

Sector	Use Case 1	Use Case 2	Notes
Transforming Bioenergy & Agriculture with Synthetic Biology	(Bioenergy) – Metabolic engineering of Lignin synthesis and composition	(Agriculture) – Phytic Acid/Phytate composition in plants	Pick one Agriculture Use Case. Combine need for Apomixis Use Case into the selected Agriculture Use Case.
		(Agriculture) – Metabolic engineering of C3 →C4 plants	
Transforming Cellular Factories with Synthetic Biology	Spatially and temporally controlled biological synthesis of mesoscale molecular structures using Artificial cell or Cell Free systems	Spatially and temporally controlled biological synthesis of mesoscale molecular structures using engineered microbial cultures (communities)	
Transforming Medicine with Synthetic Biology	Smart Medicine (Cells): Engineered (bio-circuits) mammalian cells to sense and respond to physiological state	Bio-printing: Bio-printing of tissues/organs with their associated network of functional blood vessels	The bio-printing Use Case needs more development. Either combine or select one of the Smart Medicine Use Cases.
	Smart Medicine: Engineered gut microbial communities that produce compounds to activate neuropod cells with predictable, quantifiable, and reproducible cognitive and/or psychological outcomes		
Transforming Biomanufacturing with Synthetic Biology	Minimize supply chain gaps of critical DoD precursors: Production of 1,2,4-butanetriol-energetic precursor	Scaling Cell-Free Systems: Practical cell-free workflows to span volumes of 10ul to 10 ³ L, expansion to non-model systems, and predicative modeling of cell-free systems	