

MPAR Industry Perspective

Dr. Greg Turner

Harris Corporation



- Large Public Corporation with \$4 Billion in sales
- Founded in 1895
- Headquartered in Melbourne, Florida
- 14,000 employees
- Serving customers in more than 150 countries



**Government
Communications
Systems**



**RF
Communications**



**Broadcast
Communications**



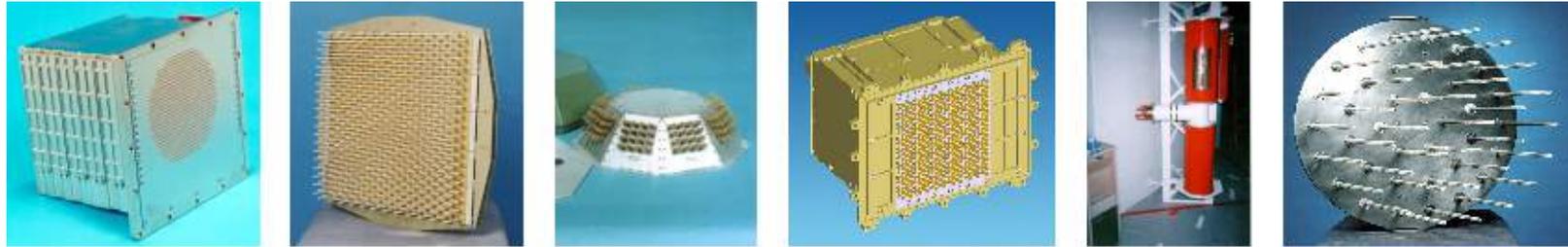
**Microwave
Communications**

Harris is a large company offering a wide variety of communications and information processing products, systems and services to government and commercial clients

Harris Phased Array Heritage



SPACE/OTHER



AIRBORNE



MOBILE



GROUND



Over 25 years experience with design, integration, and test of ground, airborne, and spaceborne phased arrays.

MPAR vs. MRCCR

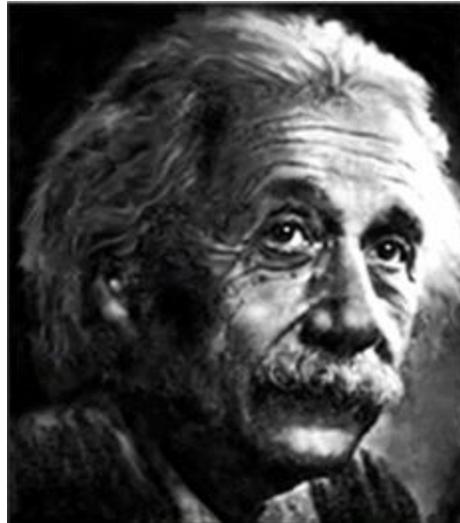
A Classical Antenna Trade



Gimbaled Antenna
•Affordability



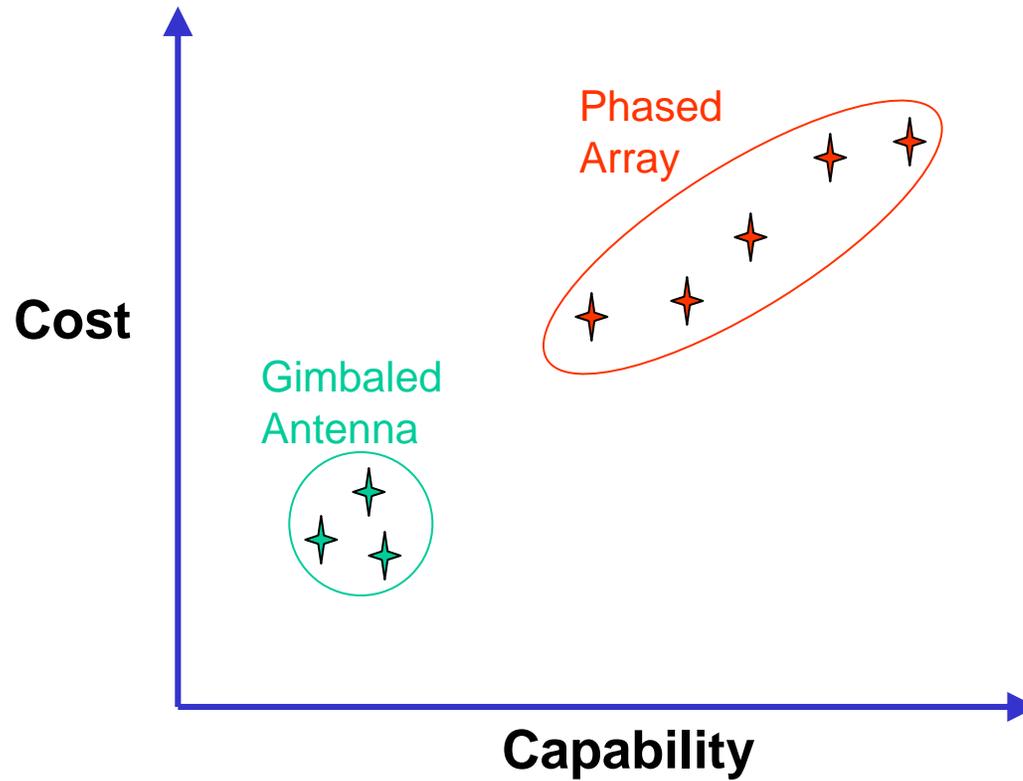
Electronically Scanned Array
•Scan Agility
•Flexibility
•Reliability



“The best design is the simplest one that works.”
Albert Einstein

**An Often Revisited Trade;
Outcome Is Driven By The Unique Details For Each Case**

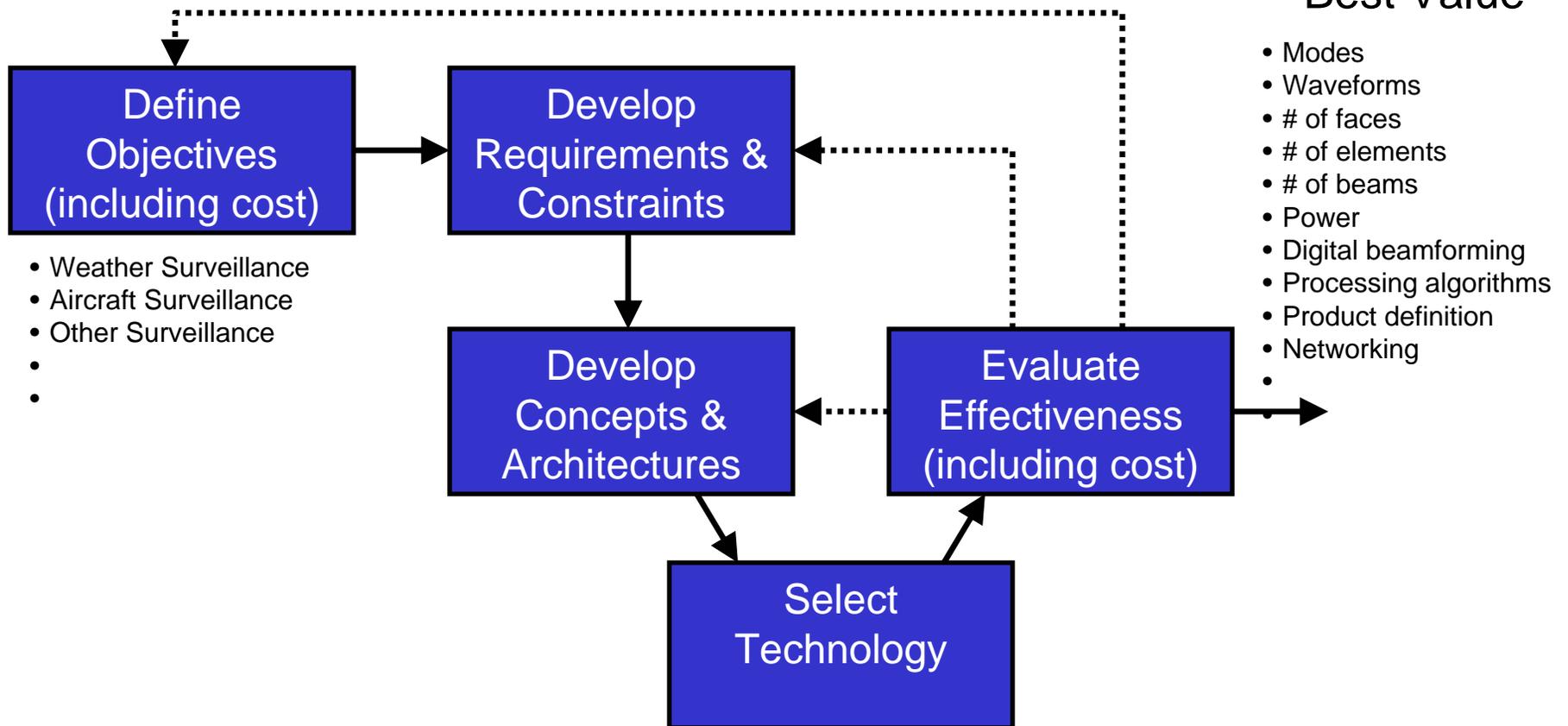
Phased Array Range of Capabilities



**Wide Range Of Capabilities vs. Complexity (Cost) For Phased Array
Needs To Be Carefully Considered For A Valid Trade**

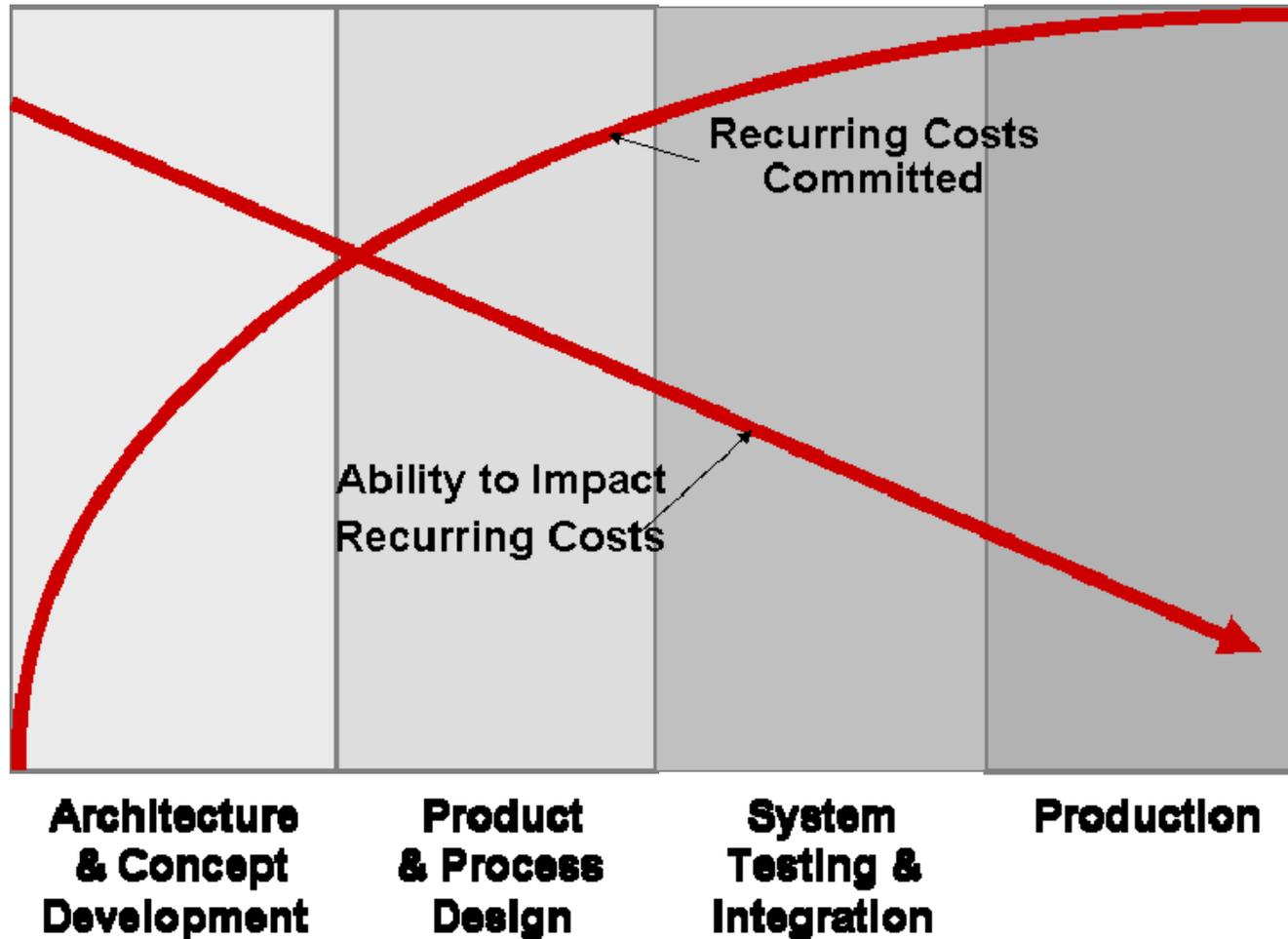
Synthesis of a cost effective System Architecture

Best Value



Rigorous Attention To Detailed Cost-Benefit Trades Are Necessary To Arrive At 'Best Value' Architecture

Architecture Impact on Affordability



Affordability Is Dramatically Influenced At Front-end By System Architecture

- Threshold level technologies required to support an MPAR implementation exist today
 - ‘New discoveries or inventions’ are not required
- Continuing incremental improvements in performance and producibility will influence system affordability

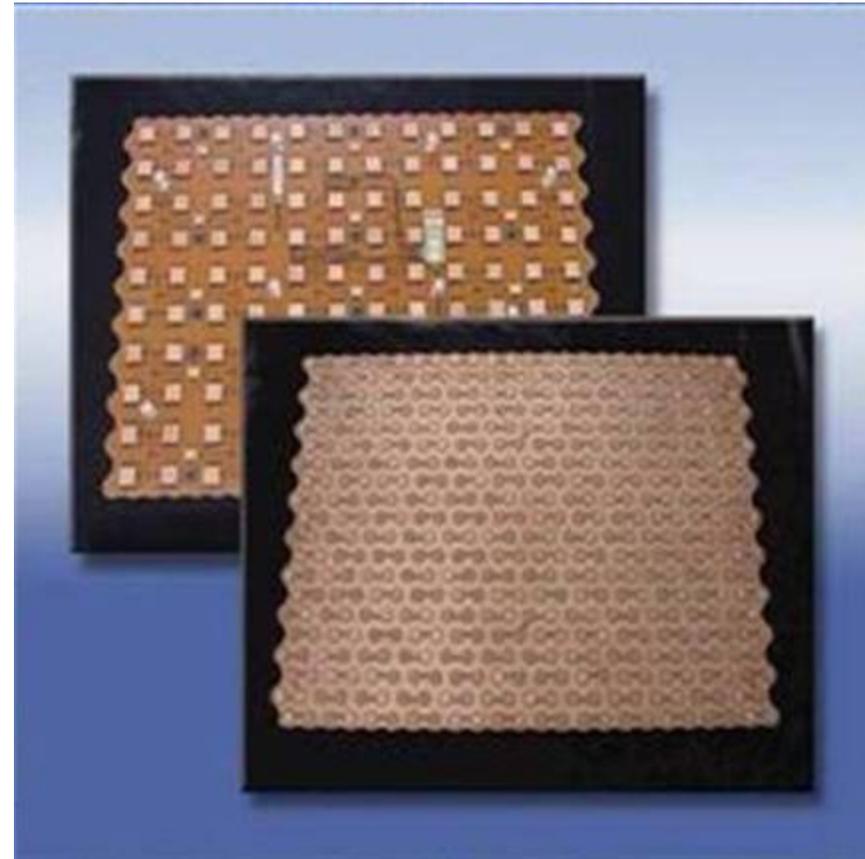
Technology Area	Impacts & Trends
T/R Modules	<ul style="list-style-type: none">• Key to systems performance (sensitivity, efficiencies)• Production costs reduced dramatically in recent years
Integrated Sub-Apertures	<ul style="list-style-type: none">• Becoming a more significant cost factor as T/R module costs reduce• Designs taking advantage of standard Circuit Card production methods
Digital Processing Components	<ul style="list-style-type: none">• A driver to rich trade space between complexity and capability• Continuing performance improvements for digital components
Radar Modes and Processing Algorithms	<ul style="list-style-type: none">• Another key driver to trade space between complexity and capability• Tends to be more unique to the specific application

Integrated Sub-Apertures



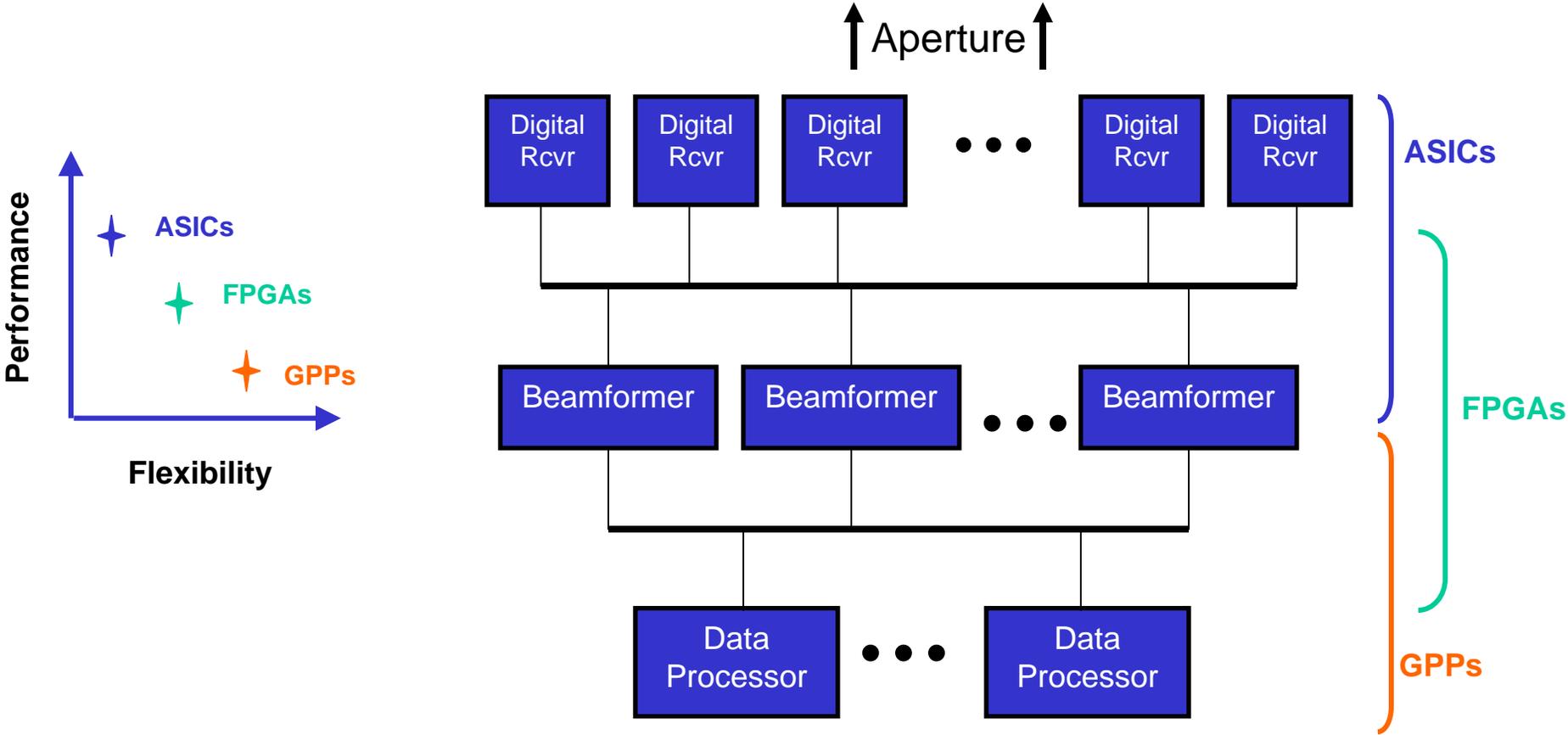
Sub-Aperture example

- Surface mount Circuit Card Assembly (CCA) packaging approach
- Modular design for expansion and flexibility
- Embedded beamforming, power, and control distribution networks
- Surface mount electronics
- Printed radiating elements
- Automated manufacturing and test for affordable high volume production



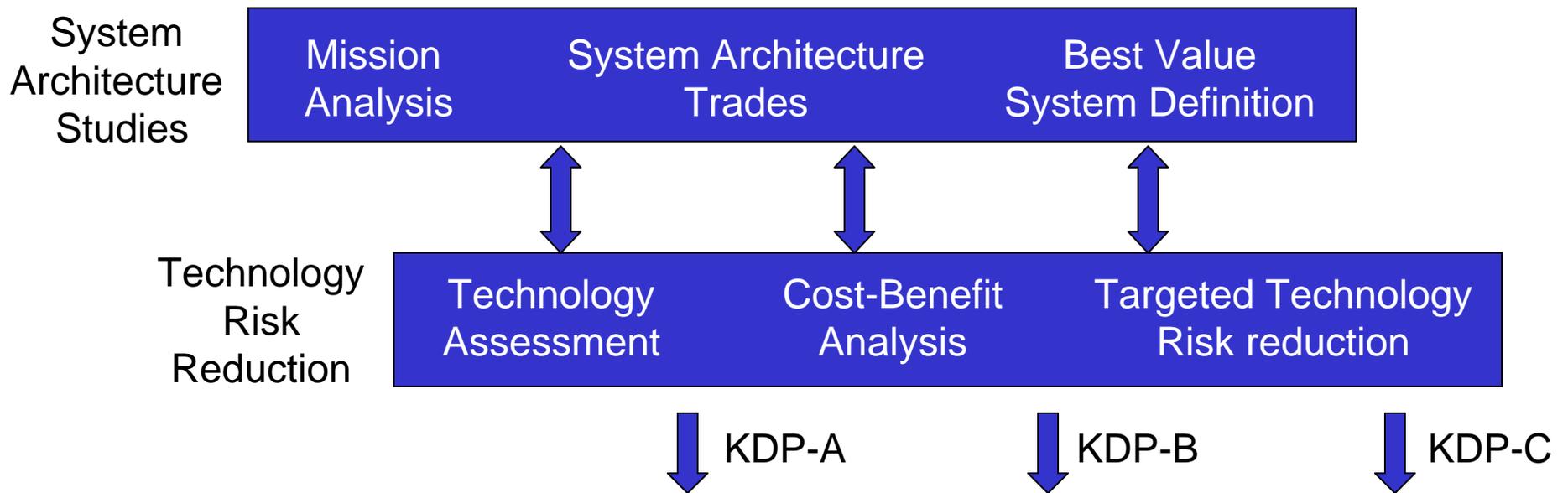
Sub-Aperture Producibility And Testability Are A Significant Driver To Large Scale Phased Array Affordability

Digital Processing



The Trend For Digital Components Is Continuing Improvement In Performance (FLOPs/Unit, FLOPs/SWaP) And Higher Levels Of Integration ('Radio-on-chip')

- Prudent investments in System Architecture development and Technology Risk Reduction to drive Key Decision Points



Harris Corporation Has The Required Capability And Enthusiastic Interest In Supporting MPAR Development

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- **The Timing Is Right** for evaluation of MPAR to replace aging radar surveillance systems
 - The key challenge to fielding an MPAR system will be development of a **Cost Effective System Architecture**
 - Threshold level **MPAR Technology Is Available**
 - Future advancements will influence system affordability
 - Next steps should include **System Architecture Development** and **Technology Risk Reduction**