

Background

- As with all microsurgical procedures, DIEP (deep inferior epigastric artery perforator) flaps have **steep learning curves**.
 - As novice surgeons → experts, re-exploration rates and OR times ↓
- What cognitive + technical processes differ between novice and expert?
- Cognitive Task Analysis (CTA) deconstructs procedures → discrete tasks and makes *explicit* the *implicit* behaviors + cognitive processes of experts.

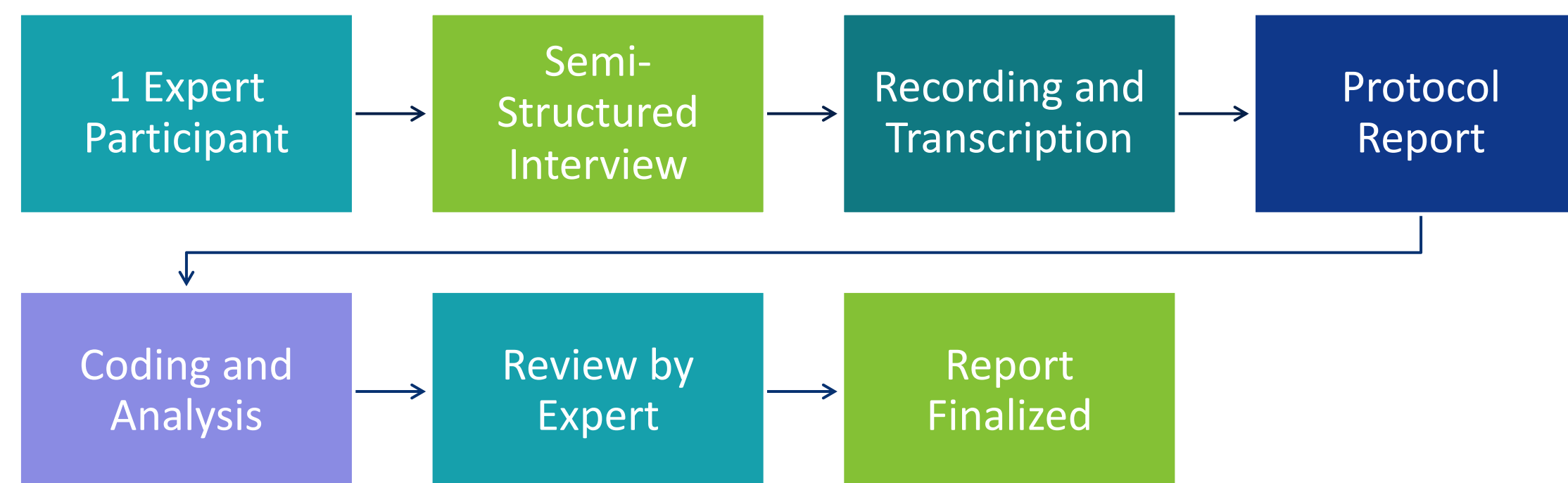
Aims

To combat the learning curve for DIEP flaps through CTA by:

- Defining the tasks, decisions, and potential errors in a DIEP flap.
- Unveiling the expert cognitive behaviors required for success.

Methods

- Cognitive Task Analysis



- Preliminary coding + analysis based on cognitive behavior framework by Grover for Roux-en-Y gastric bypass (Grover et. al., Surg Endoscopy, 2023)

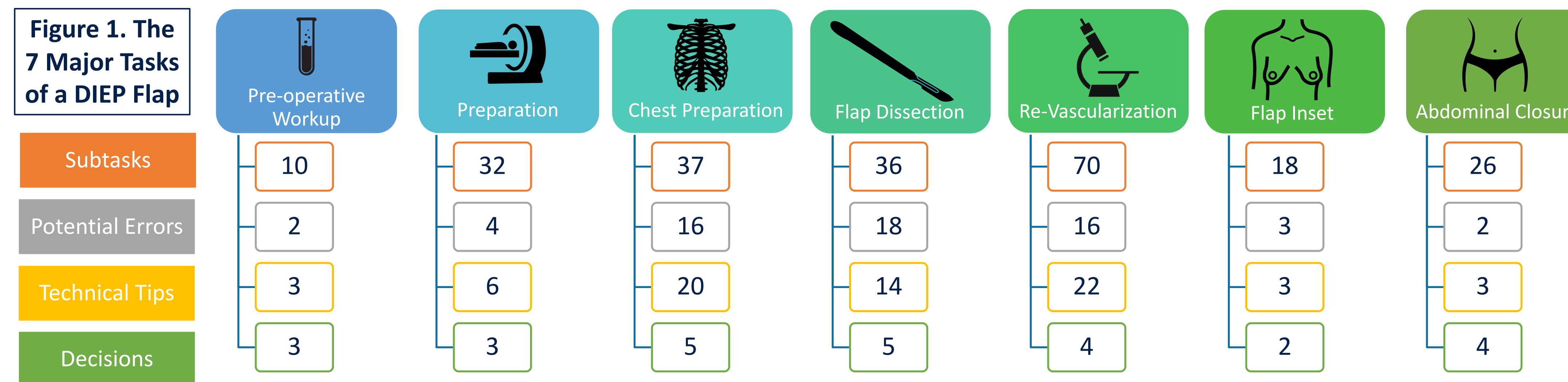
Results

Expert Characteristics

- Microsurgery fellowship-trained
- Works in high volume breast cancer center
- Performed > 400 DIEP flaps

Results – Major Tasks and Subtasks

- 7 major tasks identified for a DIEP flap → subtasks, potential errors, technical tips and decisions (Figure 1) → master protocol.



Potential Errors - example

“[In] some women you'll find that their [vessels] are very sensitive, meaning that they are fragile, like if you lift up... suddenly, I just caused this little bleed from my retraction...so then you know that you can no longer pull as much. You have to be able to check that before you're getting to your [main] perforators. How fragile their vessels seem.”

Technical Tips- example

“And with the artery you can only grab the adventitia, while you grab all the way across [the vein]. So the way that you handle the vessels is very different. And you actually don't ever want to pinch a little bit of the vein. You can cause a rip in it. And you don't want to grab all the way across the artery because you can crush it.”

Results – Cognitive Behaviors

- Master protocol coded → modified framework of 10 behaviors (Fig 2., far right panel)

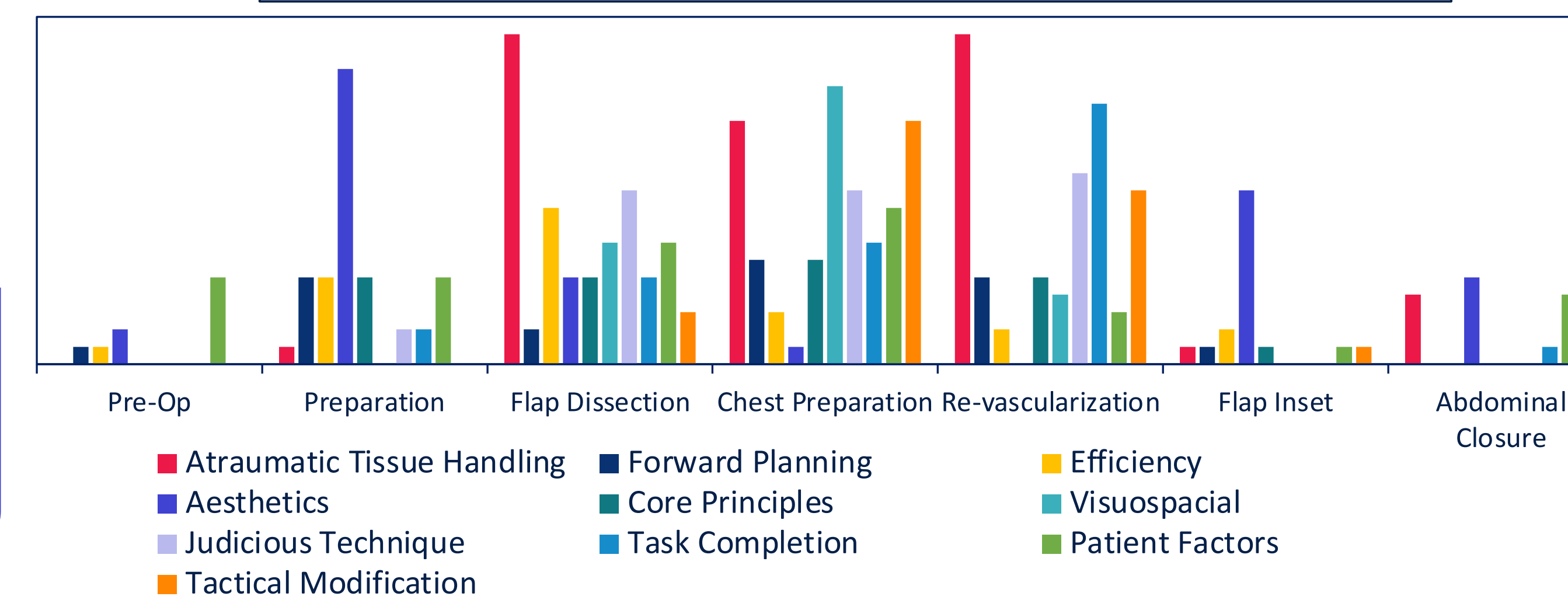
Operative Efficiency - example

“They just had way too much equipment...so we pared down the sets to [only] have the instruments that we use...trying to pay attention to what [the scrub technician] puts on the Mayo stand, because [it] is for the [tools] that should be readily available.”

Aesthetic Considerations - example

“Lately I've been trying to go to the fourth rib [for chest vessel dissection] because I think [it creates] a less noticeable defect...taking out that cartilaginous portion of the third rib can sometimes be visible later.”

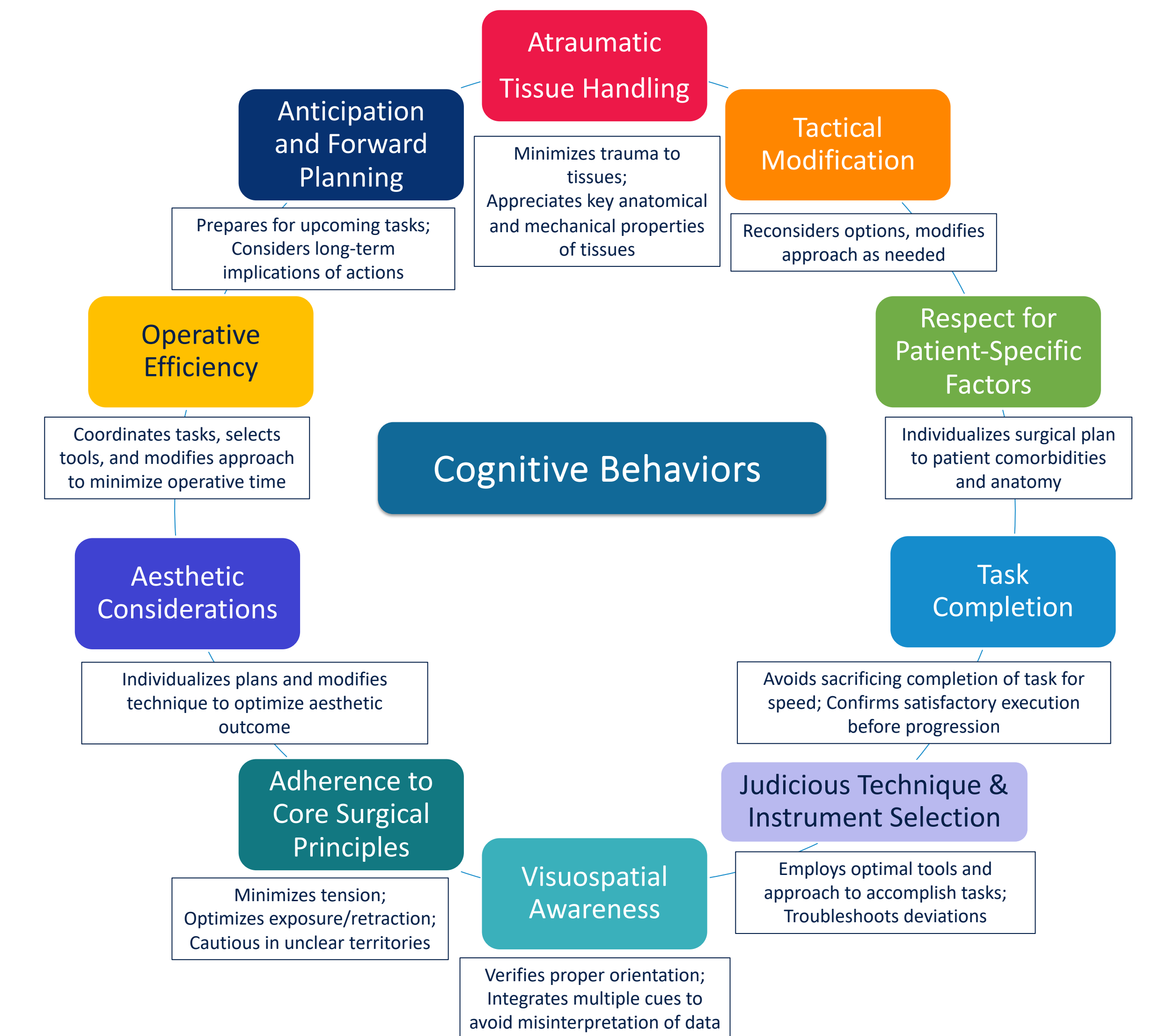
Figure 3. Cognitive Behaviors in Each Major Task of a DIEP Flap



- Cognitive behaviors employed throughout the major tasks of a DIEP (Fig 3.)

- Chest vessel dissection** has ↑cognitive load
- Atraumatic tissue handling = most prevalent cognitive behavior

Figure 2. Cognitive Behaviors Framework for a DIEP Flap



Conclusions

Protocol highlights critical areas for decision-making, error avoidance & technical tips to perform DIEPs safely, efficiently and with optimal aesthetics.

Cognitive behaviors

- Chest vessel dissection** has ↑cognitive load → critical area for teaching
- Proficiency in **atraumatic tissue handling** before high-stakes subtasks

Future Work

- Additional expert interviews → master protocol
- Visual framework, targeted educational and assessment tools