Surgical World models From Perception to Agency

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Erez Lampert - CEO of PathKeeper Surgical

The Cognitive AI Layer

Bridging the gap between perception and autonomous surgical actions

The Cognitive AI Layer is essential for enhancing surgical performance. By integrating perception with decision-making, it allows for more informed actions in real time. This layer enables surgical systems to transition from merely reacting to their environment to actively engaging with it, significantly improving patient outcomes.

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The AGI Bottleneck

Intelligence vs. Agency

AI lacks real-world consequences without physical interaction.

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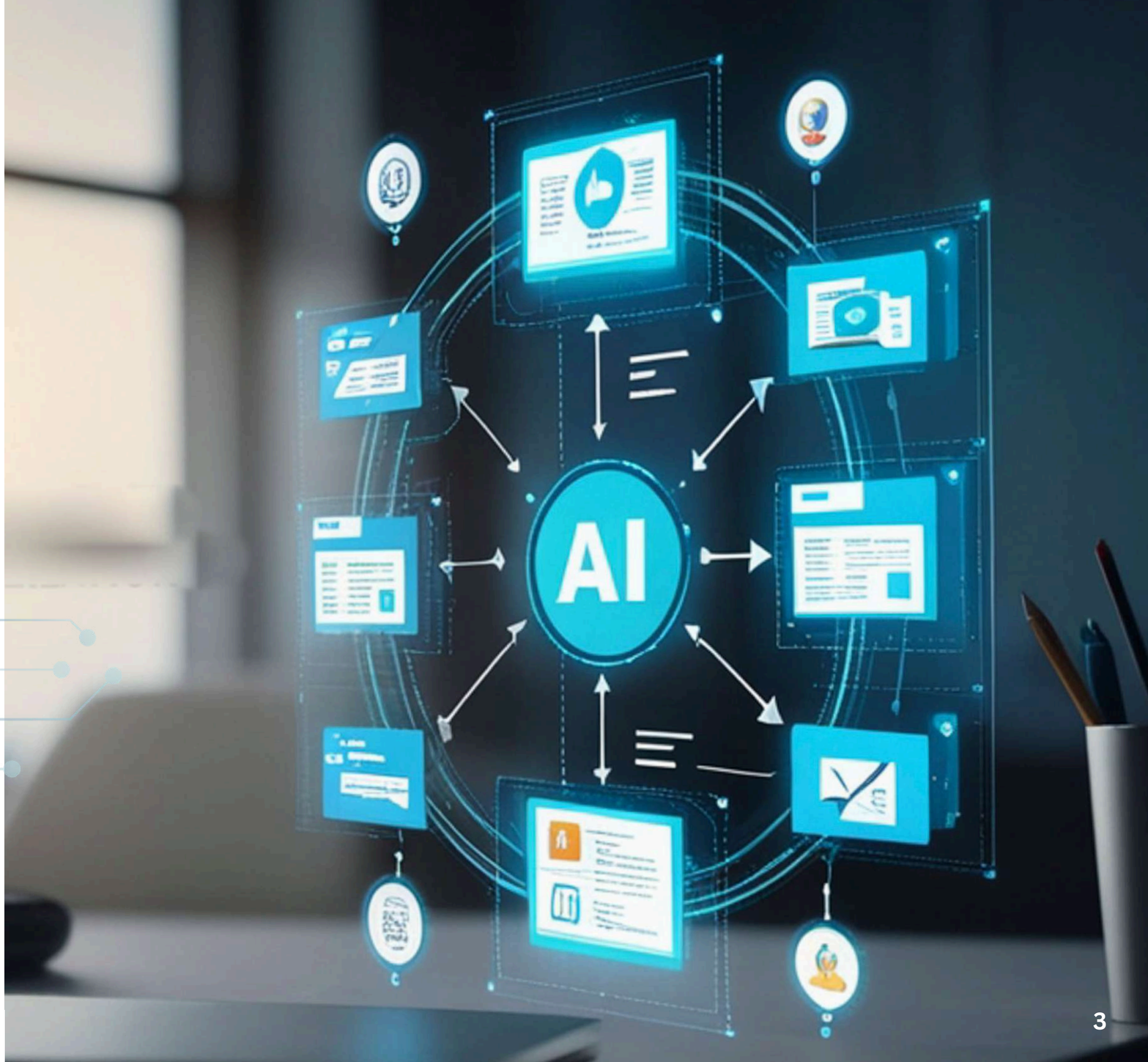
Definition of Physical AI

Closed loop

This architecture links perception, decisions, and actions seamlessly. By giving the AI agnecy, it can learns from real-life situations



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Why Autonomous Cars Matter

Real-world Testing

Autonmous car were imminent 5 years ago and they still are.

However, current solutions exposes AI systems to critical challenges and edge cases

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Lessons Learned from Autonomous Vehicles

Edge Cases and Regulatory

Real-world scenarios reveal critical system behavior challenges.

We have much lower risk tolerance for AI mistakes versus human mistakes

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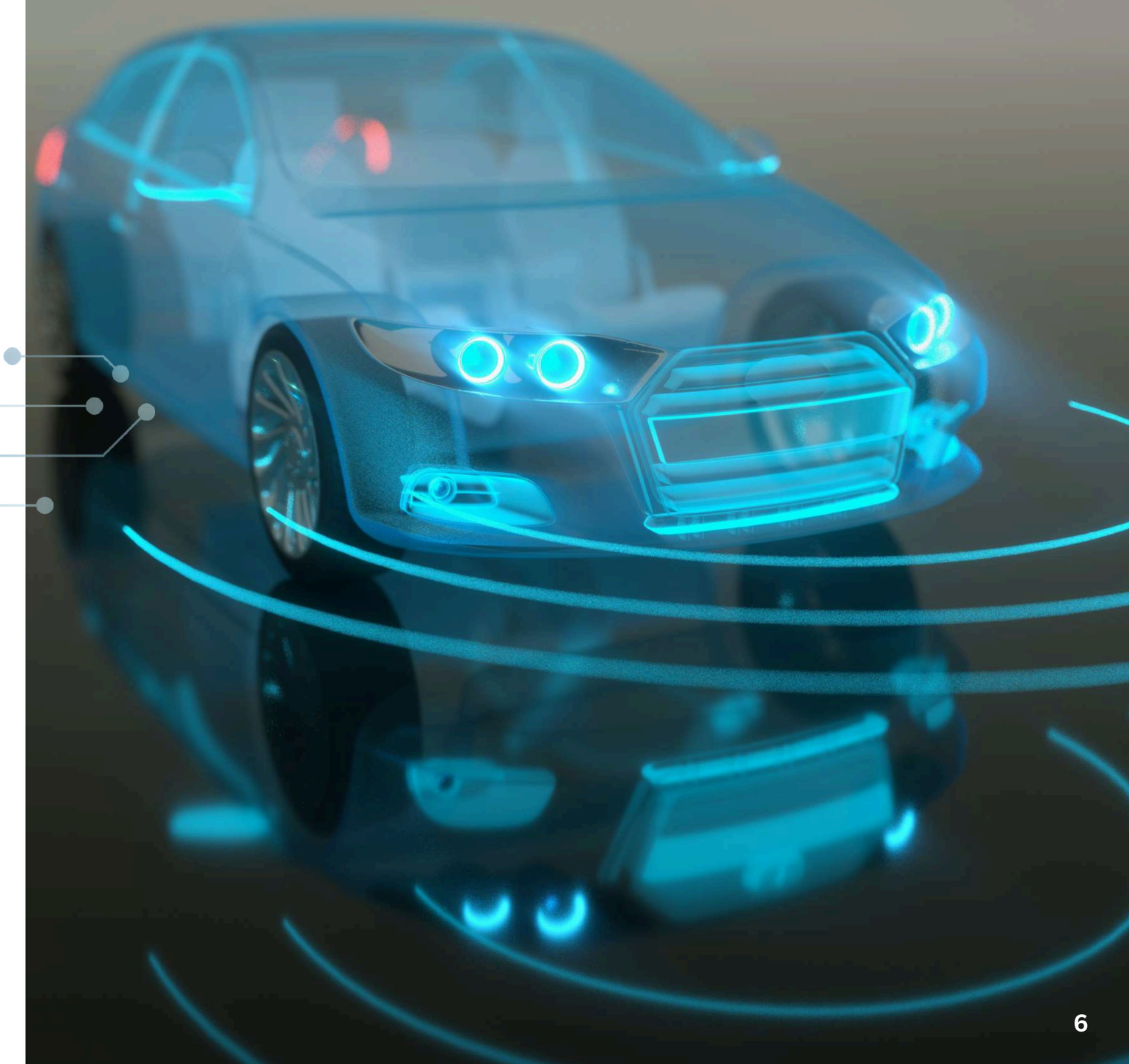
Cars vs Surgery: A Critical Comparison

Different level of complexity??

Both Driving and Surgery are high stakes operations.
But, humans find it much easier to drive than to perform surgery.
It’s not neccesarly the case for AI.



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Dynamic Changes in Surgical Anatomy

Live Anatomy

Surgery by defintion handles anomlies, edge cases.

Continuous changes in the anatomy require real-time understanding and adaptation.

The surgery has different stages, each requires different type of operation.

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Why Robotics Alone Fails

Amplified Errors

For many years, robotics was all about better mechanical arm.

That’s not enough!

Tobot’s Lack of understanding leads to increased surgical mistakes.

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The Missing Cognitive Layer

Understanding is Key

The next step in robotic surgery, toward a future of more autonmous robots lay in understanding!

Improved perception, following by understand is needed.

A cognitive layer is essential for developing autonomy.

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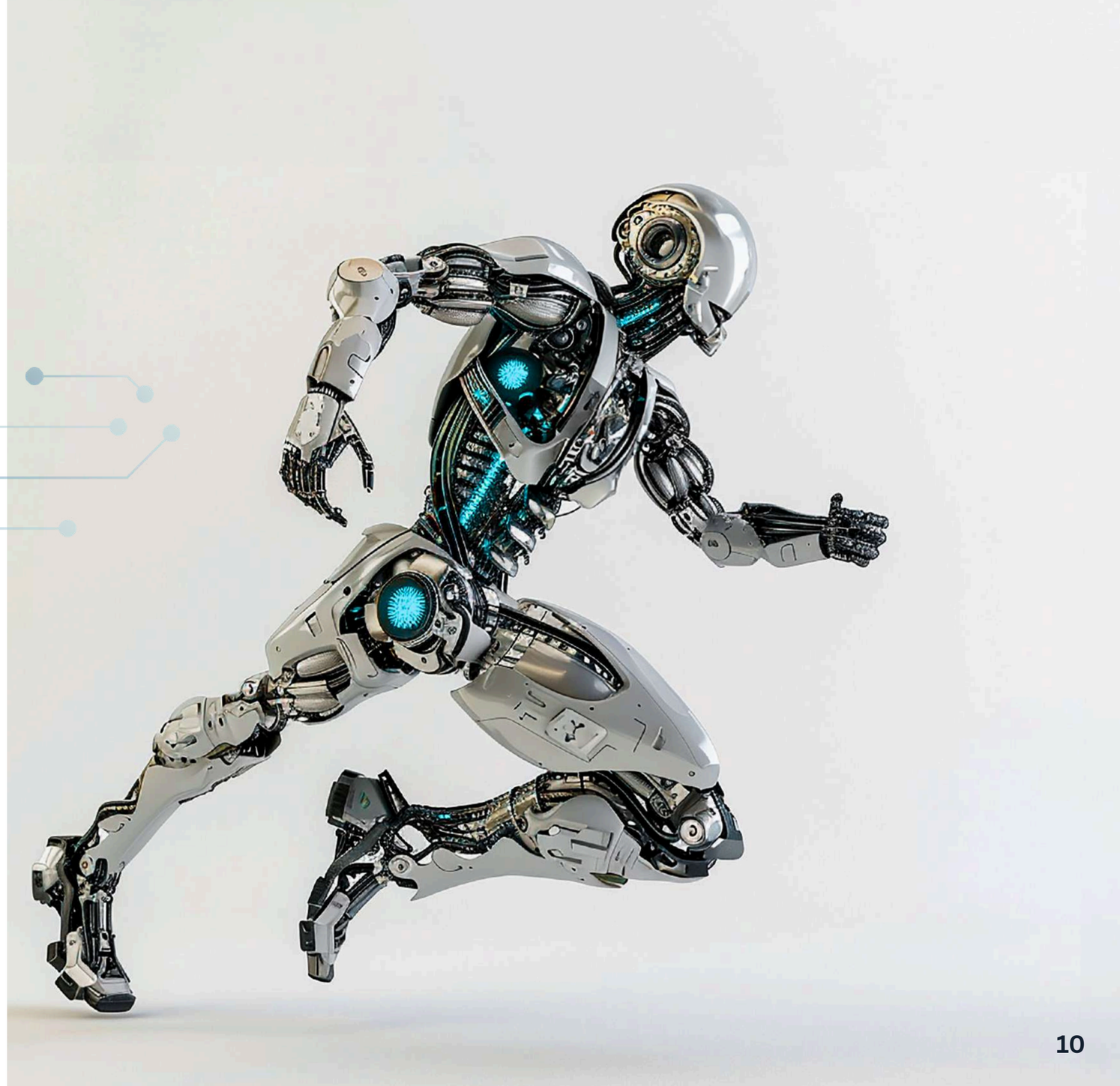
Incremental Steps Toward Surgical Autonomy

Situational Awareness

Different stages of surgery requires different measurment, feedback, alerts

Situational awareness enables predictive alerts to improve outcomes.



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What PathKeeper Delivers

Real-time Surgical Engine

How do you create a surgical world model and situiational awarness?

A real valuable product is key
Giving value to clinicians while learning
Ensures accurate anatomical understanding during surgical procedures.

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Anatomy First: Direct Tracking for Surgical Precision

Direct Tracking

Provides real-time anatomical awareness during surgical procedures.

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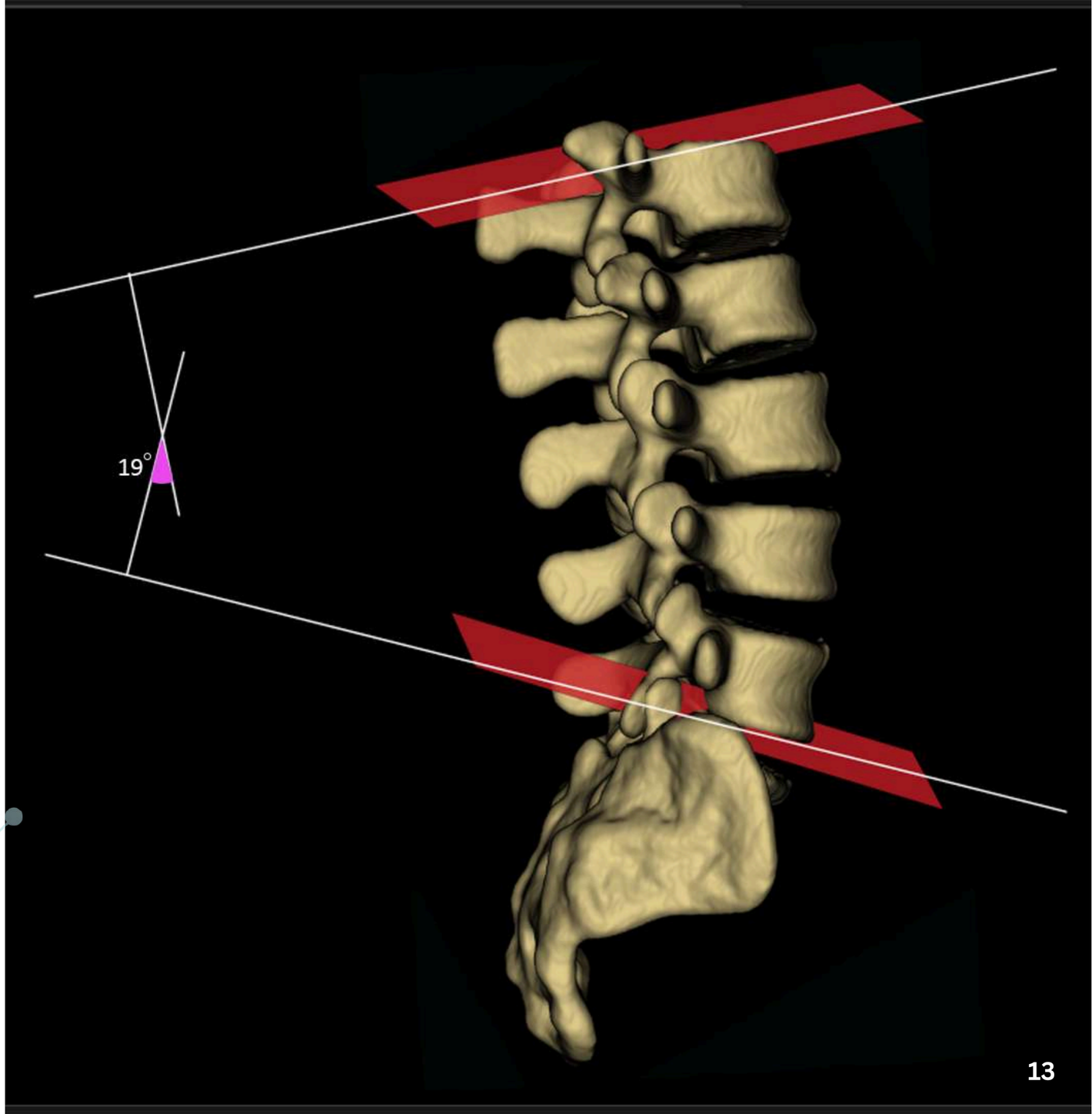
Maintaining Anatomical Alignment

Continuous Registration

This process ensures real-time alignment during procedures.



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The Future of Surgical Autonomy

Cognitive Infrastructure

Essential for safe surgical autonomy development and growth.

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Thank you

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