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“VLSI design and test for enhanced systems dependability”

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Program term: FY2007~2014

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- In its 6th year of the 8 year term

*CREST: http://www.jst.go.jp/kisoken/crest/en/index.html

Attributes, Threats, and Means in Dependability as defined by IFIP:

Attributes	way to assess the dependability of a system
Availability	readiness for correct service
Reliability	continuity of correct service
Safety	absence of catastrophic consequences on the users/environment
Integrity	absence of improper system alteration
Maintainability	ability for a process to undergo modifications and repairs
Threats	things that can affect the dependability of a system
Fault	defect in a system
Error	discrepancy between the intended and actual behavior of a system
Failure	system behavior that is contrary to its specification
Means	ways to increase a system's dependability
Prevention	preventing faults being incorporated into a system
Removal	fault removal during development and removal during use
Forecasting	prediction of faults to remove them or circumvent their effects
Tolerance	putting fault-tolerant mechanisms in place

Rationale for research in DVLSI

VLSI: Is the component key to systems of all kinds. Its dependability is at the foundation of systems dependability.

Problems: The dependability of VLSI is actually being increasingly more threatened.

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Threats arising from miniaturization

Variations in dimensions, shapes, doping densities,

Decrease in S/N ratio (radiation, EMI, fixed and floating charges),

Aggravating wear/fatigue phenomena (NBTI, hot carriers, electro-migration).

Threats arising from increased complexity

Enhanced functionality (id, encryption,---)

Multiple- Many-core architecture, multi-thread operation,

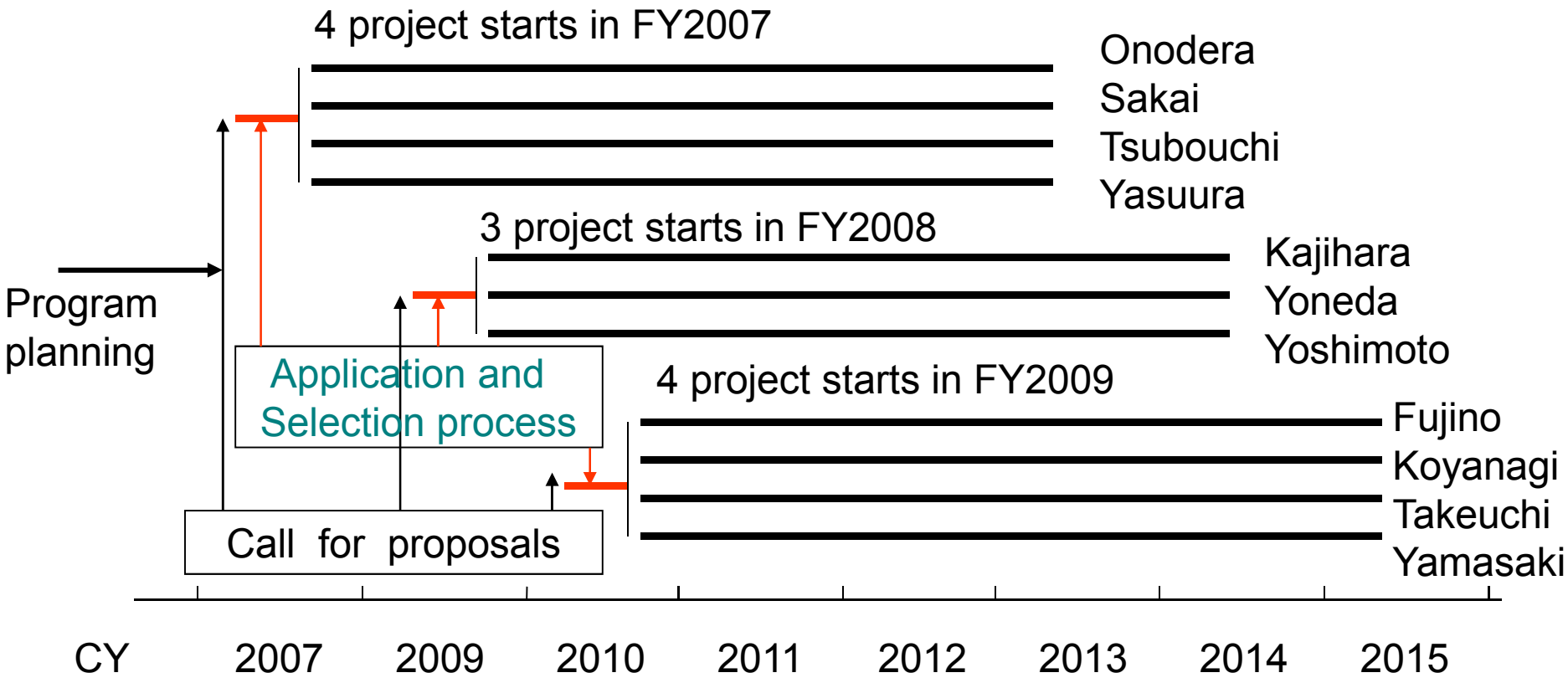
Heterogeneous integration
Analog, digital, nonvolatile, network, sensors, actuators, etc.

Mission of the DVLSI Program:

1. Contain Rising Threats within VLSI (Component Supposed to be Most Dependable) by Design and/or Testing

2. Provide New Functionalities in VLSI which Improve Dependability at the Systems Level

Selection and Terms of the DVLSI Projects

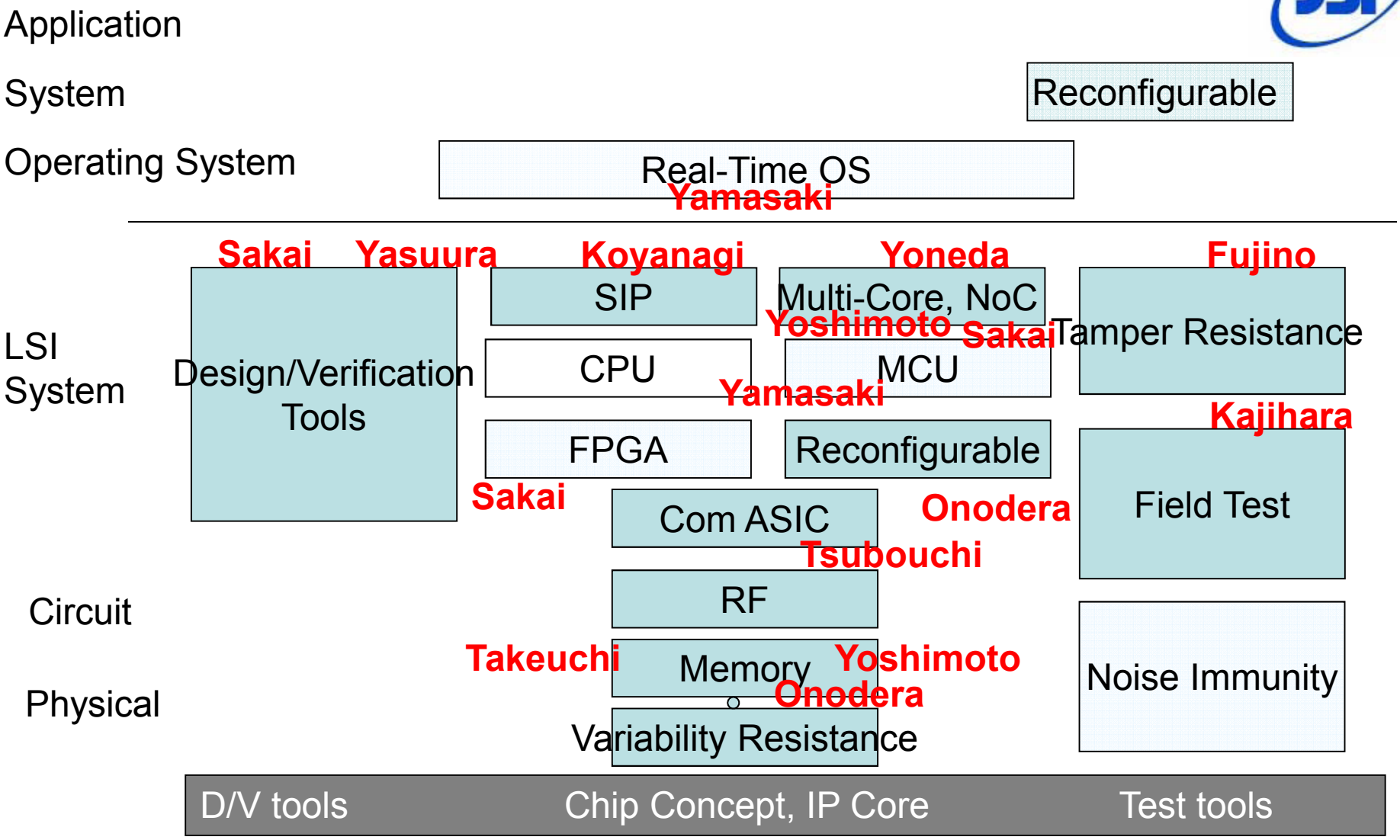


Program Term: 2007- 2015

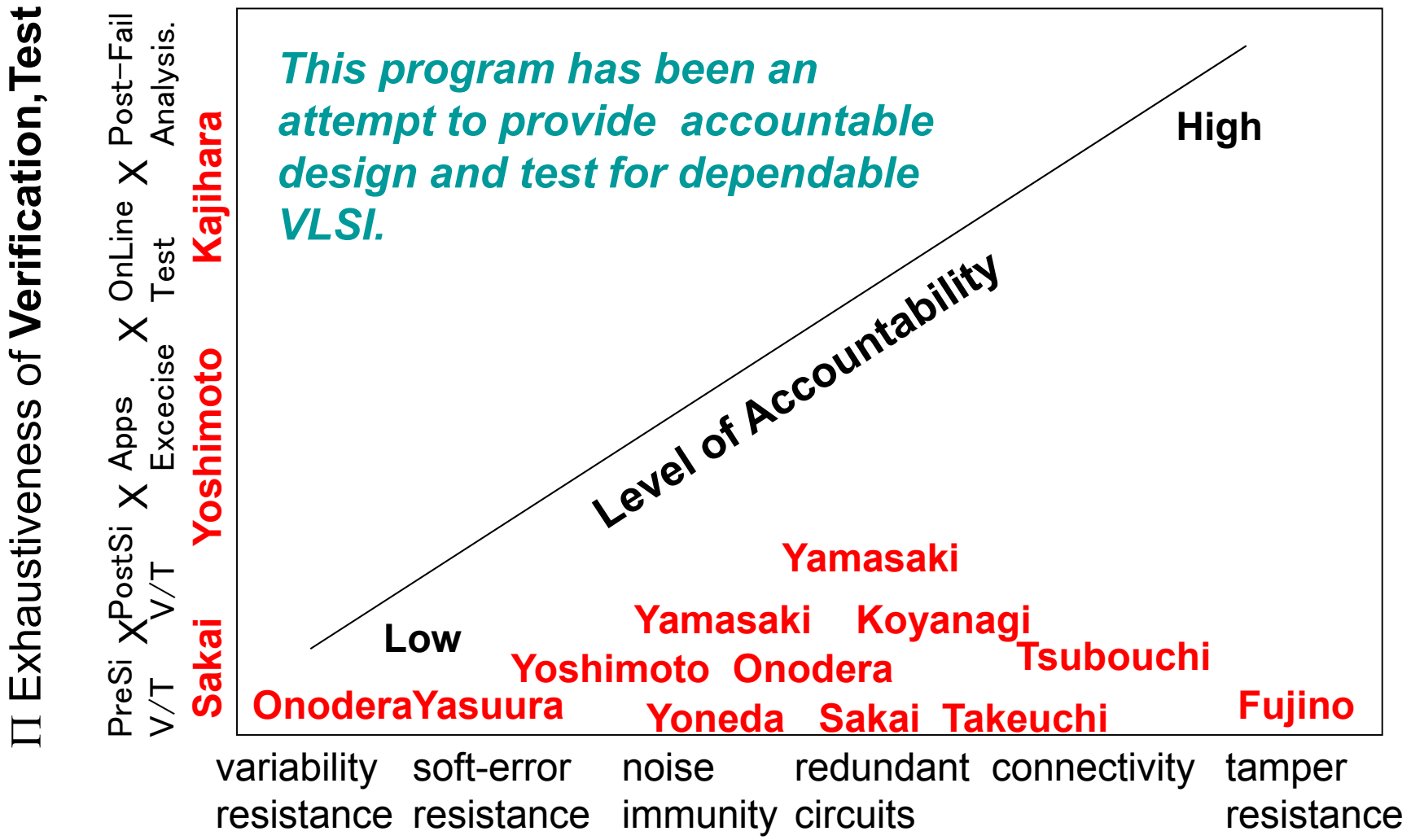
Applications eyed and Approaches taken

Application	Space	Plant Control Transportation	Robot	Auto	Information Telecom	Finance Medical	Consumer
Onodera	Reconfigurable Processor, FF Design, Layout for Manufacturability						
Sakai	Failure-Resistant Architecture, Formal Design Verification						
Tsubouchi				Wide Bandwidth RF, FDE、Coding,, Connectivity, Heterogeneous Interface			
Yasuura	Systems-Level Soft-error Simulation, Soft-error-resistant Circuit/Systems Design						
Kajihara	Design/Test for Field Dependability						
Yoshimoto		Soft-Error-Resistant Memory, Systems-Level Simulation					
Yoneda		Networked Multi-Core Systems					
Koyanagi			Dependable 3D Processor for Image-Recognition				
Takeuchi				Wireless Solid-State Drive, Wireless Interconnect, Wireless Power			
Fujino					Tamper-Resistant Circuits, Tamper-resistance test		
Yamasaki	Real-time OS, controller, and packaging for Hard-Real-Time applications						

Areas DVLSI Projects cover:



VLSI Dependability = Π (Strength of Means against Threat) x Π (Coverage of Verification and Test)



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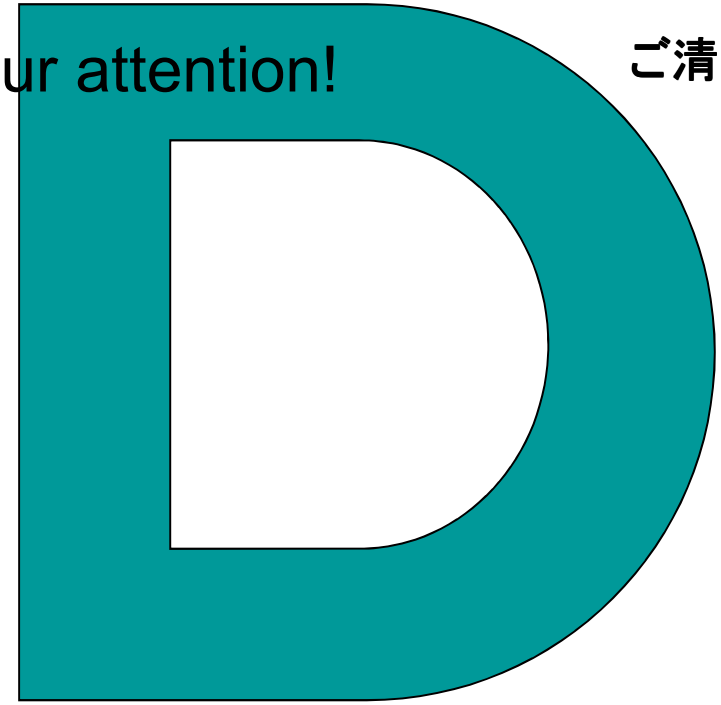
Thank you for your attention!

ご清聴ありがとうございました



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