP POTENTIAL

Built for **partnership**

TISSIUM's platform is designed to support collaboration with medical device companies developing innovative products enabled by programmable biomaterials and advanced manufacturing — helping partners accelerate development while leveraging the full capabilities of the platform. The technology is protected by a broad patent estate of 143 granted patents across 27 families, supporting a defensible foundation for jointly developed products.

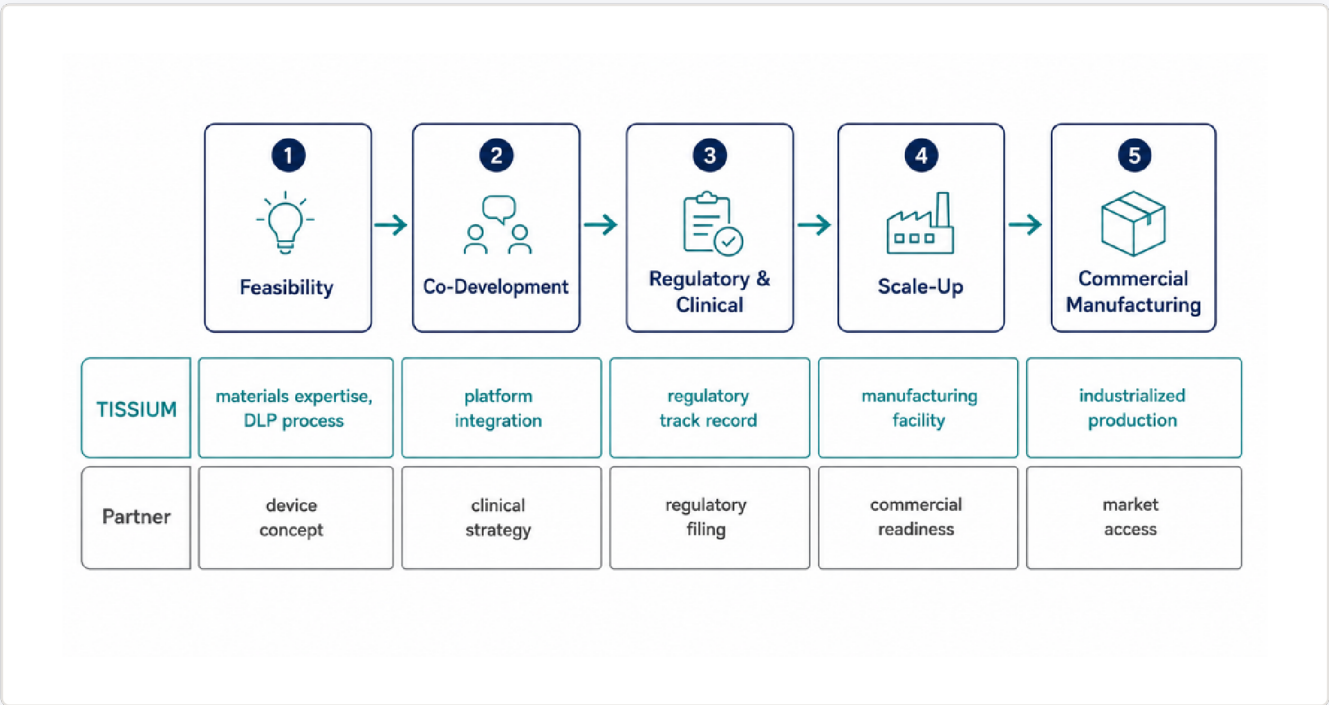


Figure 9 TISSIUM's industrialized, diverse, and proven platform supports partnership from feasibility through commercial manufacturing.
COAPTIUM® Connect, a 3D-printed device built on this platform, has received FDA authorization to date.

IN CONCLUSION

A new approach to **implant engineering**

The integration of programmable, biodegradable, elastomeric biomaterials, additive manufacturing, and intentionally architected structural design enables a new approach to biomedical implant engineering — already validated by a first FDA-authorized device, COAPTIUM® Connect, and extensible to a range of new implant concepts.

By providing precise control over mechanical properties across multiple levels, the platform supports the development of implants tailored to specific clinical and performance requirements — opening new opportunities in regenerative implants, soft-tissue reconstruction, and minimally invasive delivery.

TISSIUM welcomes **collaboration** with partners advancing the next generation of biomedical technologies.

PARTNER WITH US

To explore next steps, contact our partnerships team.

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