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Update: FPGA Trust/Assurance Study

USG/DIB FPGA Assurance Community of Interest Meeting

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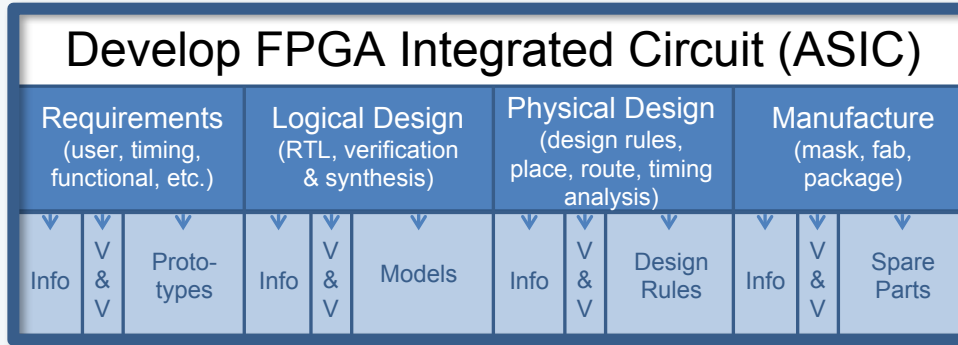
BACKGROUND

- 2014 “Trust in FPGAs” Study – what was it?
 - In-depth review of the design, development, provisioning, and system considerations of FPGAs and the tools, information, and processes supporting this
 - Focused on US-based FPGA vendors, design tool developers, and end-users/system integrators of FPGA-based systems for the DoD and IC
 - Assessed relative risk across the FPGA lifecycle based upon postulated attacks weighed against their difficulty to conduct and consequence if successful
 - Highlighted areas where USG investment could address highest risk elements of the lifecycle – some of which are being worked today

FPGA Assurance: Lifecycle Considerations

FPGA Vendor

Acquire
Materials
Tools
Hard IP

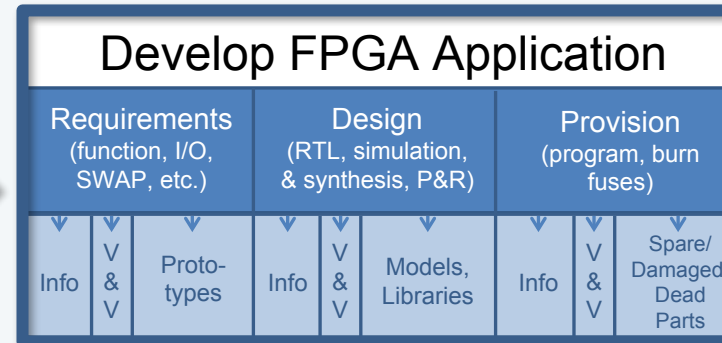
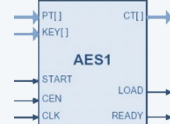
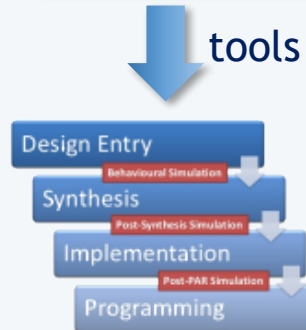


unprogrammed
devices



System Developer

Acquire
FPGAs
Tools
Soft IP



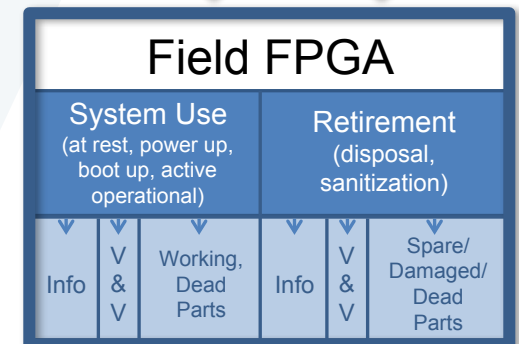
bitstream

Deploy
System



upgrade/
re-purpose

Field FPGA



Why Update the 2014 Study?

- Review and document relevant technical improvements and trust & assurance developments in the FPGA market since 2014
 - Updates from the 4 major US-based FPGA Vendors: Xilinx, Intel, Microchip *and Lattice*
 - Updates pertinent to FPGA EDA tools, IP, and end-user application development
 - Intention is not to revisit each 2014 topic from scratch
 - Assurance considerations pertaining to development and usage of system-on-chip devices is of special interest – emergent area since 2014 study concluded
- Results are intended to consider and complement other ongoing USG FPGA efforts as appropriate
 - Title III FPGA effort, DoD FPGA Assurance Strategy, eFPGA initiatives, other...

What's New Since 2014?



Industry Shifts

- Altera → **Intel PSG**; Actel → Microsemi → **Microchip**
- **Lattice** → ~~Canyon~~ **Bridge**
- **Xilinx** → **AMD**

▪ eFPGA

Tech Advancements

- 14nm/16nm → 7nm; novel NV memory technologies
- Complex SoC-FPGA architectures becoming ubiquitous
- 2.5D/3D and Heterogenous Integration solutions

- Bitstream authentication, PUFs, secure boot (SoCs), SCA mitigation, etc.

USG Initiatives

- **T&AM Quantifiable Assurance / JFAC FPGA Assurance**

- NDIA FPGA Device Mfr WG
- AFRL FPGAs for Space - GOMAT

▪ 5200.44 Update



2020 FPGA Study Update Status

- Assembled USG Advisory Panel
 - DoD and IC SMEs and Stakeholders to review RFI material and study team results
- Requests for Information (RFIs) disseminated
 - RFI Focus Areas: FPGA Vendors, IP Vendors, EDA Tool Vendors, End-user developers
 - Majority of RFI responses have been received and briefed to USG Panel
- Develop informational references supporting T&AM FPGA Assurance efforts
 - Up-to-date technical information
 - Establish technical basis for ongoing activities
 - Investment, partnership, and research opportunities
- SNL update to conclude with final deliveries Sept 2021



QUESTIONS?