Interagency Workshop on Synthetic Biology
Use Cases by Sector

Sector	Use Case 1	Use Case 2	Use Case 3
Transforming *Bioenergy & Agriculture* with Synthetic Biology	***Metabolic Engineering of Lignin Synthesis and Composition***	***Metabolic Engineering of C3 Plants to C4 plants***	***Synthetic Sexual Reproduction - Apomixis*** Apomixis (synthetic fertilization)
Transforming *Cellular Factories* with Synthetic Biology	***Temporally and Spatially Controlled Production of Structural Materials using Artificial Cells and Cell Free Systems*** Spatially and temporally controlled biological synthesis of mesoscale molecular structures using Artificial cell or Cell Free systems	***Temporally and Spatially Controlled Production of Structural Materials*** Spatially and temporally controlled biological synthesis of mesoscale molecular structures using engineered microbial cultures (communities)	N/A
Transforming *Medicine* with Synthetic Biology	***Cells as Physicians*** Smart Medicine: Engineered gut microbial communities that produce compounds to activate neuropod cells with predictable, quantifiable, and reproducible cognitive and/or psychological outcomes	***Living Wearable Technology*** Smart Medicine (Cells): Engineered (bio-circuits) mammalian cells to sense and respond to physiological state and interface with electronic medical devices	***Synthetic Tissues and Organs*** Bio-printing: Bio-printing of tissues/organs with their associated network of functional blood vessels
Transforming *Biomanufacturing* with Synthetic Biology	***Minimizing Supply Chain Gaps*** Minimize supply chain gaps of critical DoD precursors: Example → production of 1,2,4-butanetriol-energetic precursor	***Scaling Cell-Free Systems*** Scaling Cell-Free Systems: Practical cell-free workflows to span volumes of 10ul to 10^3L, expansion to non-model systems, and predicative modeling of cell-free systems	N/A