Surgical Education Learner's Forum
Simulator Fidelity Checklist

This checklist is designed to be used by developers of SELF modules for deconstructing the psychomotor element of surgical tasks and designing and finding the materials for the *physical* aspect of the simulators with the appropriate level of fidelity.

Before you Begin:

- **Define the Learner.** Understand and define the needed context of the learner and deployment i.e. what is the minimum level of training and skill this learner has? This is needed to determine what do you need to address, and what do you NOT need to address in terms of the learner's psychomotor skill such as: Are you teaching suturing, or assuming they already know how to suture?
- **Define the endpoint**. Considering where the learner is starting, define learning objectives and narrow down the scope of the expected simulator to only address those objectives. The simulator should be fit for purpose with as narrow a scope as possible.
- Keep your learner definition and the end goal in mind throughout the design process

Creating the Framework:

- **Deconstruction.** Deconstruct the task into the sequential physical and decision-making steps within the procedure, and identify the tissue type that this step interacts with, and lay out in a table. These should be at the level of single interactions with tissues such as Surgical step: "identify cystic duct" Tissue: "cystic duct" and Manipulation type: "visual identification". Surgical step: "Divide feeder artery" Tissue: "mid-sized artery" and Manipulation type: "seal then sharply divide". Include variations for common complications. This is your starting list of tissues.
- **Uniqueness.** Note whether each step is common to a large number of procedures (e.g. abdominal entry and closure) to which you would assign a "3", unique to the procedure (e.g. "identify the appendiceal artery") to which you would assign a "1", or somewhere in-between ("2"). This aids in narrowing down what actually needs to be simulated with the physical simulator as common entry/closure techniques do not need to be covered in every module that uses them.
- **Fidelity type.** For all the unique/level 1 steps, and the level 2/3s in between those steps, list all the elements of the interaction with the simulated tissue which are essential for the learner to translate what they are learning over to clinical applications. Account for elements such as color, anatomical shape/relationships, response to blunt or sharp dissection, "drillability", elasticity, rigidity, tactile, auditory, olfactory, or consistency of texture.
- **Simplify.** Only require a tissue fidelity type if is it *arguably necessary to the aspect of the task being learned*. Recognize that tactile fidelity requirements are not universal – they are dependent upon target learner experience, the procedure type, and the likelihood of incorrect technique causing complications. For example, a more experienced learner may be able to suspend disbelief when a tissue has low tactile fidelity and learn an essential element of a surgical step from visual fidelity alone, or alternately, when the performance of the step is so dependent on the characteristics of the material (such as sewing bowel to pancreas) anything but identical physical characteristics is likely to have the clinician practicing inappropriate techniques with potentially deadly consequences. Work to maximize cost effectiveness and fidelity with minimal complexity while addressing the learning objective
- **Choose Materials.** Use the biomaterials database to search for tissue types. Have one that works well that isn't listed? Add it! Ideal simulator materials should be available everywhere at low cost, or have a set of available substitutes.

Surgical Step	Tissue	Manipulation type	Uniqueness	Desired type of feedback to the learner	Fidelity Type	Materials and Alternates
Step 1						
Step 2						
Step 3 …						