

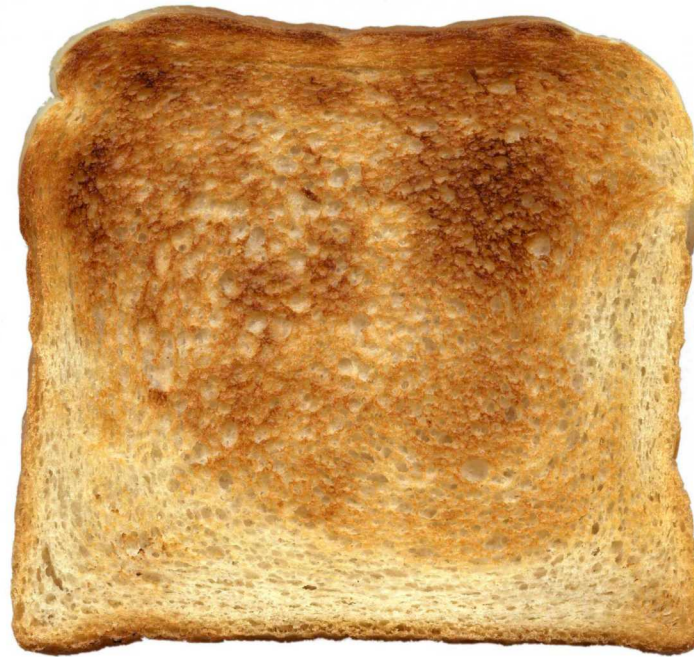
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Systems Engineering in Everyday Life

Jonell N. Samberson, Ph.D.
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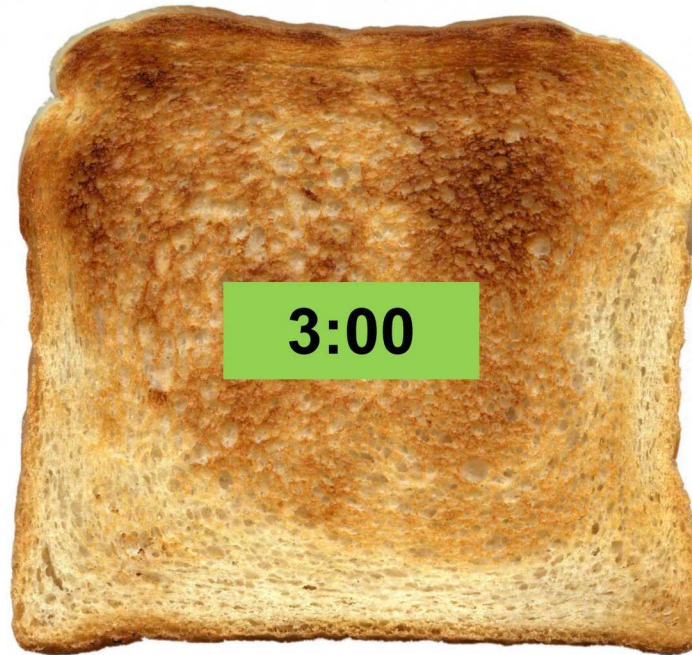
Engineer's Week 2018: February 16, 2018





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Using NO Words Draw a Picture of How to Make Toast



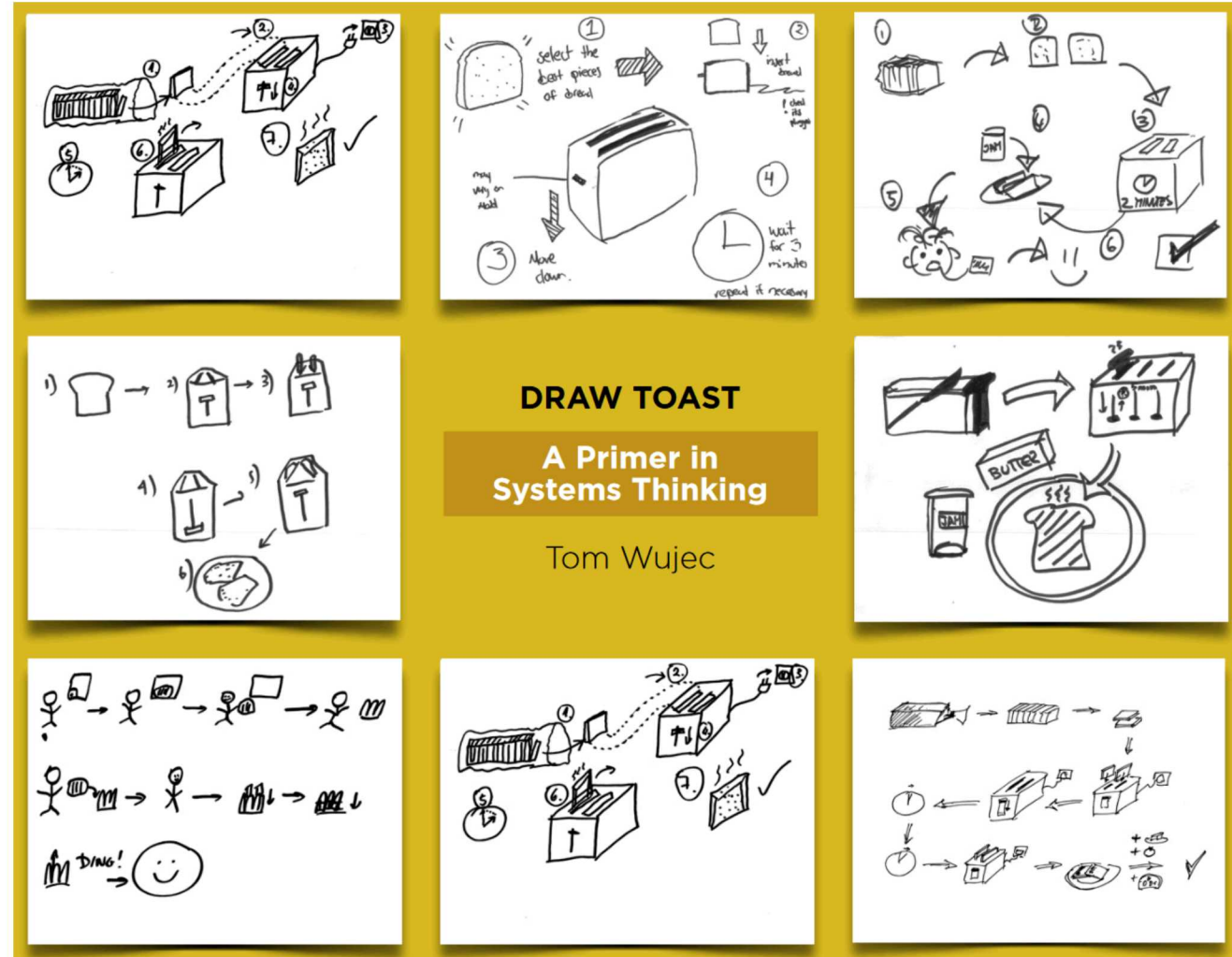
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What did you draw?

- All about the **process**
- All about the **toast**
- All about the **toaster**
- All about the **experience**
- All about the **supply chain**

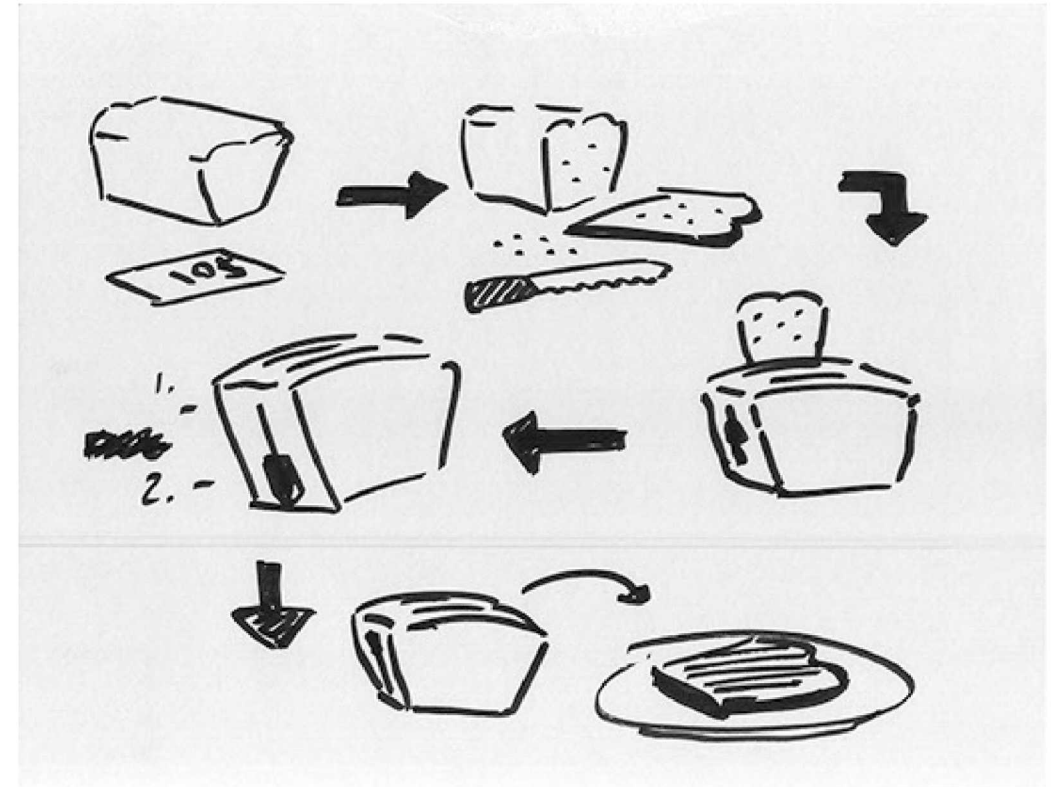
But wait...

- Did you **use** a toaster?
- Did you **plug** the toaster in?
- Did you remember the **butter**?



The Making Toast Exercise

1. Helps people understand and solve complex problems
2. Demonstrates that we can take something very complex, break it into smaller parts, and put it back together again



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An Introduction to Systems Engineering

- **A System**

- “A combination of interacting system elements organized to achieve one or more stated purposes” [ISO/IEC/IEEE 2008]
- “A system is a construct or collection of different elements that together produce results not obtainable by the elements alone. ... The value added by the system as a whole, beyond that contributed independently by the parts, is primarily created by the relationship among the parts; that is, how they are interconnected” [Rechtin, 2000]

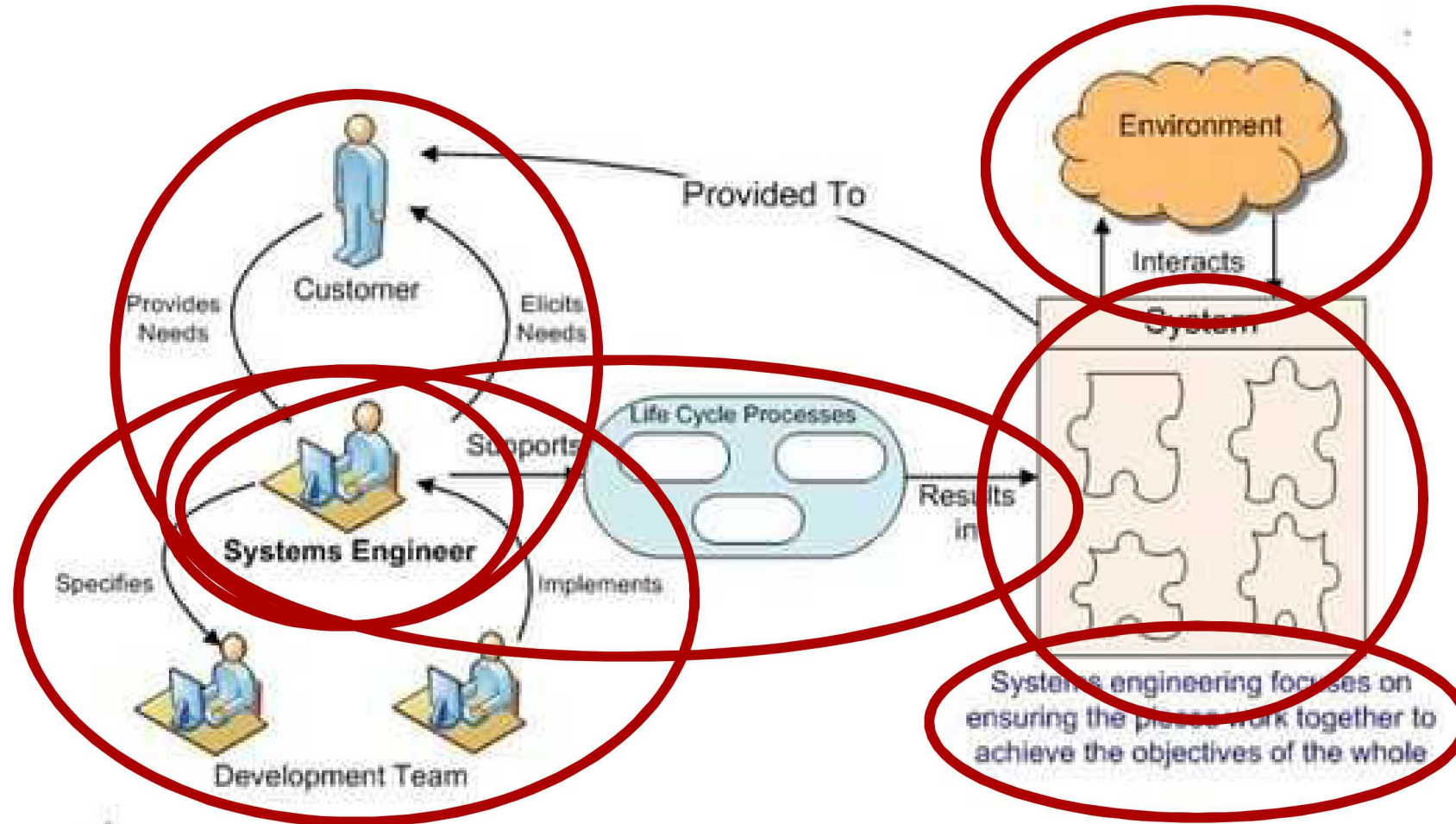
- **Systems Engineering**

- “Systems Engineering is ***an interdisciplinary approach and means to enable the realization of successful systems***. It focuses on defining customer needs and required functionality early in the development cycle, documenting requirements, then proceeding with design synthesis and system validation while considering the complete systems problem” [INCOSE SE Handbook]

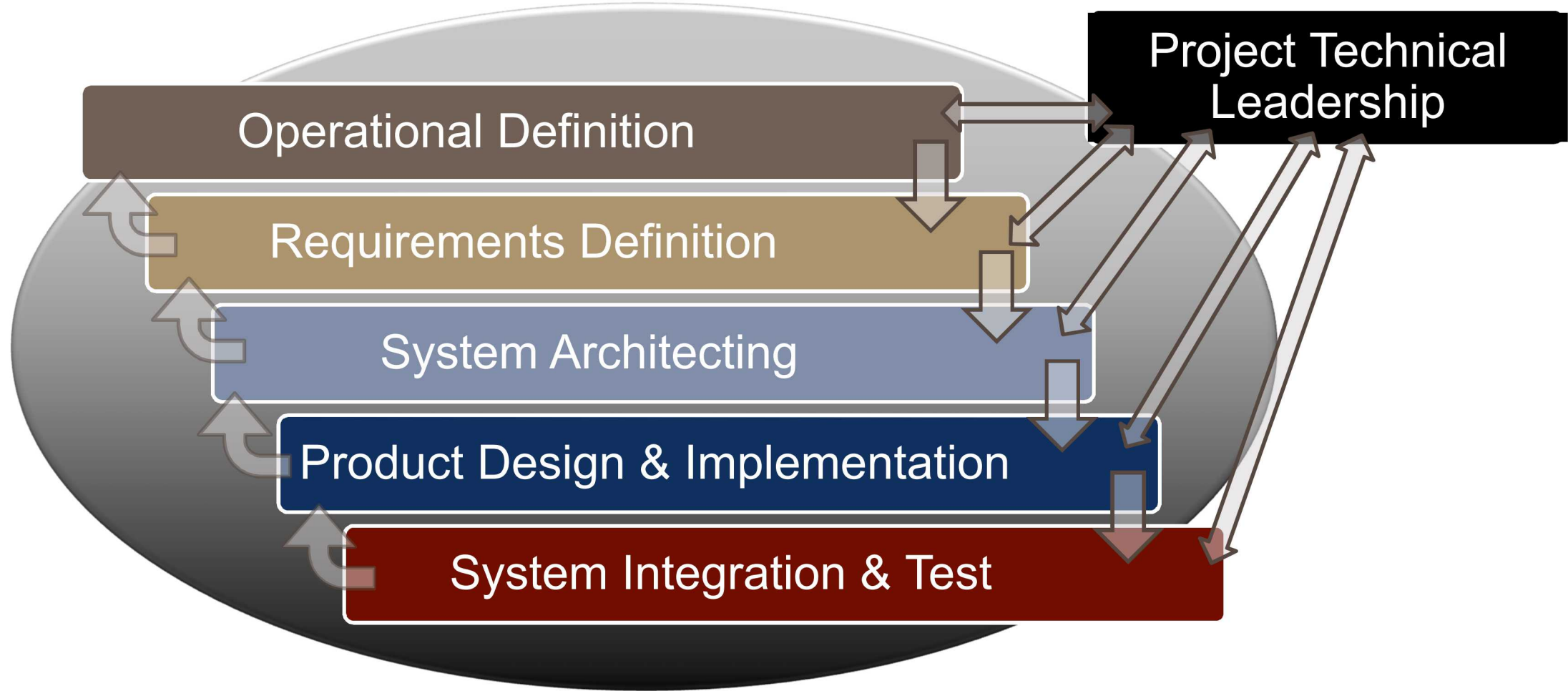
“Systems Engineering is worrying about the space between.”

Systems Engineering Focuses on All of the Pieces

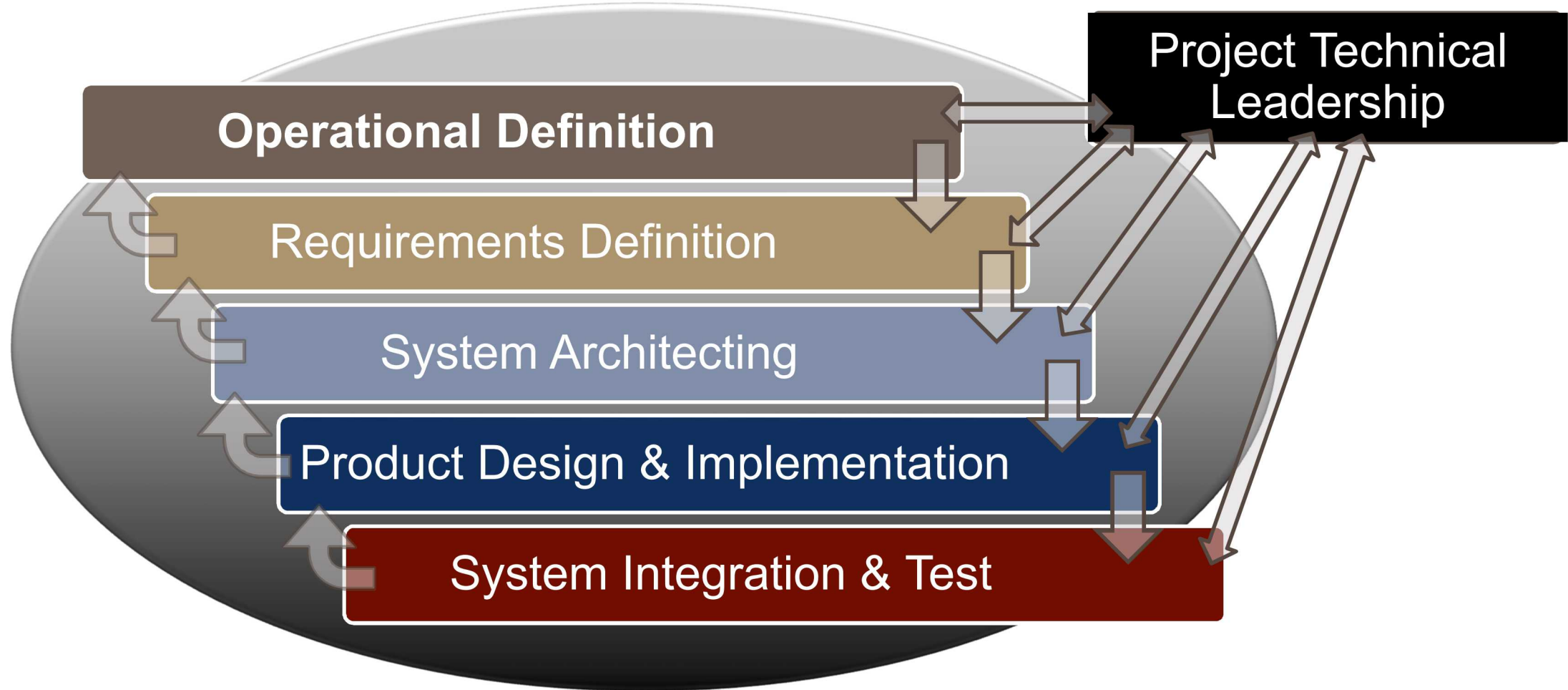
- “an interdisciplinary approach and means to enable the realization of successful systems”



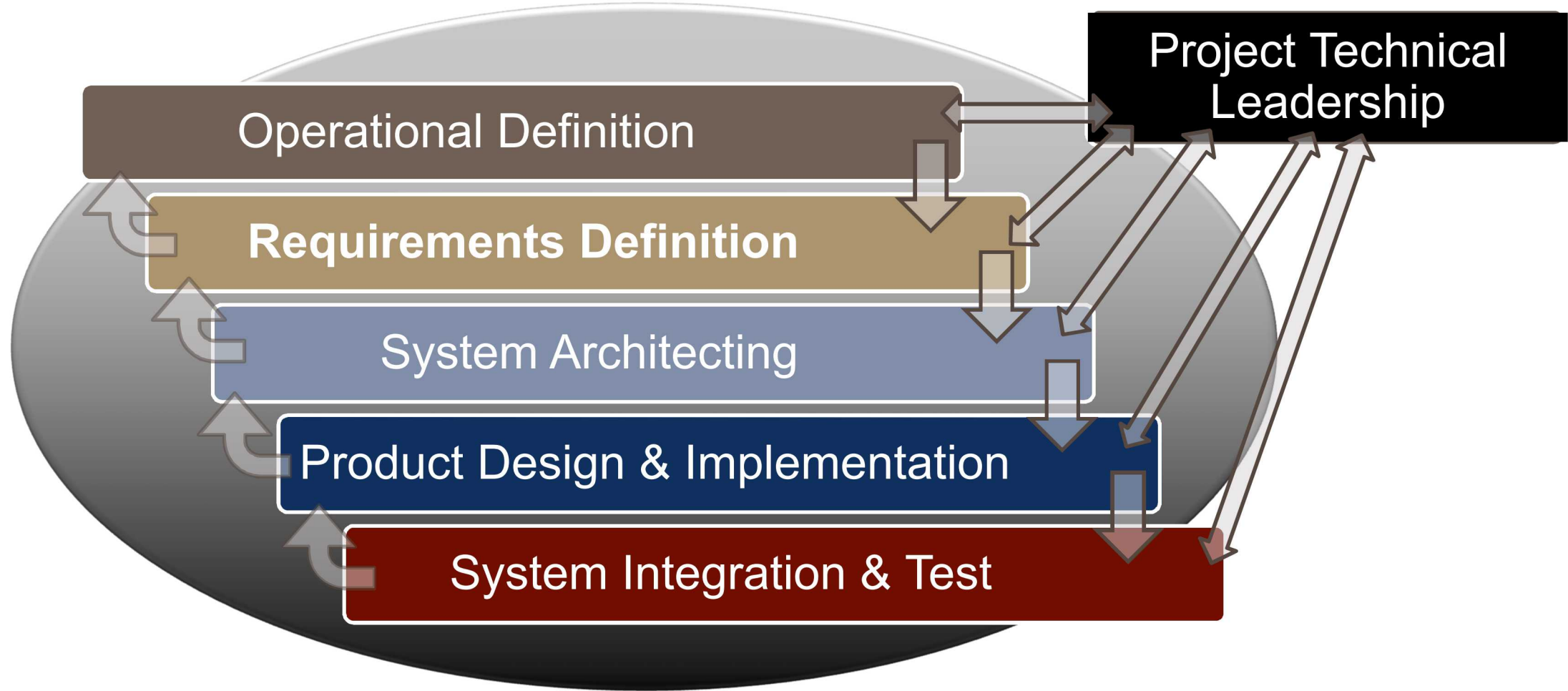
Basic Systems Engineering Model



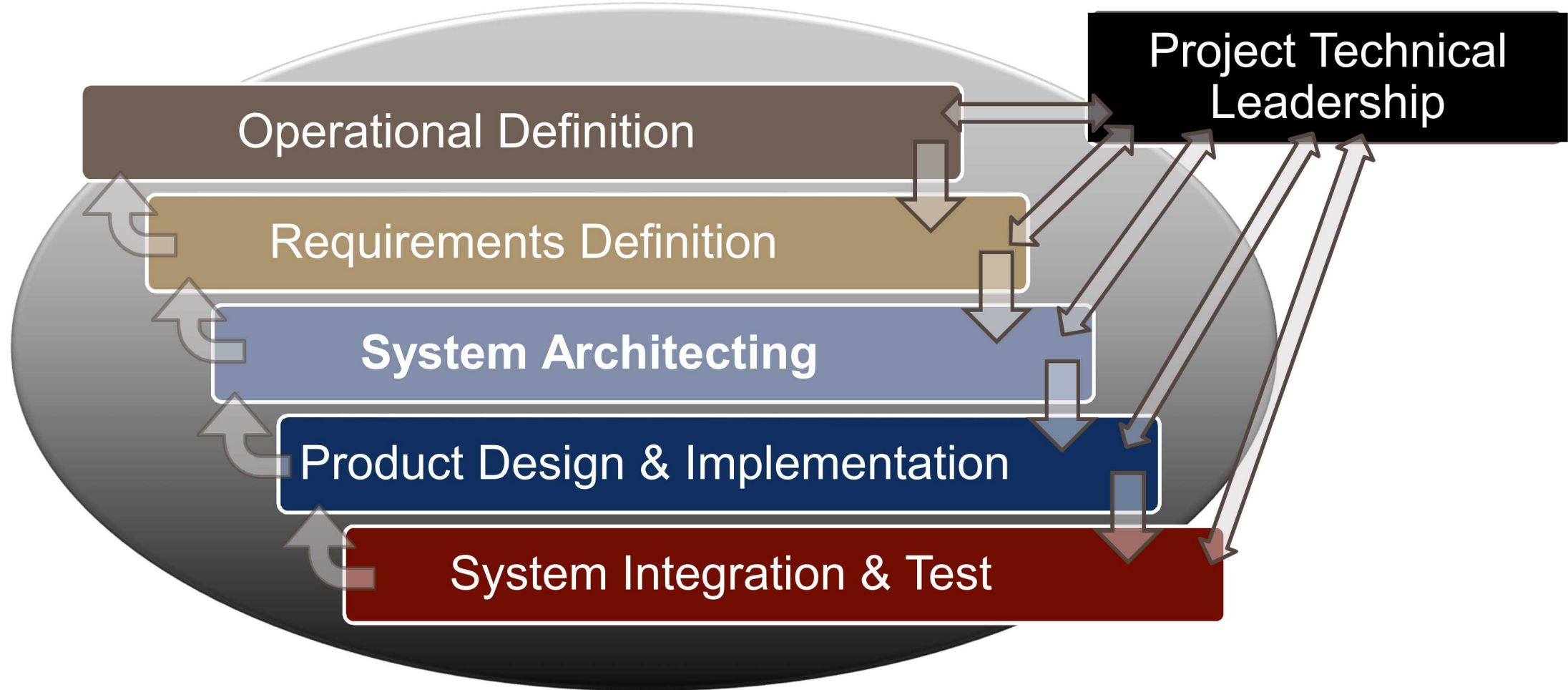
Basic Systems Engineering Model



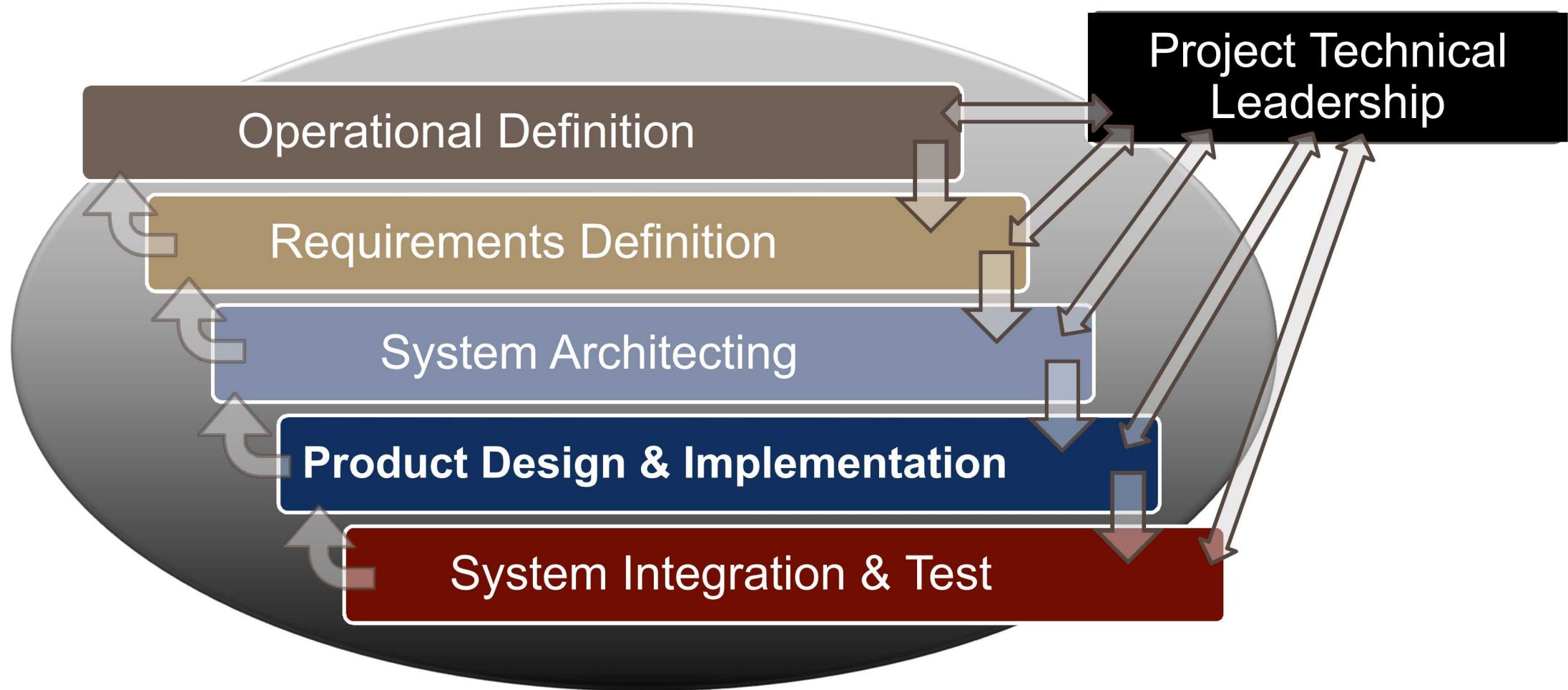
Basic Systems Engineering Model



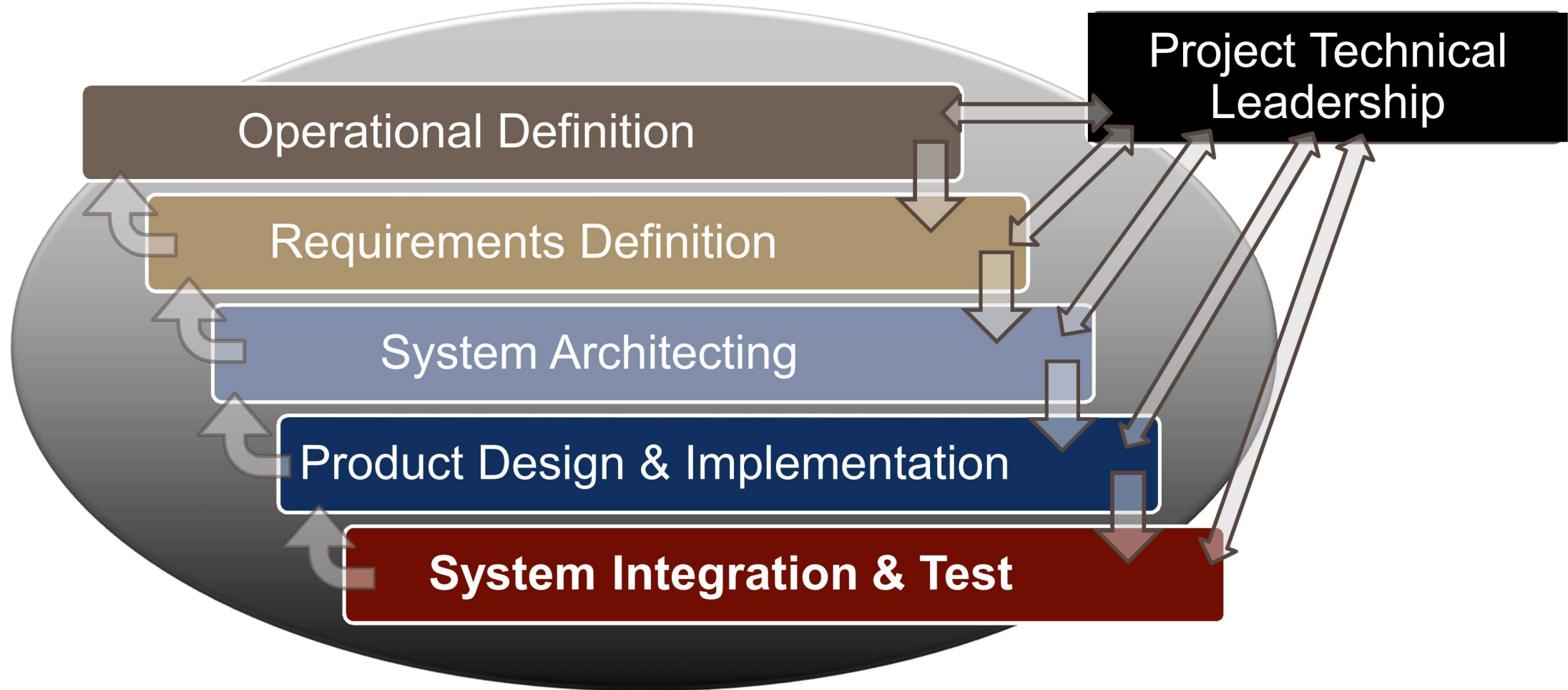
Basic Systems Engineering Model



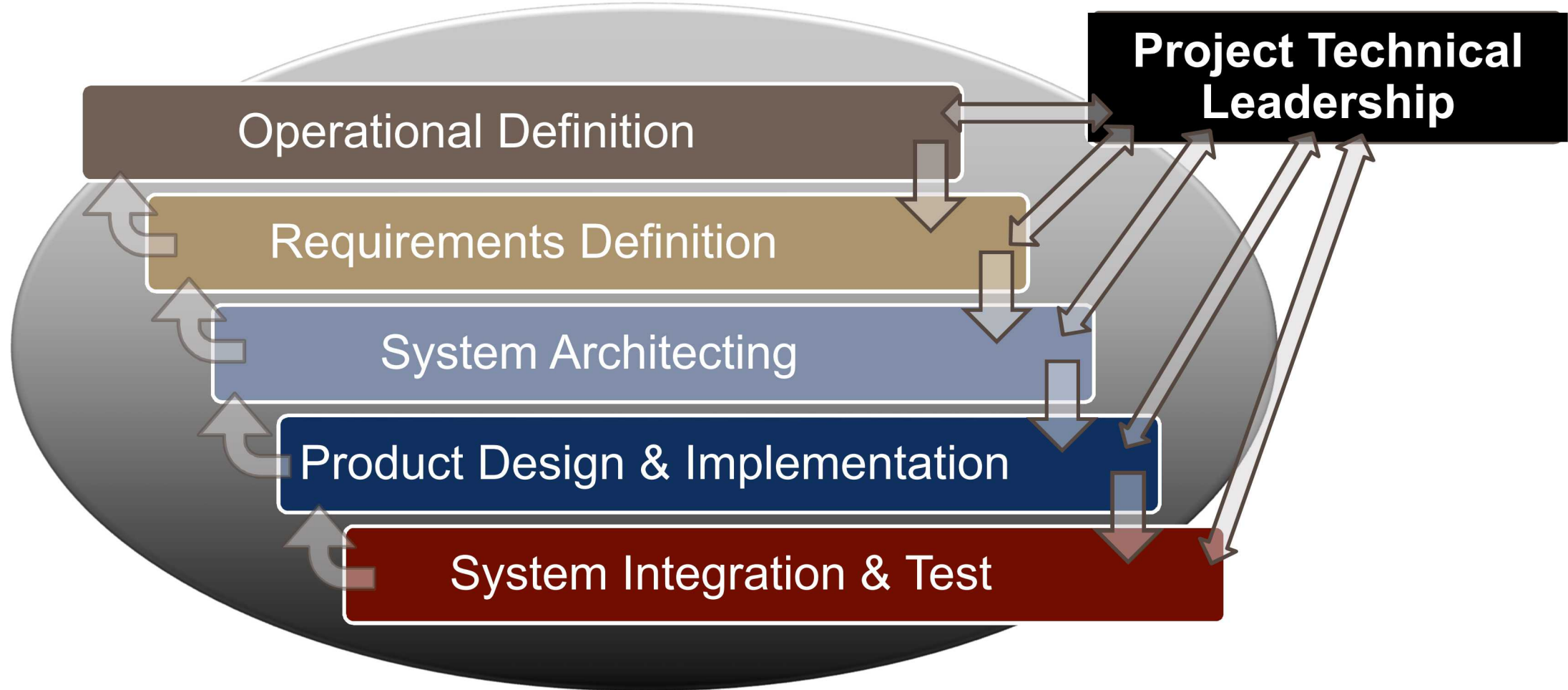
Basic Systems Engineering Model



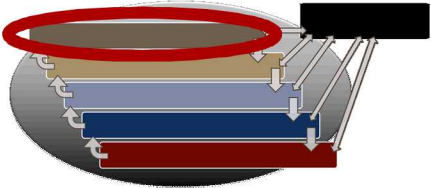
Basic Systems Engineering Model



Basic Systems Engineering Model



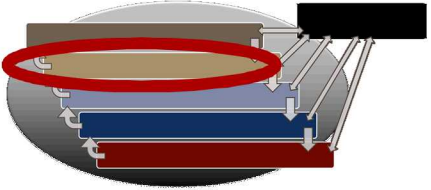
Operational Definition



Serve a high quality cup of coffee to a given customer.

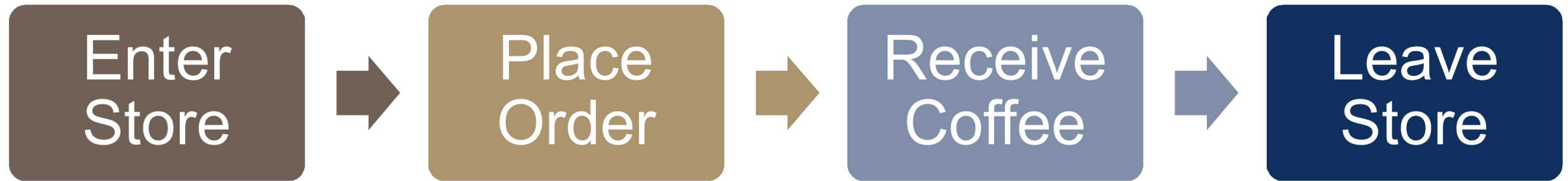
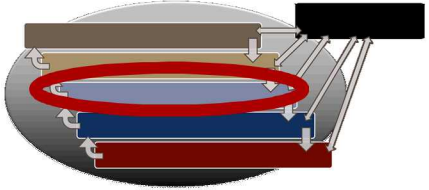
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Requirements Definition



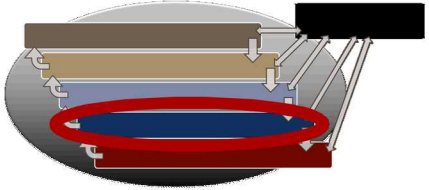
Coffee needs to be sold in a store.

System Architecting



Block diagram of process flow.

Product Design & Implementation

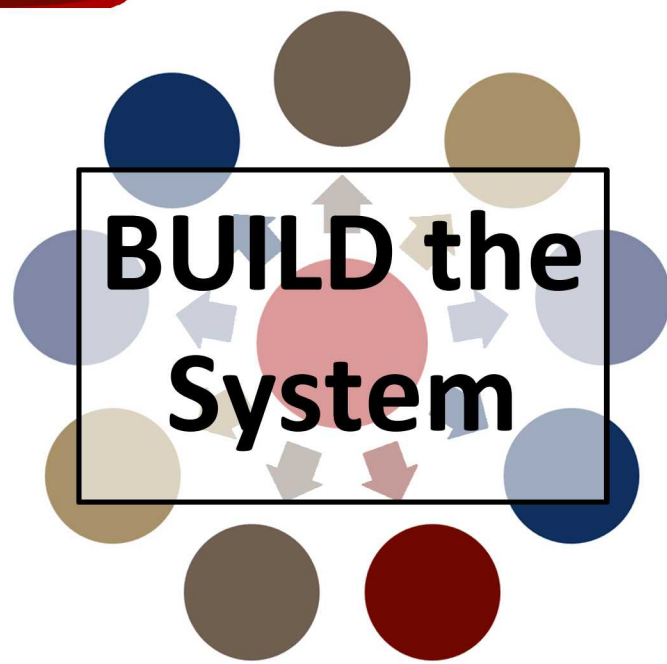
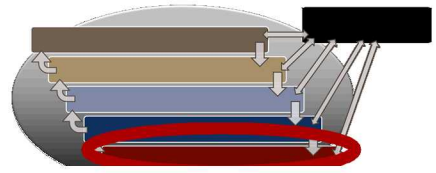


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Use a paper cup to serve the coffee.

System Integration & Test



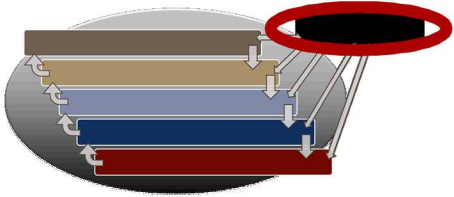
TEST the System



- ✓ Excellent
- ☐ Good
- ☐ Poor

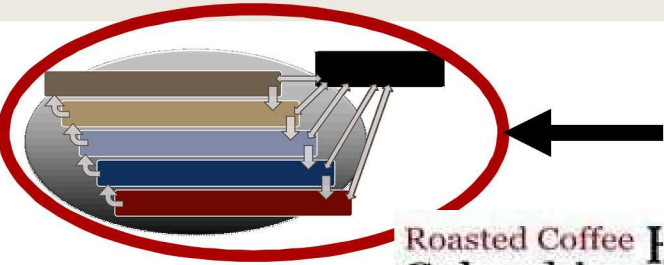
Customer arrives at store, interacts with staff, and receives a hot cup of coffee.

Project Technical Leadership



Guide and control the development effort in a direction to ensure technical completion.

What if the company takes a new direction?

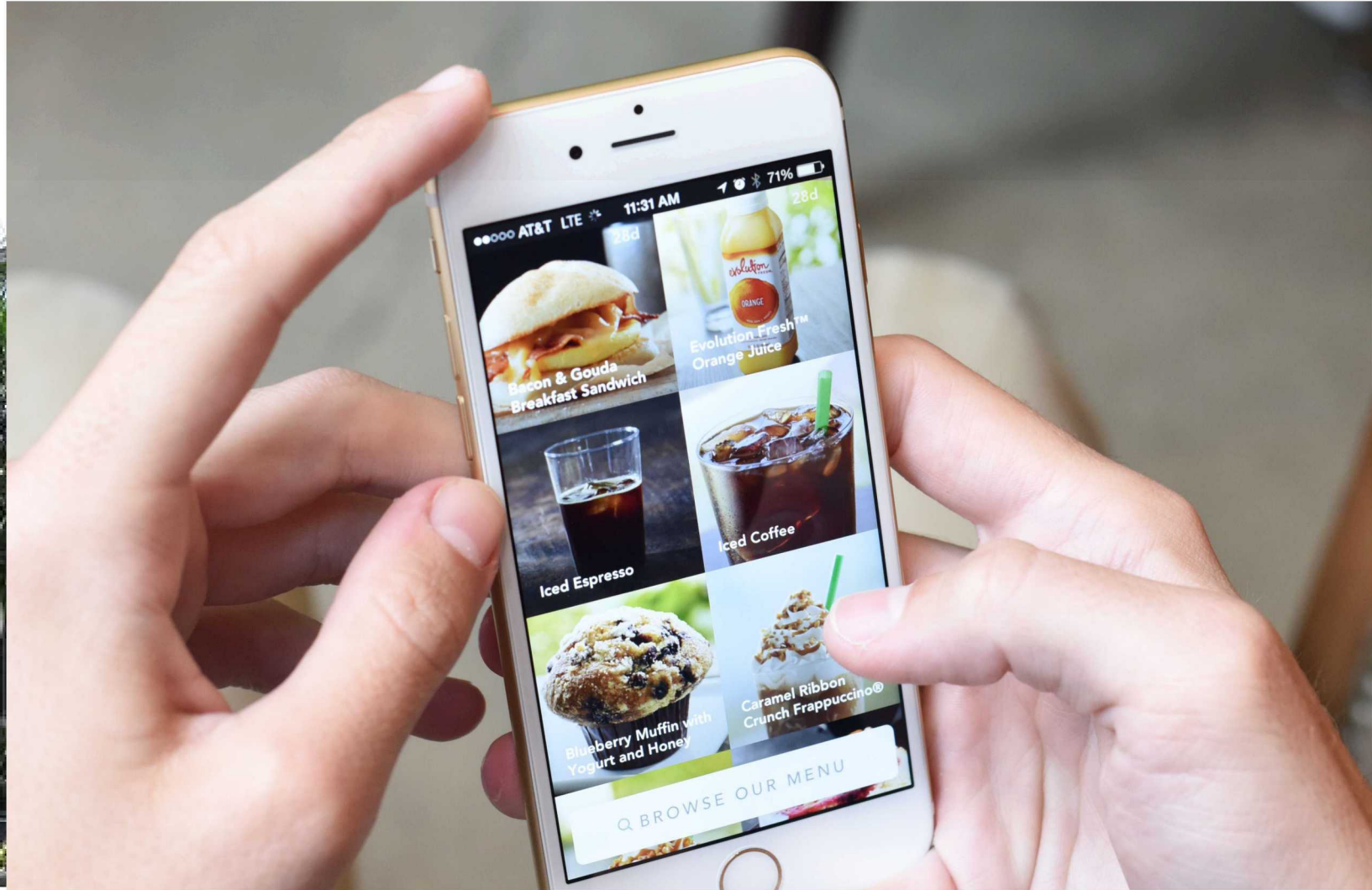


Roasted Coffee
Columbian
Coffee
Gourmet Coffee
Home Blend
Flavoured
Organic
Chai
Espresso
Kona
Herbal
Roasted
Tea
Decaf
Hawaiian
Cappuccino

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Closing Remarks

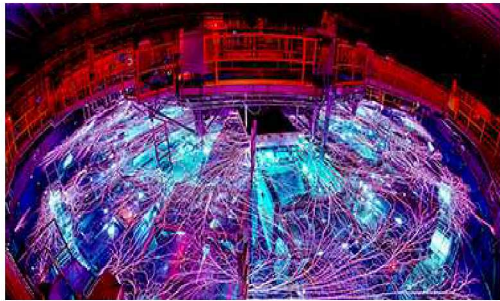
- Where could you apply a systems engineering approach in your life?
- Examples:
 - *Planning a trip*
 - *Planting a garden*
 - *Planning your commute to work*
 - *Etc.*

“Systems Engineering is worrying about the space between.”

SE helps people understand and solve complex problems by taking something very complex, breaking it into smaller parts, and putting it back together again.

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