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TRW

Evaluation Criteria Applicable to Architecture-Based Ground Station Development

GSAW 97

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Satellite Ground Station Architecture

Today's World

- Low life cycle costs mandatory for ground station operations
 - Needed for Classified, DOD, NASA, and commercial satellites
 - Covers all phases: Acquisition, Operations, and Sustainment

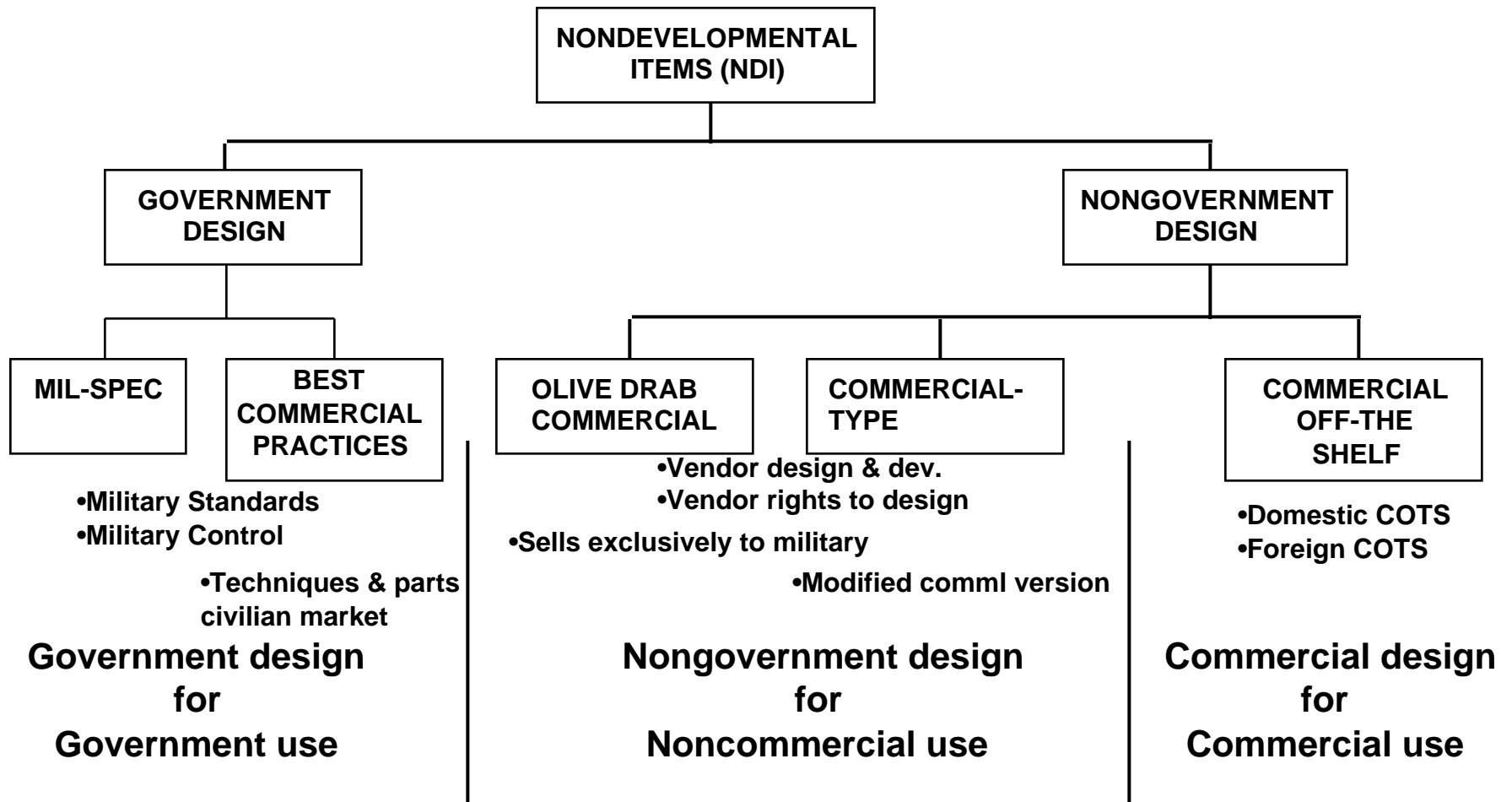
Features Desired:

- Multiple missions controlled by a single control center
- Multi-constellation controlled from single workstation
- Automated ground resource management
- Standard Human Computer Interface
- Open, distributed object oriented architecture, COTS
 - Plug'n Play from different vendors
- Database table driven

Ground Station Architecture and Use of Commercial Items

- **More and more commercial equipment and software are being mandated by the military for integration into ground station architecture**
 - **Front-end acquisition advantages of lower research and development cost and less time to field than MIL-SPEC designs**
 - **Benefit from the economies of dealing in a high-volume civilian market**
- **However, improper handling of COTS can cause long-term problems in mission performance and support that may more than erase initial advantages**
- **Evaluation criteria can assist in deciding when to use commercial products and when to develop MIL-SPEC items**

NonDevelopment Item Hierarchy



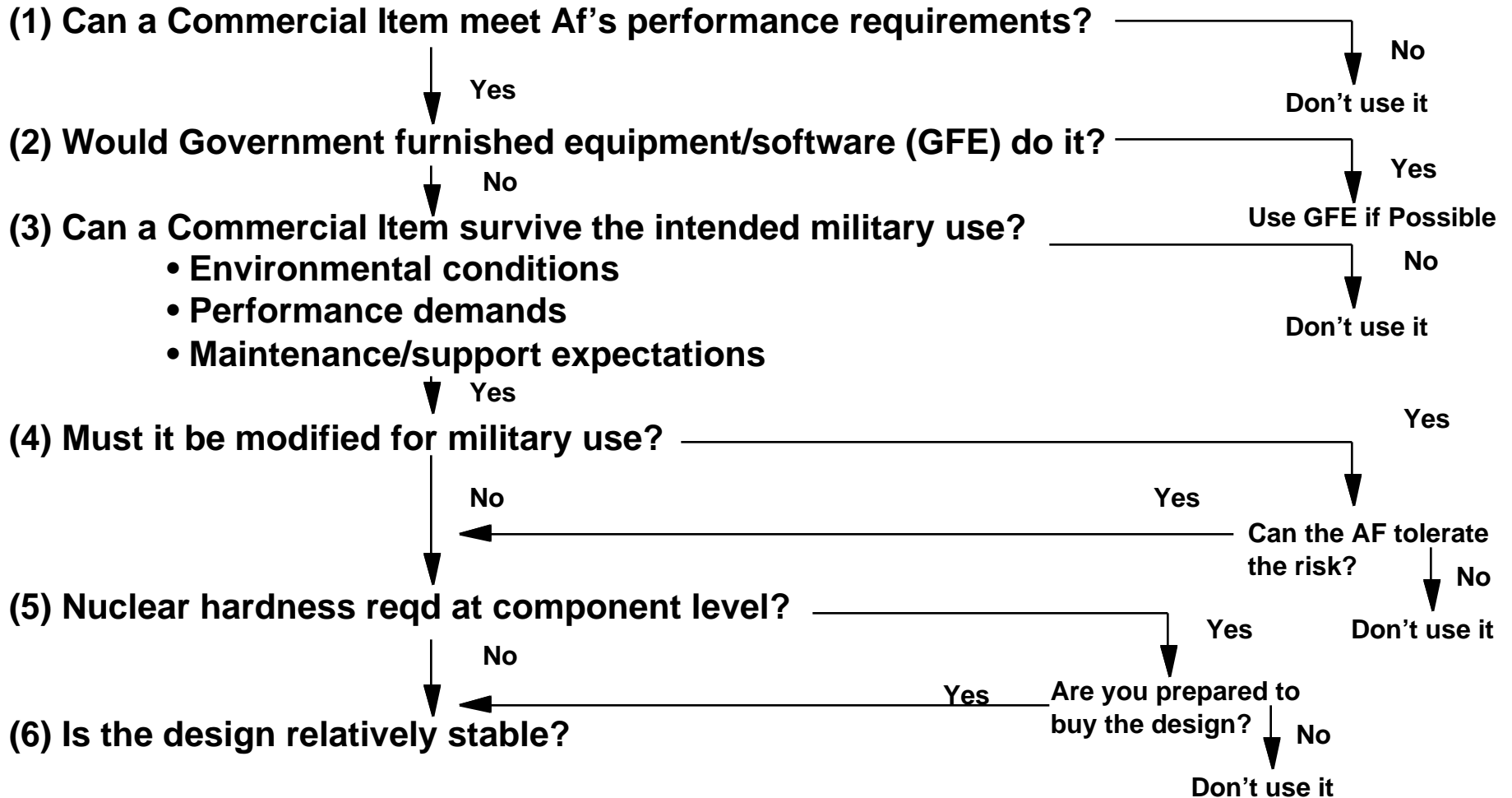
The Commercial Spectrum

	MIL-SPEC	BEST COMMERCIAL PRACTICES	OLIVE DRAB COMMERCIAL	COMMERCIAL- TYPE ("Special")	COTS
DESIGN FEATURES	Govt: Militarized	Govt: Not Militarized	Commercial: Just for Govt	COTS: Mod for Govt	For Civil Market
EXAMPLES	Fighter Aircraft	Fixed Ground Radio	Tactical Radio	Embedded Computer	Television Monitor
% OF SALES TO GOVT	100%	100%	Probably 100%	Small (of basic items)	Small
DESIGN DISCLOSURE	Full (piece part)	Full (piece part)	F3 (Form, Fit and Function) & Full	F3 with some disclosure	F3
CONFIG. AUTHORITY	Government	Government	Vendor	Vendor	Vendor
DESIGN STABILITY/ RISK	Low	Low	Moderate to low	Moderate to High	High
LONG-TERM SUPPORT/ COST RISK	Low	Low	Moderate	High	Moderate to High

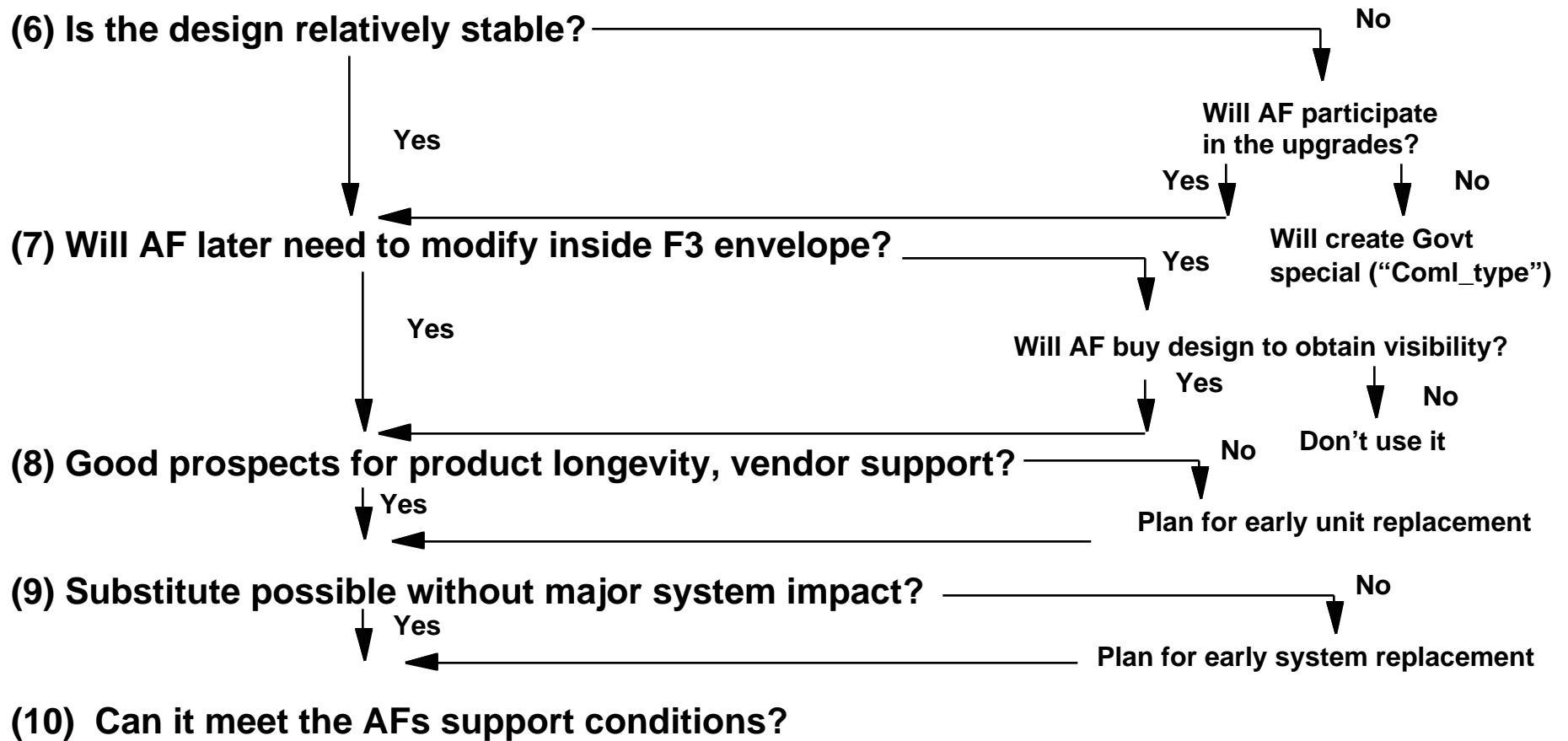
COTS Evaluation Criteria

- **Can a commercial item meet ground station performance requirements? (Will it do the job or only partially?)**
- **Would government furnished equipment (GFE) do the job?**
- **Must it be modified for military use?**
- **Can it survive intended military use?**
- **Is the design relatively stable?**
- **Good prospect for product longevity, vendor support?**
- **Is product replacement possible without a major system impact?**
- **Is a COTS product the lowest-cost alternative?**

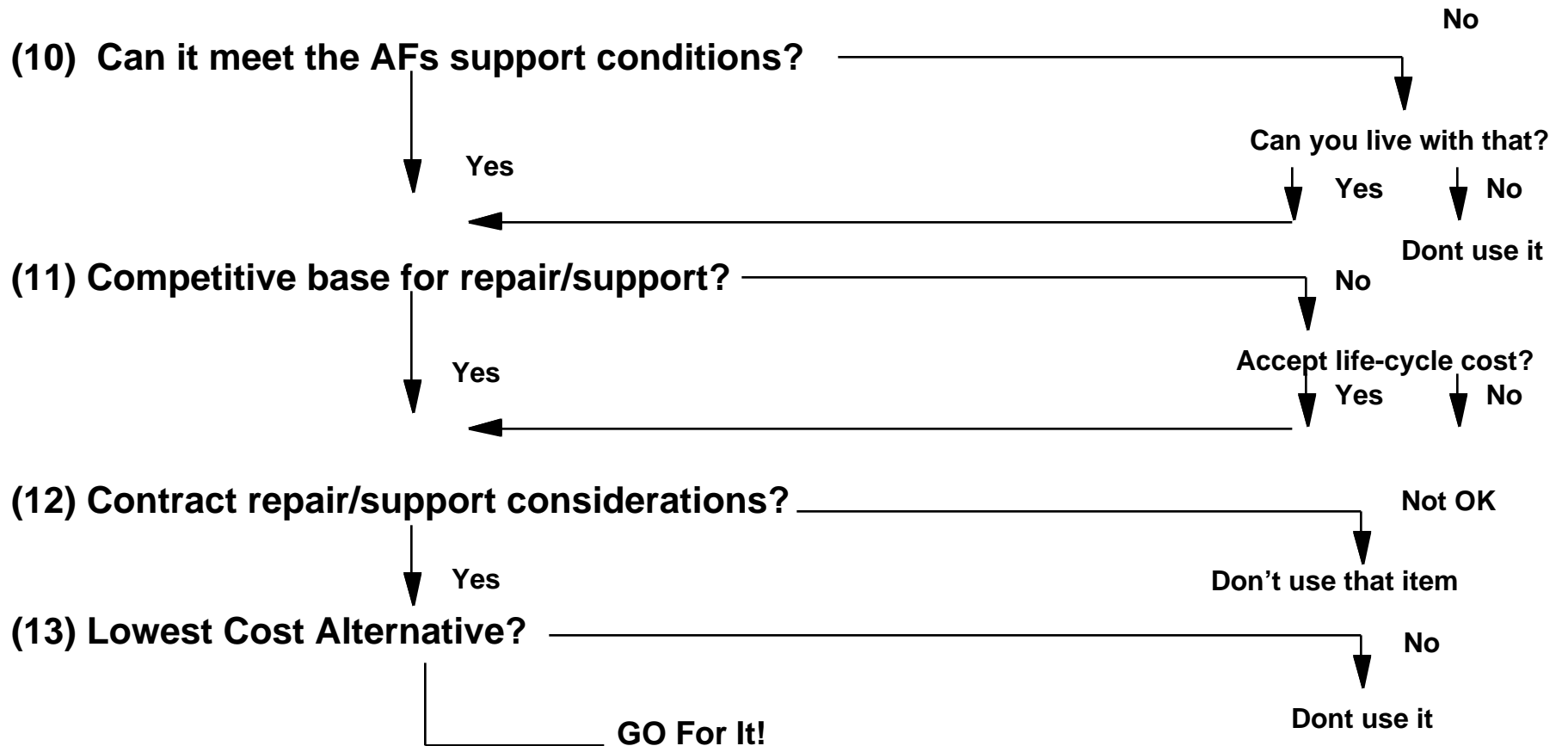
COTS Decision Making



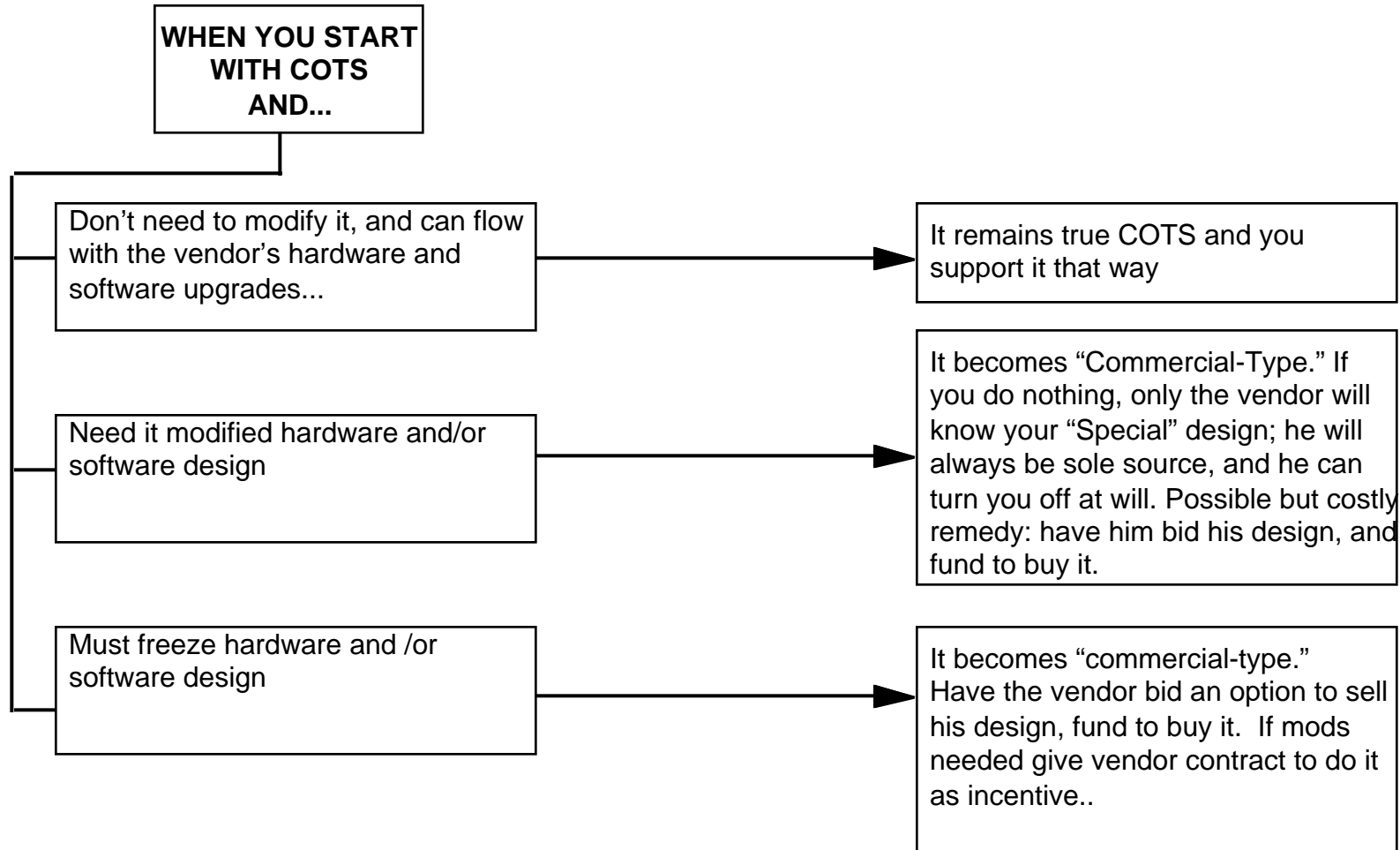
COTS Decision Making



COTS Decision Making



What Happens To Support When COTS Stops Being COTS



Summary

- **Ground station architecture development must consider equally HW, SW and commercial items throughout all design and implementation phases**
 - **Conduct early market investigation of available commercial items that can support mission needs**
 - **Design several preliminary architectures which could be acceptable**
 - **Based upon preliminary architectures prototype and evaluate hardware, software and commercial items together**
 - **During implementation of selected architecture continue to evaluate new and improved commercial items**
- **Failure to consider commercial items early can lead to an architecture which is**
 - **Inferior**
 - **Reduces mission performance**
 - **Higher life cycle cost**