



NEXT GENERATION TRANSPARENCY (NGT) PROGRAM

DDR&E AFFORDABILITY TASK FORCE CONFERENCE

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BRIEFING OUTLINE

- **AFFORDABILITY INITIATIVES**
- **AFRL AT/IPPD MODEL PROCESS**
- **NGT PROGRAM STATUS**
- **SUMMARY**



AFFORDABILITY INITIATIVES



AFFORDABLE TECHNOLOGY THROUGH INTEGRATED PRODUCT AND PROCESS DEVELOPMENT (AT/IPPD)

- **NGT SELECTED AFRL AT/IPPD PILOT PROGRAM**
- **NGT DDR&E AFFORDABILITY TASK FORCE PILOT**
 - **COOPERATIVE AGREEMENTS CITE AFRL MODEL PROCESS**



NGT COOPERATIVE AGREEMENTS

Article 8. Integrated Product and Process Development (IPPD)

The program will strive to produce Affordable Technology through Integrated Product and Process Development (AT/IPPD) by embracing the Model Process developed by the Government.

...shall employ IPPD methods to quantify the costs and risks associated with new technology demonstrated in the program.

...shall also include use of DDR&E Affordability Task Force Criteria for Assuring a Focus on Affordability as metrics to measure program success.



AFRL AT/IPPD MODEL PROCESS



ASSESSMENT OF AFRL AT/IPPD MODEL PROCESS

PRO

- POWERFUL SYSTEM
CUSTOMER BUY IN
- STREAMLINED, FLEXIBLE
PROCUREMENT
- BROAD, EFFECTIVE
TEAMING FOR SUCCESS
- VIRTUAL MEETINGS SAVE
TIME & COST
- ROBUST DECISION
MAKING TOOLS

CON

- COST OF TRAINING &
FACILITATION REQUIRED
- TIME FOR TRAINING AND
IPT BASED PROCESSES

**APPEARS THAT: AT/IPPD OFFERS SIGNIFICANT RETURN ON INVESTMENT
[WILL BE CONFIRMED BY CUSTOMER AFFORDABILITY ANALYSIS]**



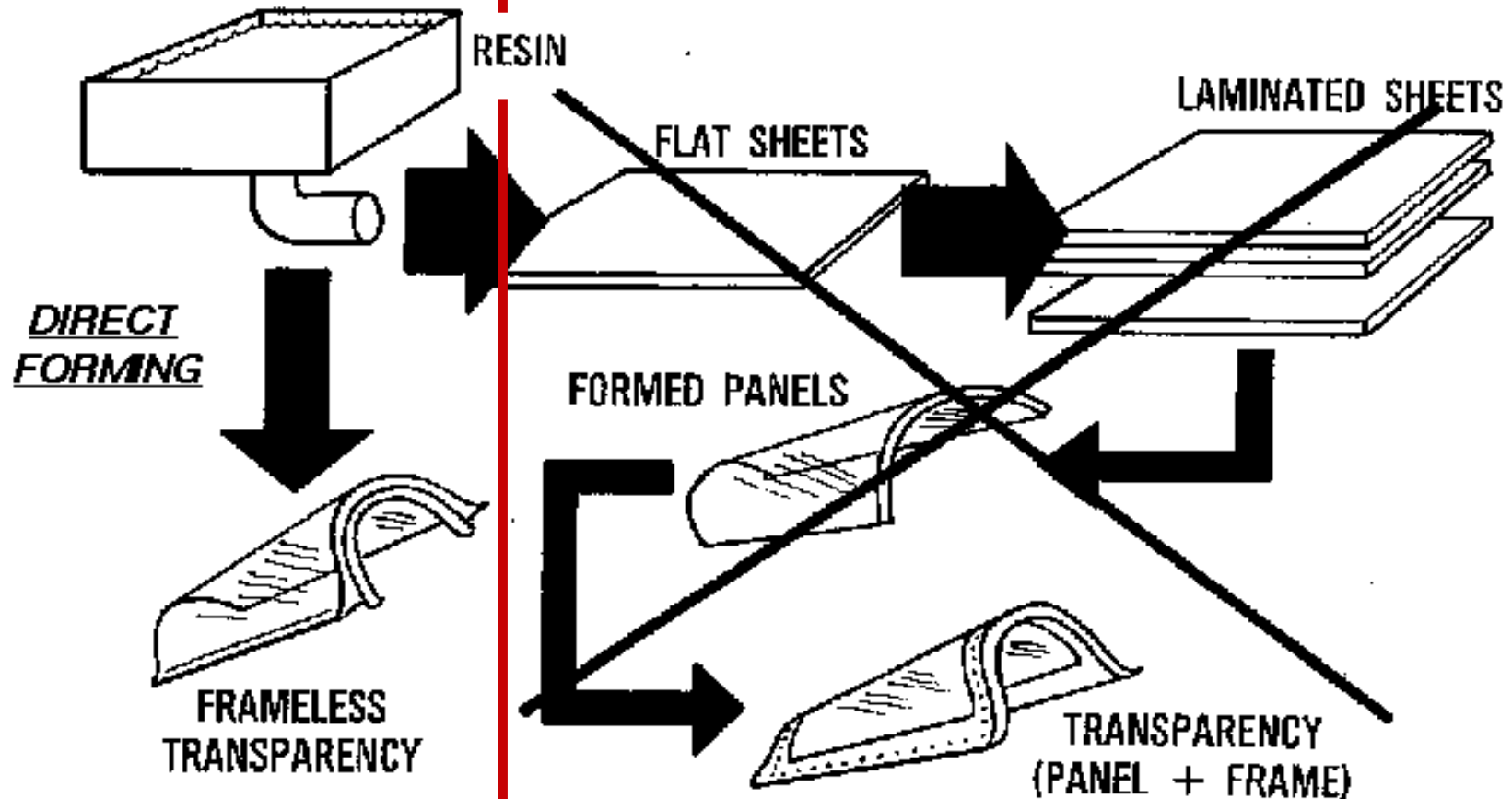
NGT PROGRAM STATUS



NGT TECHNOLOGY OVERVIEW

9 Steps for Frameless

30 Process Steps For F-16 Canopy

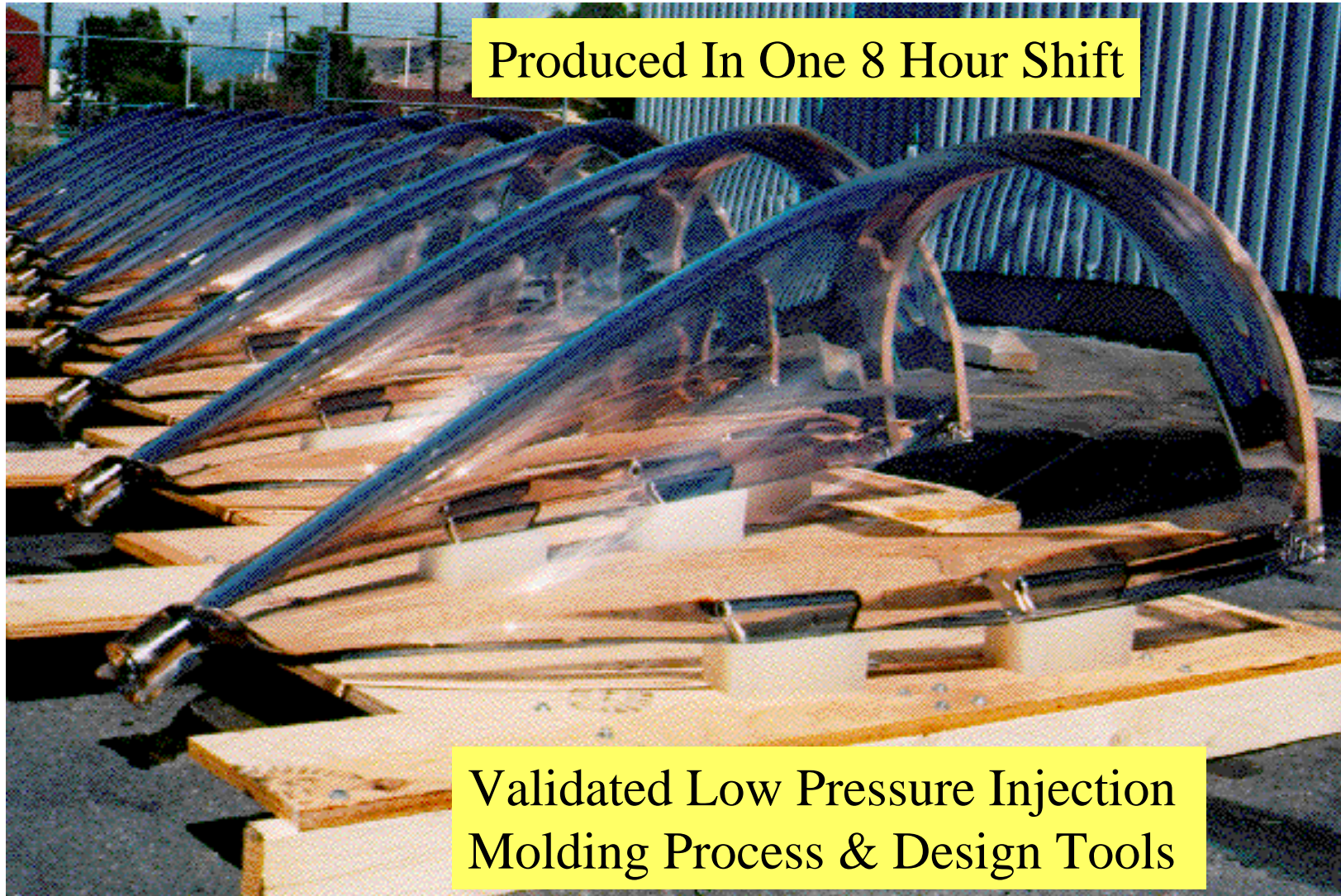


Ability to Vary Thickness
Saves Weight

>20% Scrap Rate After Final Optical Tests



NGT SLASHES MANUFACTURING TIME/COST



Produced In One 8 Hour Shift

Validated Low Pressure Injection
Molding Process & Design Tools



NGT PROGRAM

- **OBJECTIVE:**

- TECHNOLOGY INTEGRATION FOR AFFORDABLE TRANSPARENCY SYSTEMS WHICH SATISFY MISSION REQUIREMENTS

- **APPROACH:**

- EMBRACE AFRL MODEL PROCESS FOR AT/IPPD
- MEET ENTRANCE CRITERIA FOR CUSTOMER DEVELOPMENT
 - > JOINT STRIKE FIGHTER & F-22

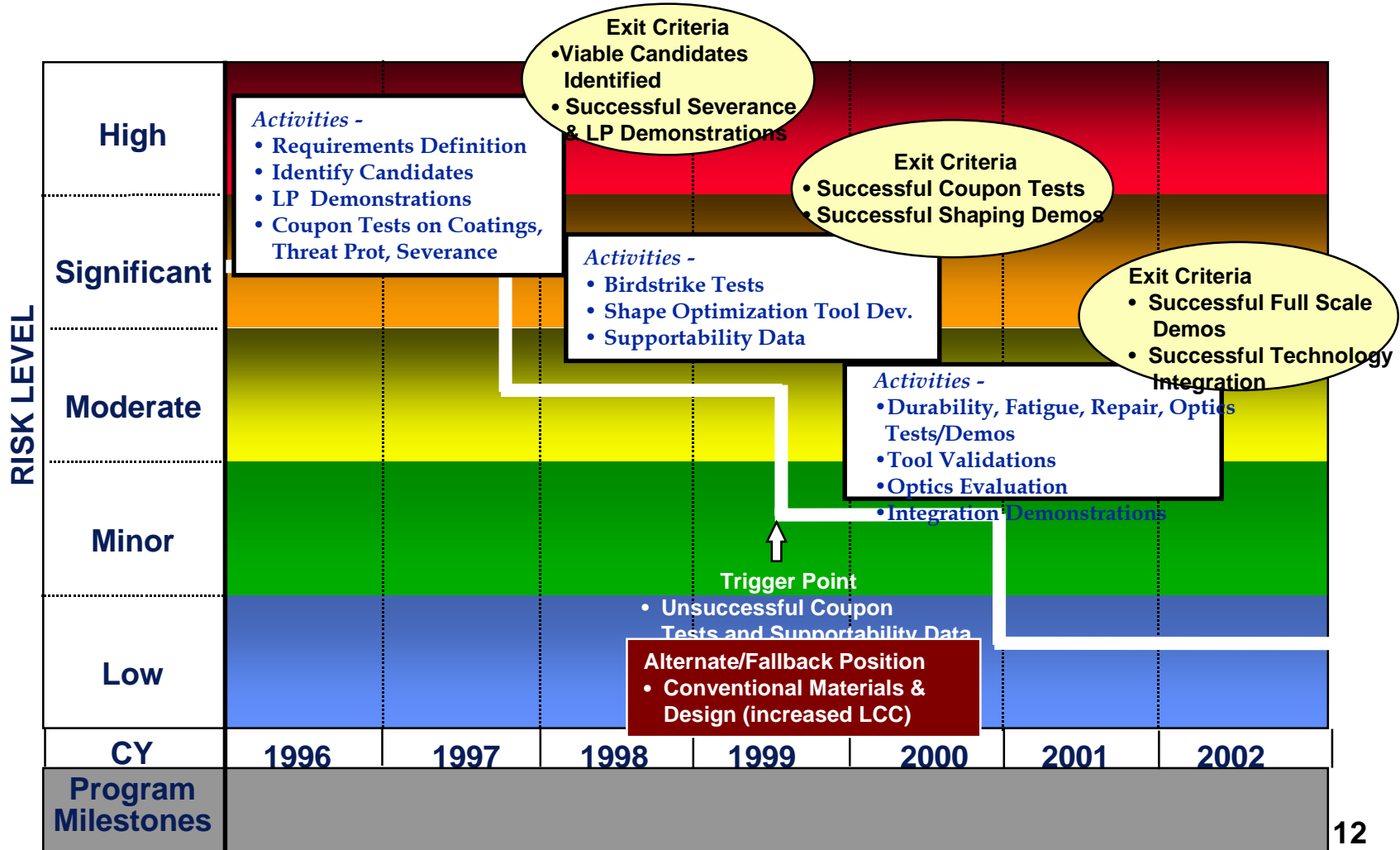
- **DELIVERABLES:**

- CUSTOMER CONFIRMED AFFORDABILITY ANALYSIS
- FLIGHT WORTHINESS CERTIFICATION / DEMO PLATFORM
- INJECTION MOLDING TOOL & MANUFACTURING PROCESS
- FULL SCALE DEMONSTRATION ARTICLES



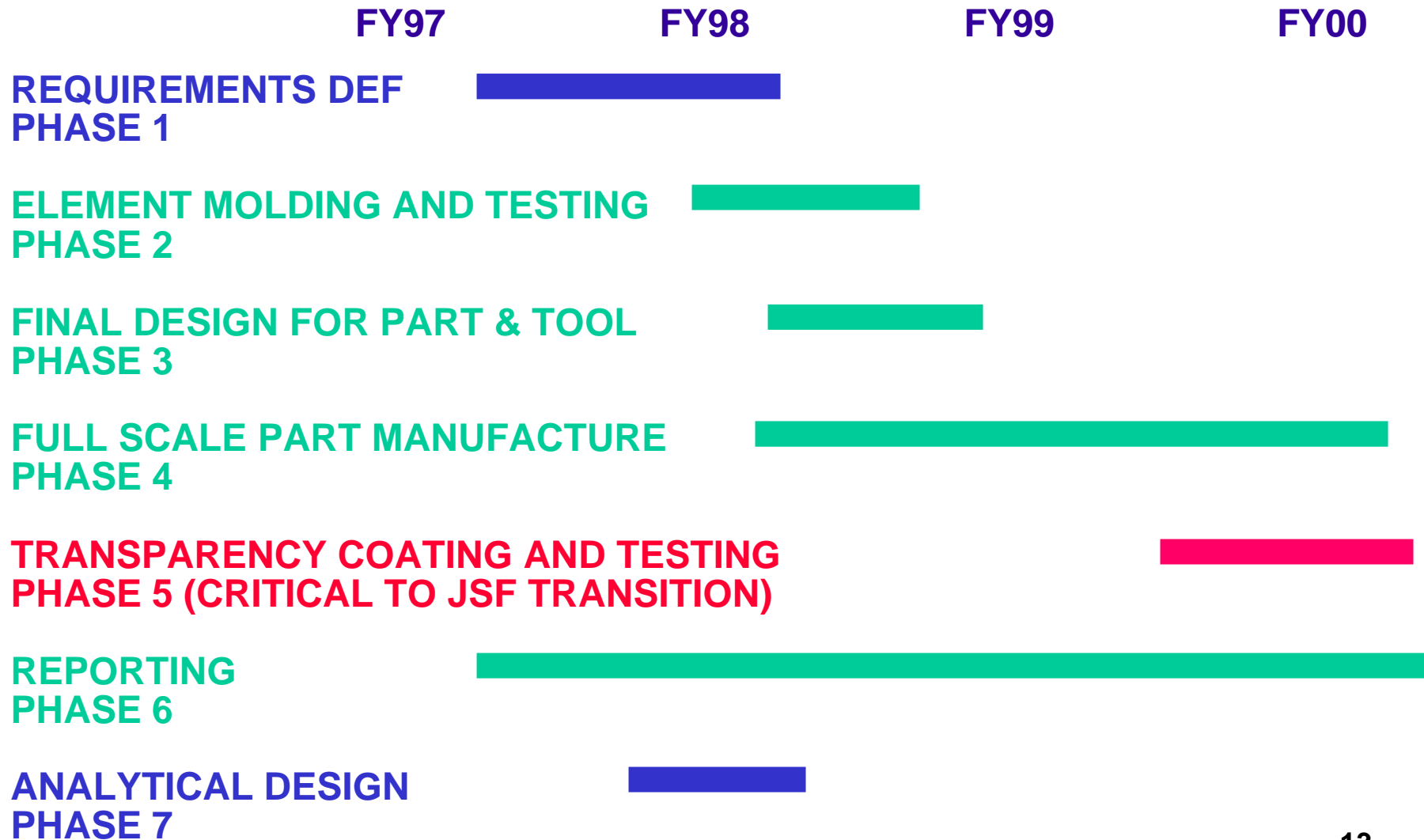
TECHNOLOGY INSERTION PLAN

JAST TECH MAT STUDY FOR AIRCRAFT TRANSPARENCIES





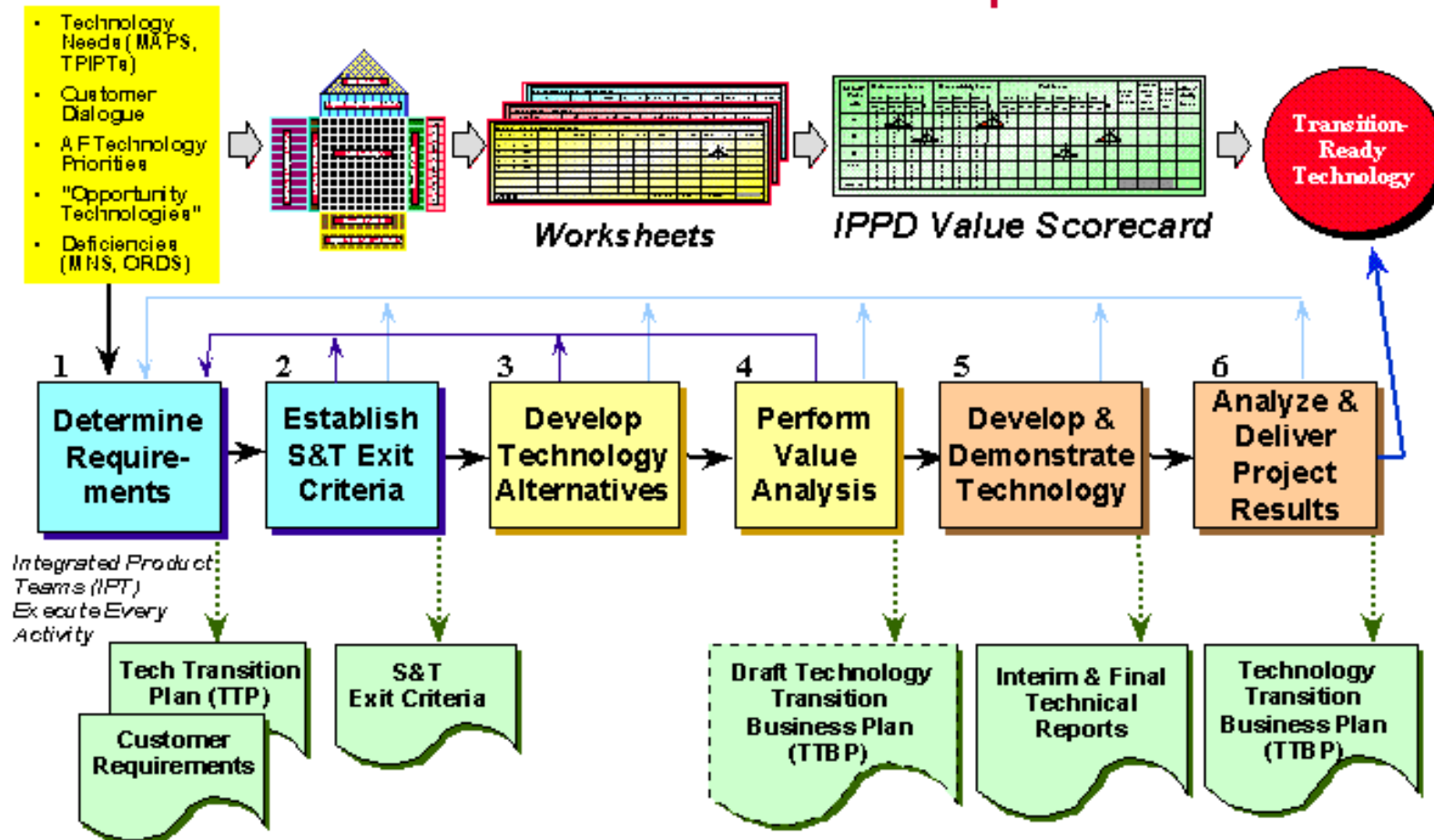
NEXT GENERATION TRANSPARENCY SCHEDULE





AIR FORCE S&T IPPD PROCESS MODEL

S&T IPPD Process Model - Top Level





NGT HOUSE OF QUALITY (PARTIAL)

EXAMPLE OF TAILORED AT/IPPD TOOLS BEING USED
 Design Variables

Requirement	Priority	Loft Line Deviation	Unfinished LT	Tool Surface Finish	Material Temp.	Mfg Defects	Min Thickness	# Process Steps	Parts Count	Abrasion Suscep	Weight	How Measured	Goals & Tolerances
		←	→	←	0	←	0	←	←	←	←		
Escape System Compat	3											Clearance (inches)	Mil Spec, 30x30 inch aper
Integrate with HUD	3											Net Angular Deviation (mrad)	≤ 0.1
Withstand bird impact	3											4 lb bird, 500 keas below 5,000 ft	No Penetration, No Injury
Reliable Attachment to Aircraft	3											Cockpit Press Load, psi	5.5 psi
												Gust Load Cap, Open, kts	60 kts
												Latching Load Cap, Lbs	3000 lbs
												Locking Reliability (Prob Fail)	P = 1e-7
Producible	3											Mfg. Yield	> 95%
On Demand Response	2											Cycle Time in days	< 25
Low Life Cycle Cost	3											8-Year LCC Goal (% Reduction)	> 50%
			Inches	LT (%)	RMS Smooth	Chr Sh Index	DPU	Inches	# Steps	# Parts	Bayer Test	% of Existing	How Measured
		≤ 0.105	> 50 %	≤ 0.0025"	< 0.3	< 0.095	0.94 ±.02	< 20	< 40	< 6% Incr	< 90%	Target Value & Tolerances	



PLATFORM SELECTION PROCESS

* AHP PAIR-WISE COMPARISONS

ANOTHER AT/IPPD TOOL BEING USED

	Size	Mfg	Risk	Single	Demand	JSF	Flight
Platform Size	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Manufacturability	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Risk ('real')	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Single Piece	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Customer Demand	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
JSF Support	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Flight Trial Potential	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Risk is more important than Manufacturability

JSF Support is MUCH more important than Flight Trial Potential

* AHP - ANALYTIC HIERARCHY PROCESS



SELECTION OF F-22 PLATFORM FOR NGT DEMO ACCEPTED BY JSF





NGT PROGRAM RETURN ON INVESTMENT

- **APPLICATION TO FIXED WING VEHICLE PROGRAM, SUSTAINMENT, MULTI-DISCIPLINARY:**
 - > **SPAN ALL DOD FIXED & ROTARY WING VEHICLES**
 - > **\$1B COST AVOIDANCE JSF INITIAL PRODUCTION**
 - > **REDUCE CANOPY WEIGHT 100 LB FOR JSF**
 - > **REDUCE CHANGEOUT TIME FROM DAYS TO MINUTES**
 - > **REDUCE PARTS COUNT 90%**
 - > **PRECISELY REPEATABLE OPTICS FOR HUD/HMD**
 - > **DUAL USE:**
 - » **AUTOS**
 - » **COMMERCIAL AIRCRAFT**
 - » **HELICOPTERS**



SUMMARY

- **NGT PROGRAM GOAL:**
 - > INJECTION MOLDED FRAMELESS TRANSPARENCY TECHNOLOGY IN AN **AFFORDABLE**, INTEGRATED DESIGN THAT MEETS THE FUTURE MISSION REQUIREMENTS FOR JSF AND F-22
- **CURRENT STATUS NGT PROGRAM:**
 - > SYSTEM CUSTOMER BUYOFF ON REQUIREMENTS
- **VALUE OF AT/IPPD FOR NGT:**
 - > PAYOFFS (EARLY IN MODEL PROCESS)
 - » CUSTOMER COMMITMENT
 - » STREAMLINED/FLEXIBLE ACQUISITION
 - » BROAD TEAMING
 - » ROBUST DECISION MAKING