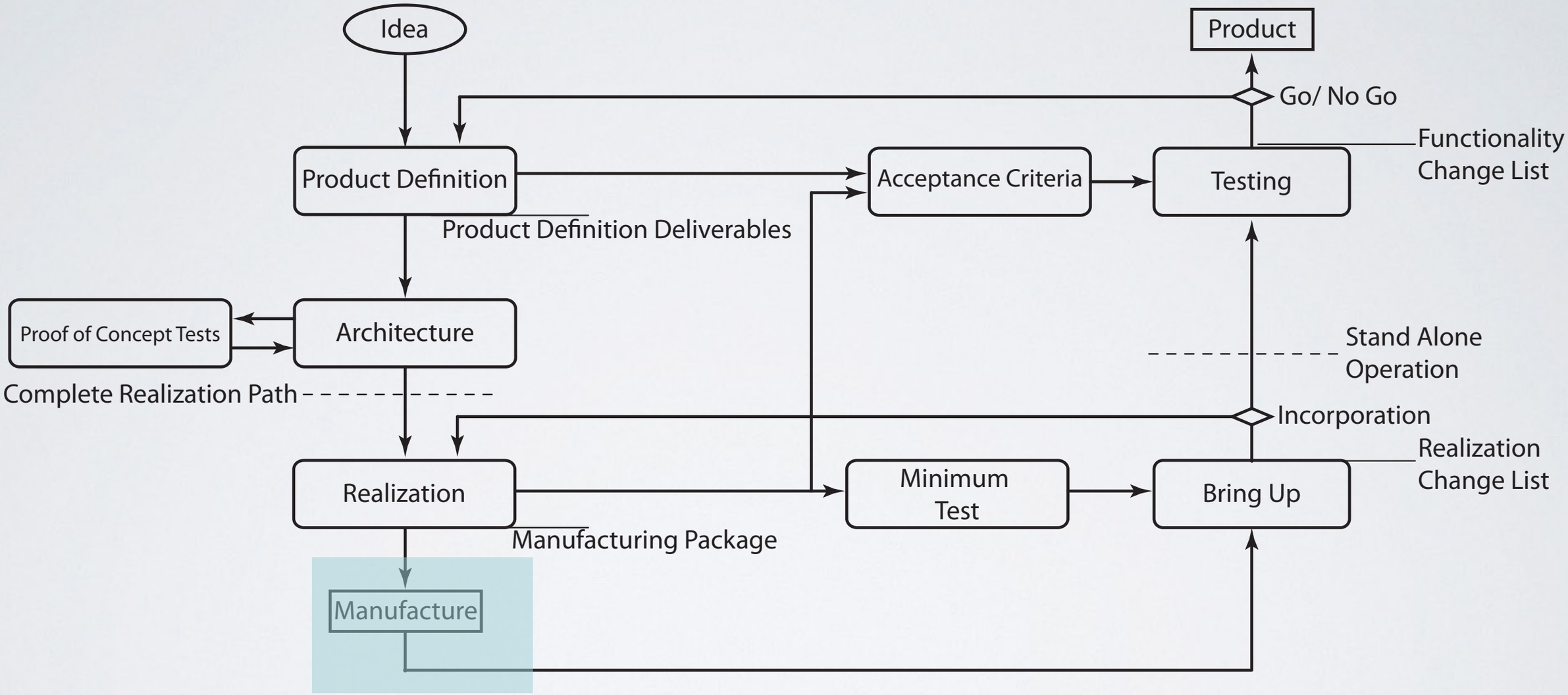
MANUFACTURING PHASE

The Engineer Accelerator
Malcolm Knapp
11/1/15

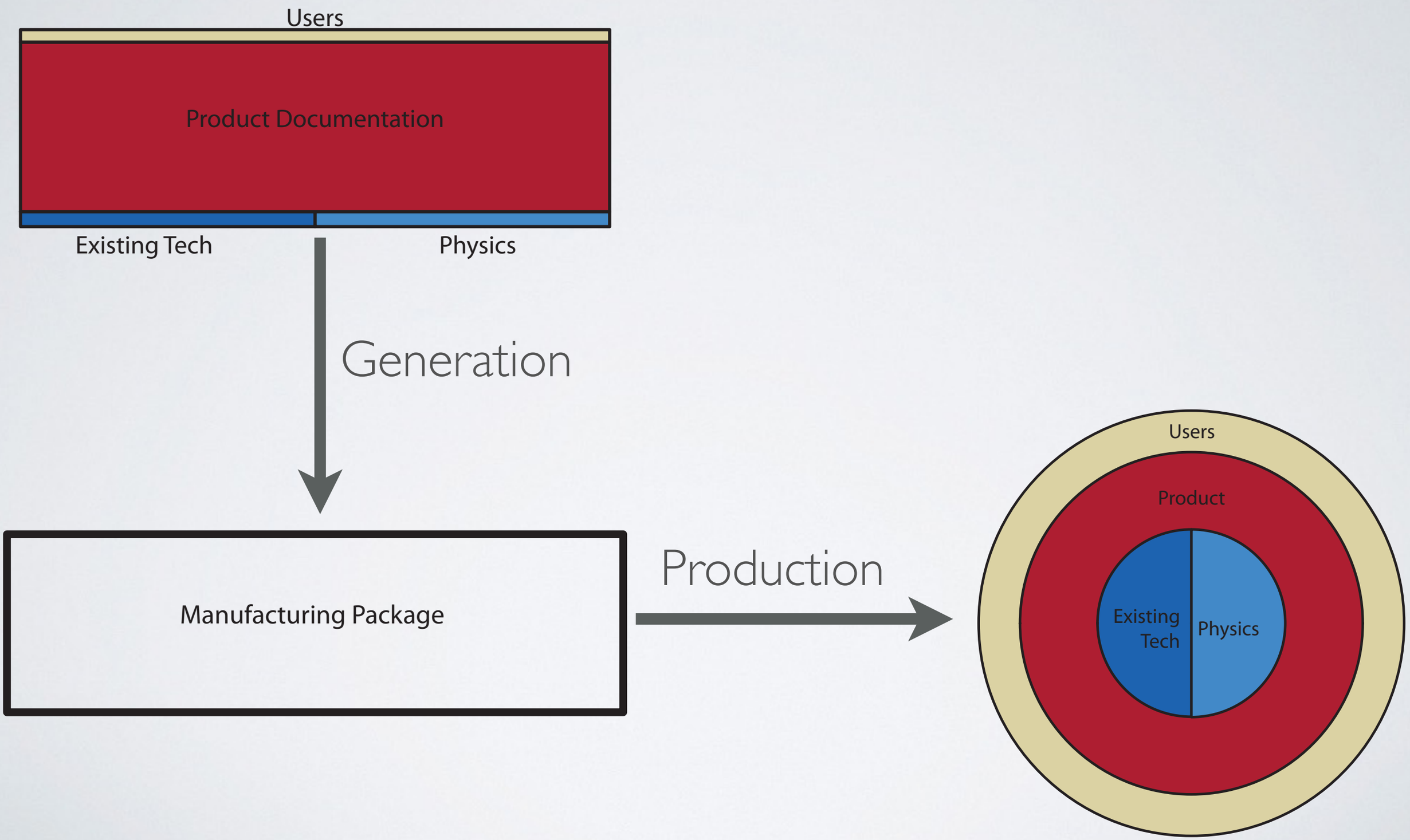
DEVELOPMENT PHASE



GOAL

CONSTRUCTION OF A DEVICE THAT ACCURATELY MATCHES THE MANUFACTURING PACKAGE

PROCESS


Users
Product Documentation
Existing Tech
Physics
Generation
Manufacturing Package
Production
Users
Product
Existing Tech
Physics

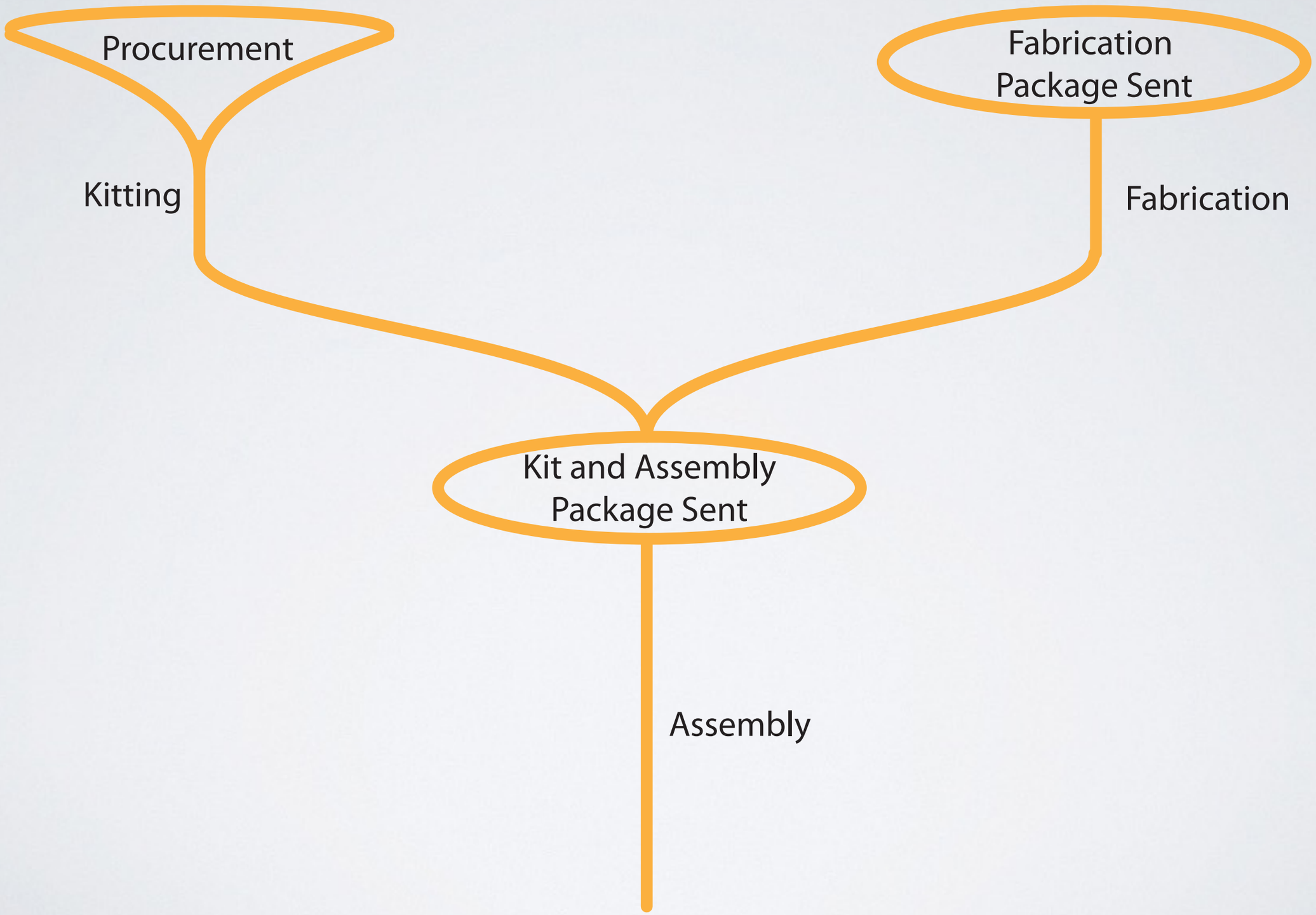
MANUFACTURING PACKAGE

- Fabrication Package
    - Gerbers
    - Fabrication Notes
- Assembly Package
    - BOM
    - XY Data
    - Gerbers

MANUFACTURING ACTIVITIES

- Procurement
- Kitting
- Fabrication
- Assembly

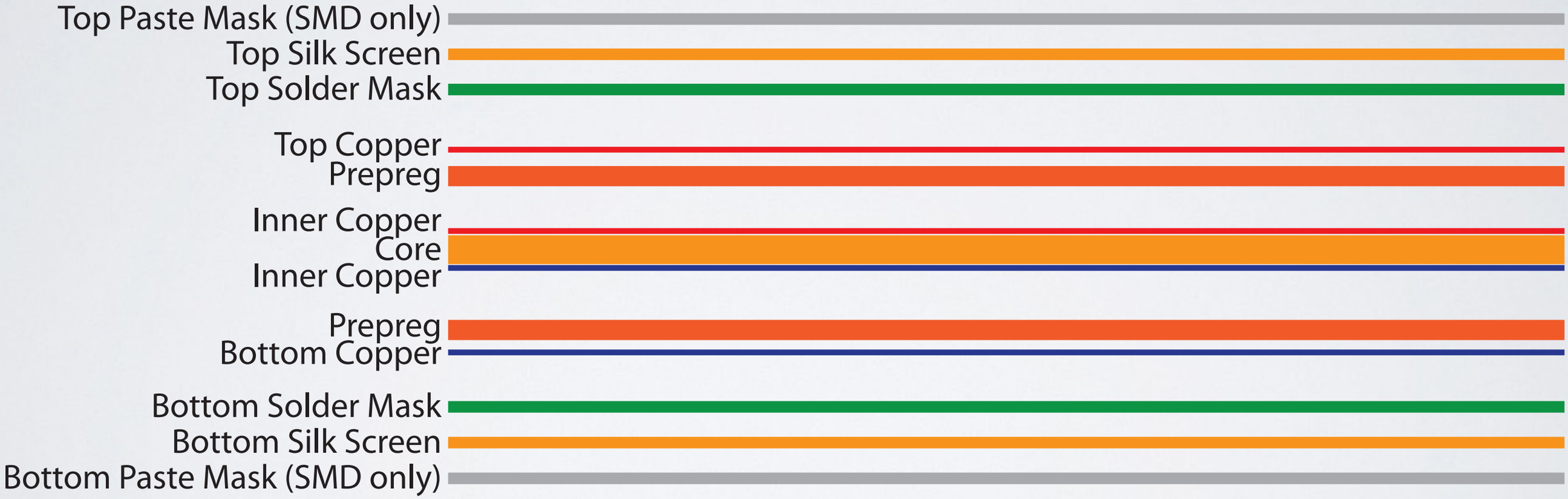
MANUFACTURING ACTIVITIES



PCB FABRICATION PROCESS

1. Core Selection
2. Dry Film Coating
3. Layer Image Derived from Gerbers
4. Image Expose
5. Image Develops
6. Inner Layer Etch
7. Resist Strip
8. Automated Optical Inspection
9. Oxide Coating
10. Lamination
11. Primary Drill
12. Deburr
13. Desmear
14. Outer Layer Electroless Copper Deposition
15. Dry Film Coating
16. Outer Layer Expose
17. Outer Layer Develop
18. Copper Pattern Plating
19. Tin Plating
20. Resist Strip
21. Etch
22. Tin Strip
23. Solder Mask Application
24. Solder Mask Cure
25. Silkscreening
26. Hot Air Soldering Leveling (HASL)\
27. Routing, Scoring, Beveling
28. Electrical Test
29. Final Inspection
30. Shipping

PCB LAYERS


Top Paste Mask (SMD only)
Top Silk Screen
Top Solder Mask
Top Copper
Prepreg
Inner Copper
Core
Inner Copper
Prepreg
Bottom Copper
Bottom Solder Mask
Bottom Silk Screen
Bottom Paste Mask (SMD only)

PCB ASSEMBLY

Surface Mount Assembly

1. Stencil Generation from Gerbers
2. Solder Paste Application
3. Pick and Place
4. Reflow
5. Inspection

Through Hole Assembly

1. Manual Insertion
2. Visual Inspection
3. Wave Solder/ Pot Solder
4. Lead Cutting
5. Final Inspection

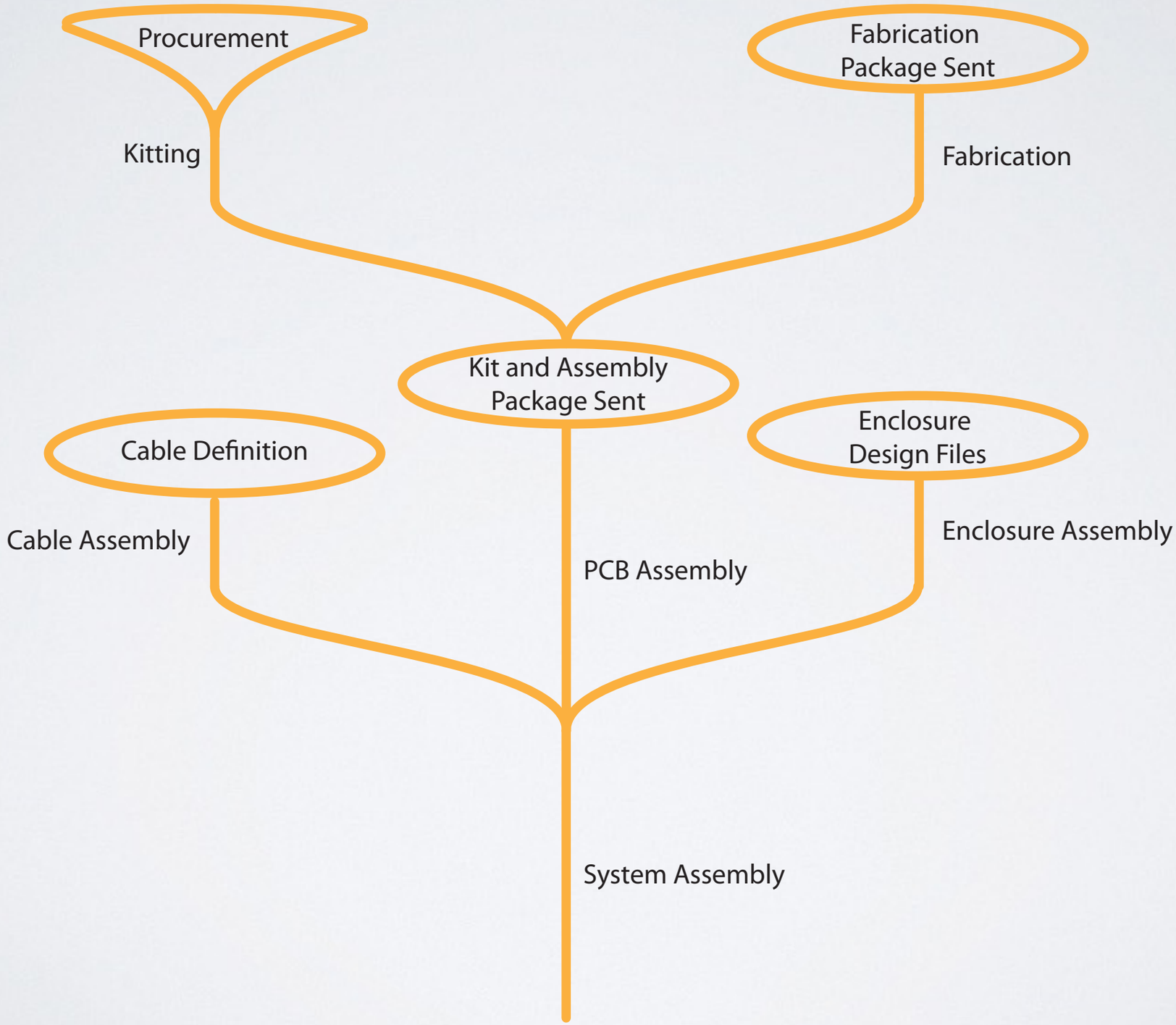
PROTOTYPE PCB TURN TIMES

Check	Fabriction	Assembly	Total Turn Time [Work Days]	Notes
Day 0	1Day	1 Day	3 Days	Local, Extreamly Expensive
Day 0	5 Day	5 Day	10 Days	Local Manufacture, Standard Cost
Day 0	7 day	7 day	15 Days	Off Shore Manufacture, Low Cost

SYSTEM MANUFACTURING ACTIVITIES

- Enclosure Assembly
- Cable Assembly
- System Assembly

SYSTEM MANUFACTURING ACTIVITIES



GOTCHAS

- Time to ship
- Shipping time cut off
- Missing files
- Combined Layers
- Inverted Layers
- Version Control

DELIVERABLES

- Manufactured System

PHASE TRANSITION

- When the system is in-house