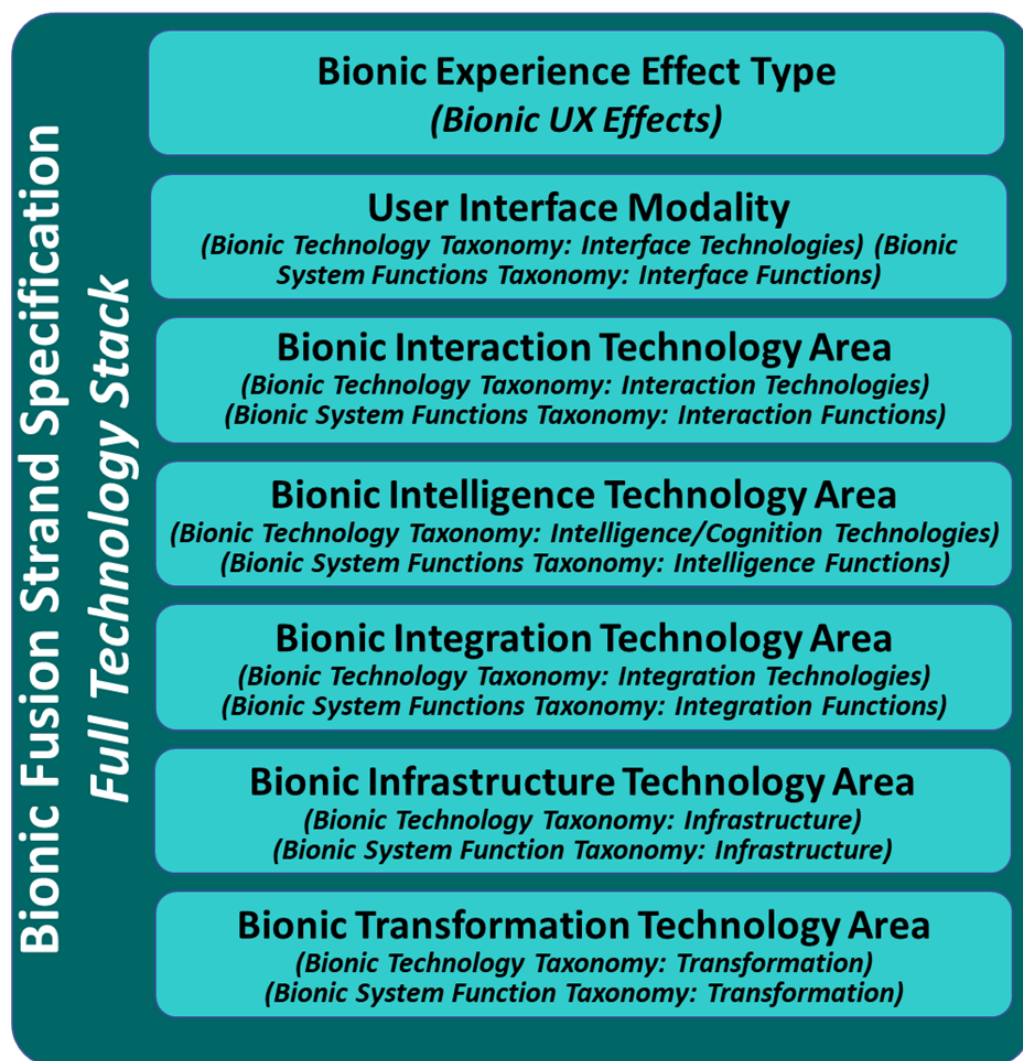
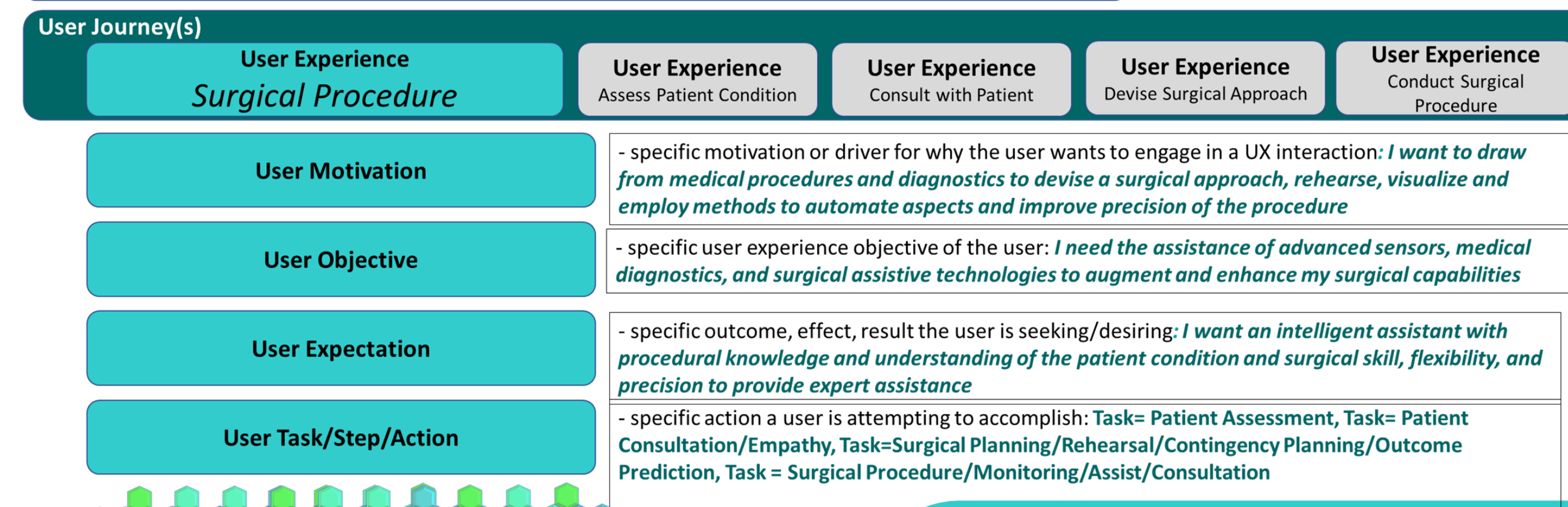




### Bionic Fusion Strand Design: Surgical Suite, User/Surgeon Interface, User/Surgeon Experience

## Bionic UX Design with Fusion Strands

**Value Stream:** Patient care from assessment through consultation, planning, rehearsal, preparation, and surgical procedure execution



### Surgical Fusion Strand Narrative

In this use case, we will explore how bionic effects, enhanced by various AI/ML capabilities, can improve the capabilities and outcomes of surgical procedures. These technologies will assist the surgical team in providing better patient care, enhancing decision-making, and optimizing surgical procedures. In the context of surgery, the integration of various AI/ML capabilities and methods enhances the surgical team's decision-making, precision, and efficiency. These technologies contribute to a safer and more effective surgery, ultimately improving patient outcomes and the overall quality of care.

User Persona Model



Bionic Surgical Suite

Bionic Effects	
<b>Capability Area 1: Immersion: Interface</b> Description: Using augmented reality (AR) to immerse the surgical team in a simulated environment to plan and practice the surgery. Bloom's Taxonomy Level: Comprehension Verbs: Interacting, Immersing AI/ML Capabilities: Predictive modeling (descriptive and prescriptive), Computer Vision (prescriptive) AI/ML Methods: Image Segmentation (computer vision), Simulated Procedural Planning (predictive modeling)	<b>Capability Area 2: Collaborating: Intelligence</b> Description: Enabling collaborative decision-making among the surgical team using multi-agent systems. Bloom's Taxonomy Level: Application Verbs: Brainstorming, Innovating, Ideating, Working AI/ML Capabilities: Multi-Agent Systems (prescriptive) AI/ML Methods: Collaborative Filtering (multi-agent system)
<b>Capability Area 1: Partial Task Automation (mechanical, digital/cognitive): Interface</b> Description: Using robotic-assisted tools for precise, repetitive tasks during surgery. Bloom's Taxonomy Level: Application Verbs: Automating, Sensing, Monitoring, Reacting AI/ML Capabilities: Robotic Automation (prescriptive) AI/ML Methods: Robotic Control Algorithms (robotic automation)	<b>Capability Area 2: Informational: Decision Support: Intelligence</b> Description: Providing real-time data analytics to support surgical decisions and optimize procedural steps. Bloom's Taxonomy Level: Knowledge Verbs: Providing, Supporting, Recommending AI/ML Capabilities: Data Analytics (descriptive), Recommender Systems (prescriptive) AI/ML Methods: Data Clustering (data analytic), Collaborative Filtering (recommender system)
<b>Capability Area 1: Task Precision: Interface</b> Description: Enhancing precision by utilizing AI-guided robotic instruments for delicate surgical maneuvers. Bloom's Taxonomy Level: Application Verbs: Achieving, Ensuring, Improving AI/ML Capabilities: Robotic Precision (prescriptive) AI/ML Methods: Robotic Control Algorithms (robotic precision)	<b>Capability Area 2: Task Acceleration: Intelligence</b> Description: Predicting surgical steps in real-time to accelerate the procedure while ensuring accuracy. Bloom's Taxonomy Level: Application Verbs: Accelerating, Speeding Up AI/ML Capabilities: Predictive Modeling (prescriptive) AI/ML Methods: Time Series Forecasting (predictive modeling)
<b>Capability Area 1: Empathizing: Interface</b> Description: Utilizing emotion AI to understand the patient's emotional state during surgery and provide appropriate responses. Bloom's Taxonomy Level: Comprehension Verbs: Understanding, Recognizing, Classifying AI/ML Capabilities: Emotion Recognition (descriptive), Natural Language Processing (prescriptive) AI/ML Methods: Facial Expression Analysis (emotion recognition), Sentiment Analysis (NLP)	<b>Capability Area 2: Task Accuracy: Intelligence</b> Description: Applying machine learning to interpret intraoperative data and assist in accurate decisions. Bloom's Taxonomy Level: Application Verbs: Improving, Enhancing, Achieving AI/ML Capabilities: Machine Learning for Data Interpretation (predictive and prescriptive) AI/ML Methods: Classification (data interpretation), Decision Trees (prescriptive)
<b>Capability Area 1: Empathic Response: Interface</b> Description: Customizing anesthesia levels and surgical actions based on patient's real-time physiological responses. Bloom's Taxonomy Level: Synthesis Verbs: Simulating, Incorporating, Approximating AI/ML Capabilities: Physiological Response Analysis (descriptive), Adaptive Control (prescriptive) AI/ML Methods: Signal Processing (physiological response analysis), Adaptive Control Algorithms (prescriptive)	<b>Capability Area 2: Task Augmentation: Intelligence</b> Description: Augmenting surgical decision-making by integrating AI-generated insights based on patient data. Bloom's Taxonomy Level: Synthesis Verbs: Augmenting, Combining, Expanding AI/ML Capabilities: Augmented Intelligence (prescriptive) AI/ML Methods: Knowledge Graphs (augmented intelligence), Neural Networks (prescriptive)
<b>Capability Area 1: Physical Enhancement: Interface</b> Description: Enhancing surgical instruments with haptic feedback to provide surgeons with a sense of touch. Bloom's Taxonomy Level: Application Verbs: Enhancing, Strengthening, Improving AI/ML Capabilities: Haptic Feedback (prescriptive) AI/ML Methods: Feedback Control Systems (haptic feedback)	<b>Capability Area 2: Task Elasticity and Scalability: Intelligence</b> Description: Adapting surgical plans based on real-time physiological changes and patient responses. Bloom's Taxonomy Level: Synthesis Verbs: Scaling, Adapting, Expanding AI/ML Capabilities: Adaptive Systems (prescriptive) AI/ML Methods: Adaptive Control (adaptive systems)
<b>Capability Area 1: Sensory Augmentation: Interface</b> Description: Augmenting surgeons' senses with AI-powered augmented reality displays for enhanced visualization. Bloom's Taxonomy Level: Application Verbs: Augmenting, Enhancing, Sensing AI/ML Capabilities: Augmented Reality (prescriptive) AI/ML Methods: Image Processing (augmented reality)	<b>Capability Area 3: Full Task Automation and Autonomous Operation: Integration</b> Description: Employing autonomous robotic systems for specific surgical tasks, reducing human intervention. Bloom's Taxonomy Level: Synthesis Verbs: Automating, Replacing, Operating AI/ML Capabilities: Autonomous Systems (prescriptive) AI/ML Methods: Path Planning Algorithms (autonomous systems)
<b>Capability Area 2: Mentoring: Intelligence</b> Description: Providing real-time guidance and advice to the surgical team using expert systems and knowledge bases. Bloom's Taxonomy Level: Application Verbs: Educating, Providing, Advising AI/ML Capabilities: Expert Systems (descriptive and prescriptive), Reinforcement Learning (prescriptive) AI/ML Methods: Rule-Based Inference (expert systems), Adaptive Decision-Making (reinforcement learning)	

### Bionic UX Effects

- Mentoring
- Collaboration
- Empathizing
- Partial Task Automation
- Task Acceleration
- Immersion (UX/VR/AR)
- Task Augmentation
- Task Elasticity & Scalability
- Task Autonomy
- Task Precision
- Task Accuracy
- Decision Support