University of Connecticut

CHASE Survey on 6 Most Important Topics in Hardware Security

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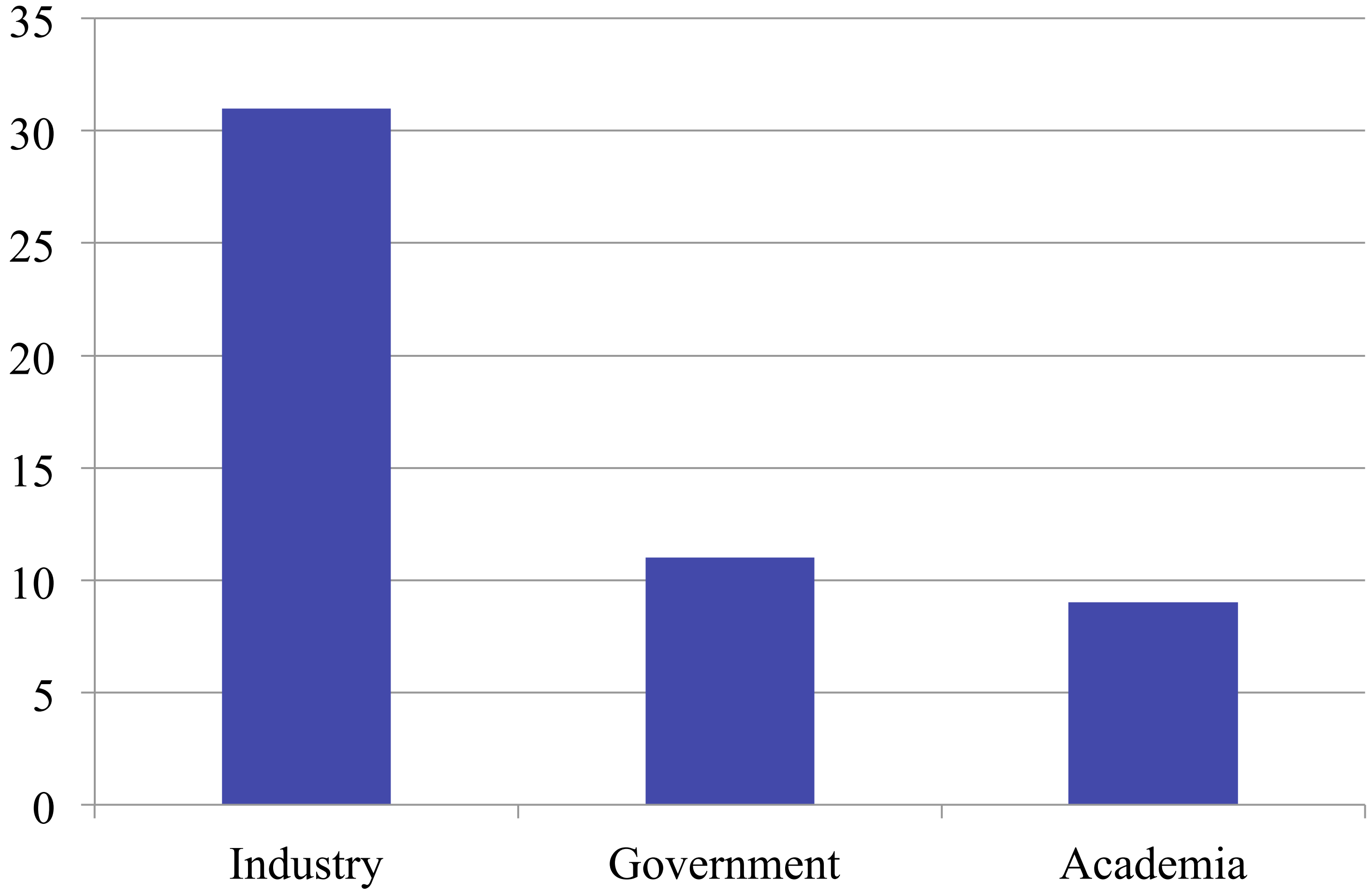
Topics

- Counterfeit Electronic Components and Supply Chain
- Hardware Security and Trust
- Reliability
- System Security
- Standards
- Emerging Threats

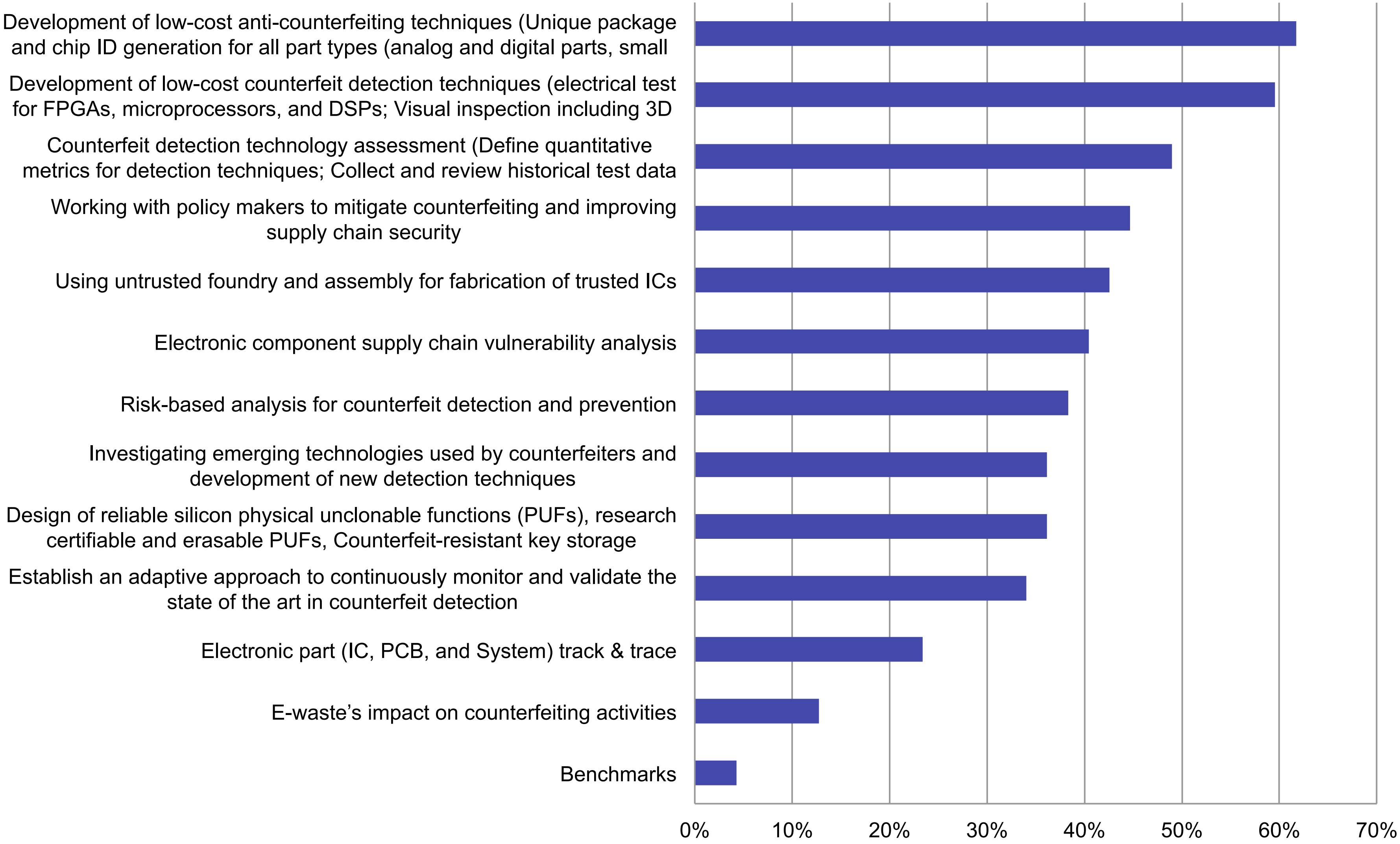
Distribution of Participants



Counterfeit Electronic Components and Supply Chain

Answer Choice	Responses in %	Responses in #
Development of low-cost anti-counterfeiting techniques (Unique package and chip ID generation for all part types (analog and digital parts, small and large ICs, passive and active components)	61.70%	29
Development of low-cost counterfeit detection techniques (electrical test for FPGAs, microprocessors, and DSPs; Visual inspection including 3D optical imaging, THz, etc. for all components; Margin tests (Flash, DRAM, SRAM, Microprocessors, etc.)	59.57%	28
Counterfeit detection technology assessment (Define quantitative metrics for detection techniques; Collect and review historical test data and evaluate effectiveness of test techniques, sequences and test combinations; Tools and methodologies for identifying a minimum set of tests to be performed for maximum test confidence; metrics to measure effectiveness of test techniques)	48.94%	23
Working with policy makers to mitigate counterfeiting and improving supply chain security	44.68%	21
Using untrusted foundry and assembly for fabrication of trusted ICs	42.55%	20
Electronic component supply chain vulnerability analysis	40.43%	19
Risk-based analysis for counterfeit detection and prevention	38.30%	18
Design of reliable silicon physical unclonable functions (PUFs), research certifiable and erasable PUFs, Counterfeit-resistant key storage	36.17%	17
Investigating emerging technologies used by counterfeiters and development of new detection techniques	36.17%	17
Establish an adaptive approach to continuously monitor and validate the state of the art in counterfeit detection	34.04%	16
Electronic part (IC, PCB, and System) track & trace	23.40%	11
E-waste's impact on counterfeiting activities	12.77%	6
Benchmarking	4.26%	2

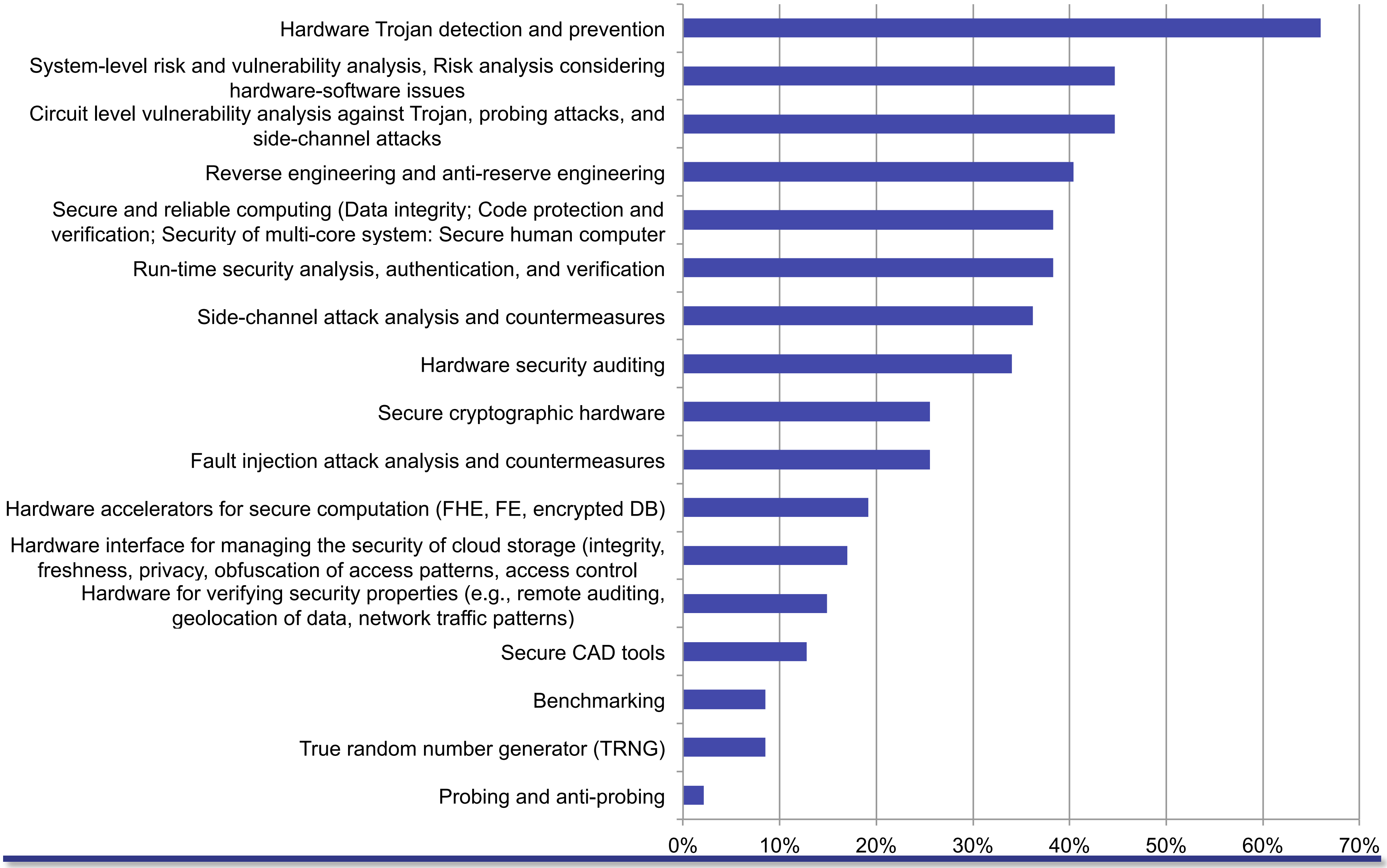
Counterfeit Electronic Components and Supply Chain



Hardware Security and Trust

Answer Choice	Responses in %	Responses in #
Hardware Trojan detection and prevention	65.96%	31
Circuit level vulnerability analysis against Trojan, probing attacks, and side-channel attacks	44.68%	21
System-level risk and vulnerability analysis, Risk analysis considering hardware-software issues	44.68%	21
Reverse engineering and anti-reserve engineering	40.43%	19
Run-time security analysis, authentication, and verification	38.30%	18
Secure and reliable computing (Data integrity; Code protection and verification; Security of multi-core system: Secure human computer interface)	38.30%	18
Side-channel attack analysis and countermeasures	36.17%	17
Hardware security auditing	34.04%	16
Fault injection attack analysis and countermeasures	25.53%	12
Secure cryptographic hardware	25.53%	12
Hardware accelerators for secure computation (FHE, FE, encrypted DB)	19.15%	9
Hardware interface for managing the security of cloud storage (integrity, freshness, privacy, obfuscation of access patterns, access control policy)	17.02%	8
Hardware for verifying security properties (e.g., remote auditing, geolocation of data, network traffic patterns)	14.89%	7
Secure CAD tools	12.77%	6
True random number generator (TRNG)	8.51%	4
Benchmarking	8.51%	4
Probing and anti-probing	2.13%	1

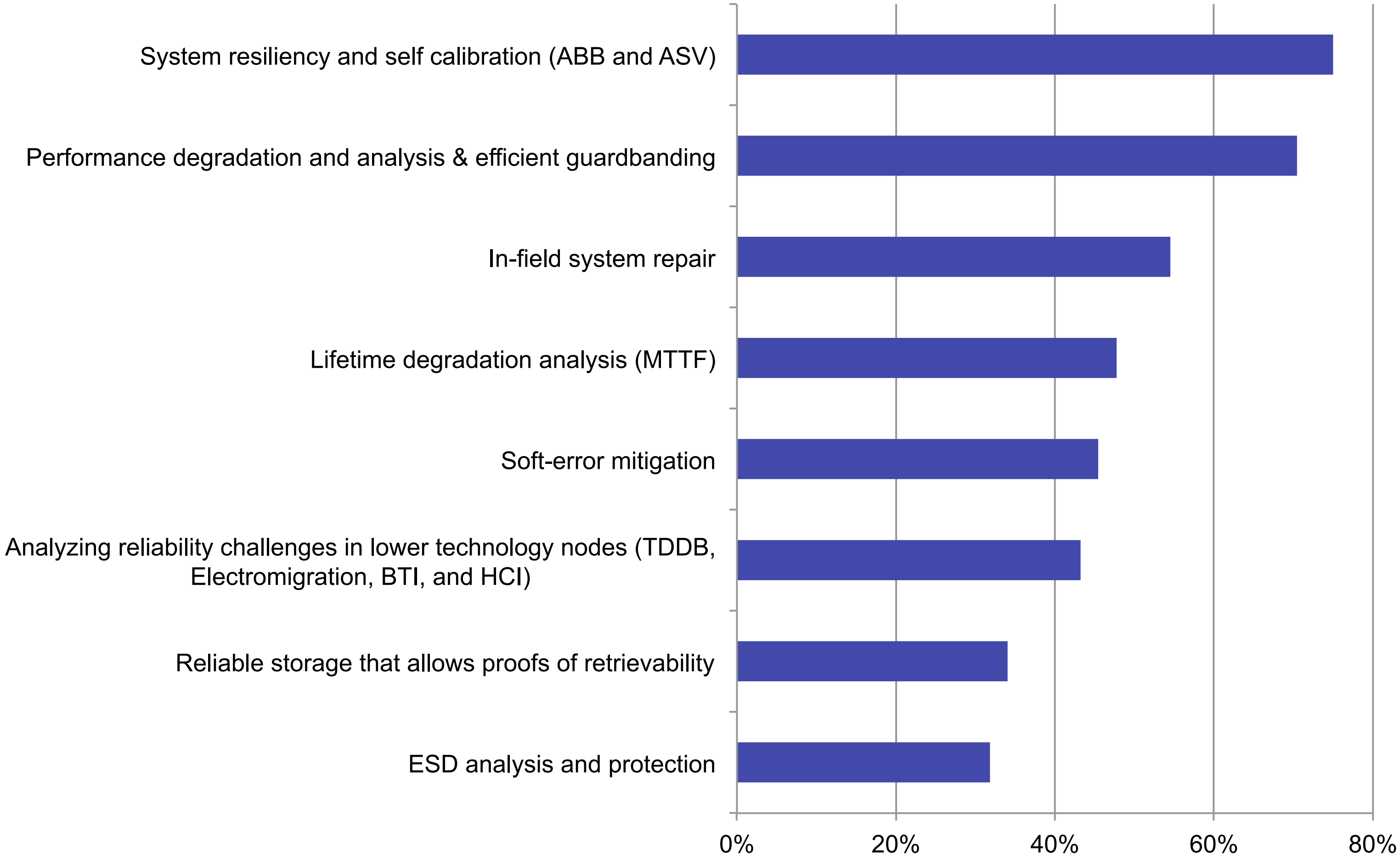
Hardware Security and Trust



Reliability

Answer Choice	Responses in %	Responses in #
System resiliency and self calibration (ABB and ASV)	75%	33
Performance degradation and analysis & efficient guardbanding	70.45%	31
In-field system repair	54.55%	24
Lifetime degradation analysis (MTTF)	47.73%	21
Soft-error mitigation	45.45%	20
Analyzing reliability challenges in lower technology nodes (TDDB, Electromigration, BTI, and HCI)	43.18%	19
Reliable storage that allows proofs of retrievability	34.09%	15
ESD analysis and protection	31.82%	14

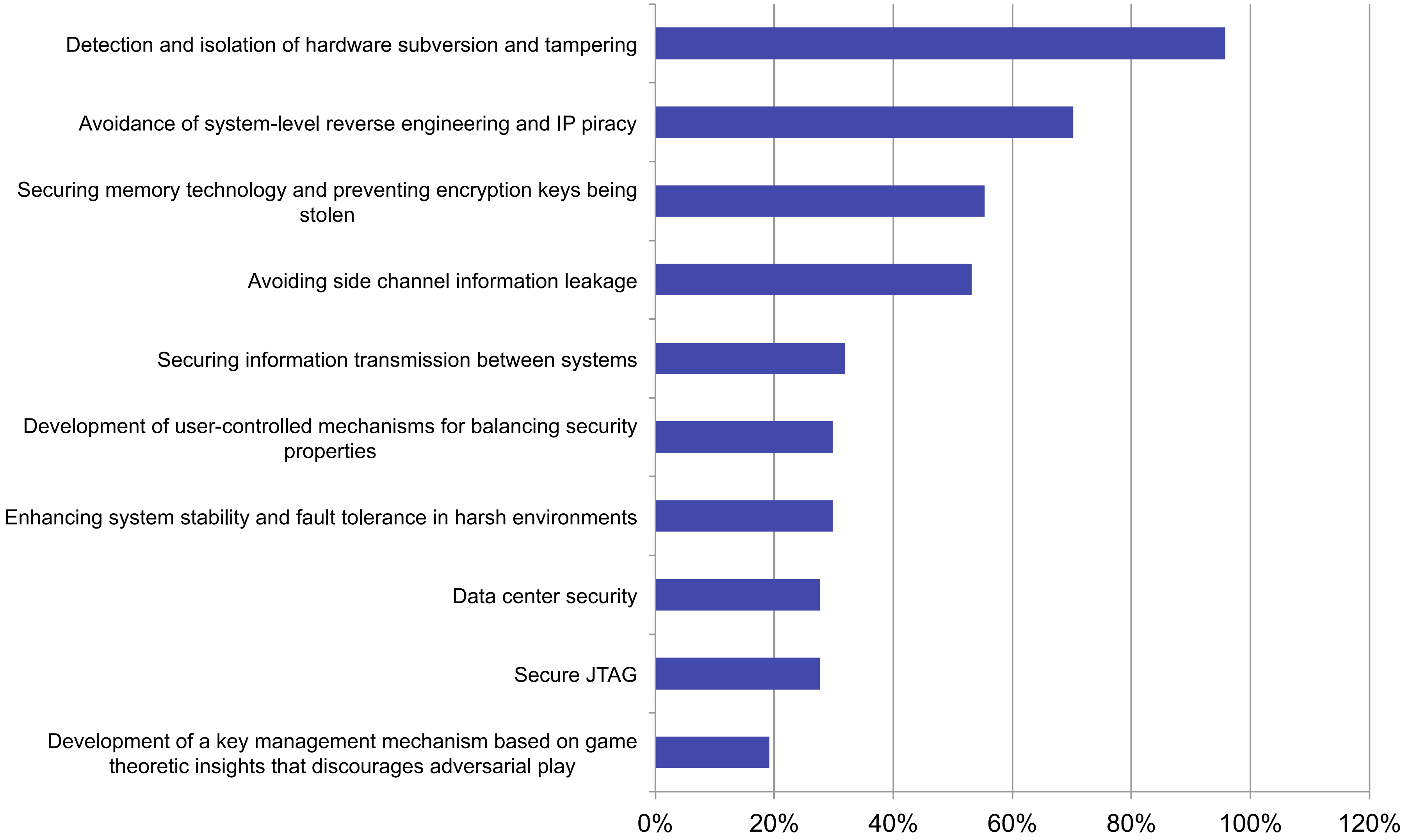
Reliability



System Security

Answer Choice	Responses in %	Responses in #
Detection and isolation of hardware subversion and tampering	95.74%	45
Avoidance of system-level reverse engineering and IP piracy	70.21%	33
Securing memory technology and preventing encryption keys being stolen	55.32%	26
Avoiding side channel information leakage	53.19%	25
Securing information transmission between systems	31.91%	15
Enhancing system stability and fault tolerance in harsh environments	29.79%	14
Development of user-controlled mechanisms for balancing security properties	29.79%	14
Secure JTAG	27.66%	13
Data center security	27.66%	13
Development of a key management mechanism based on game theoretic insights that discourages adversarial play	19.15%	9

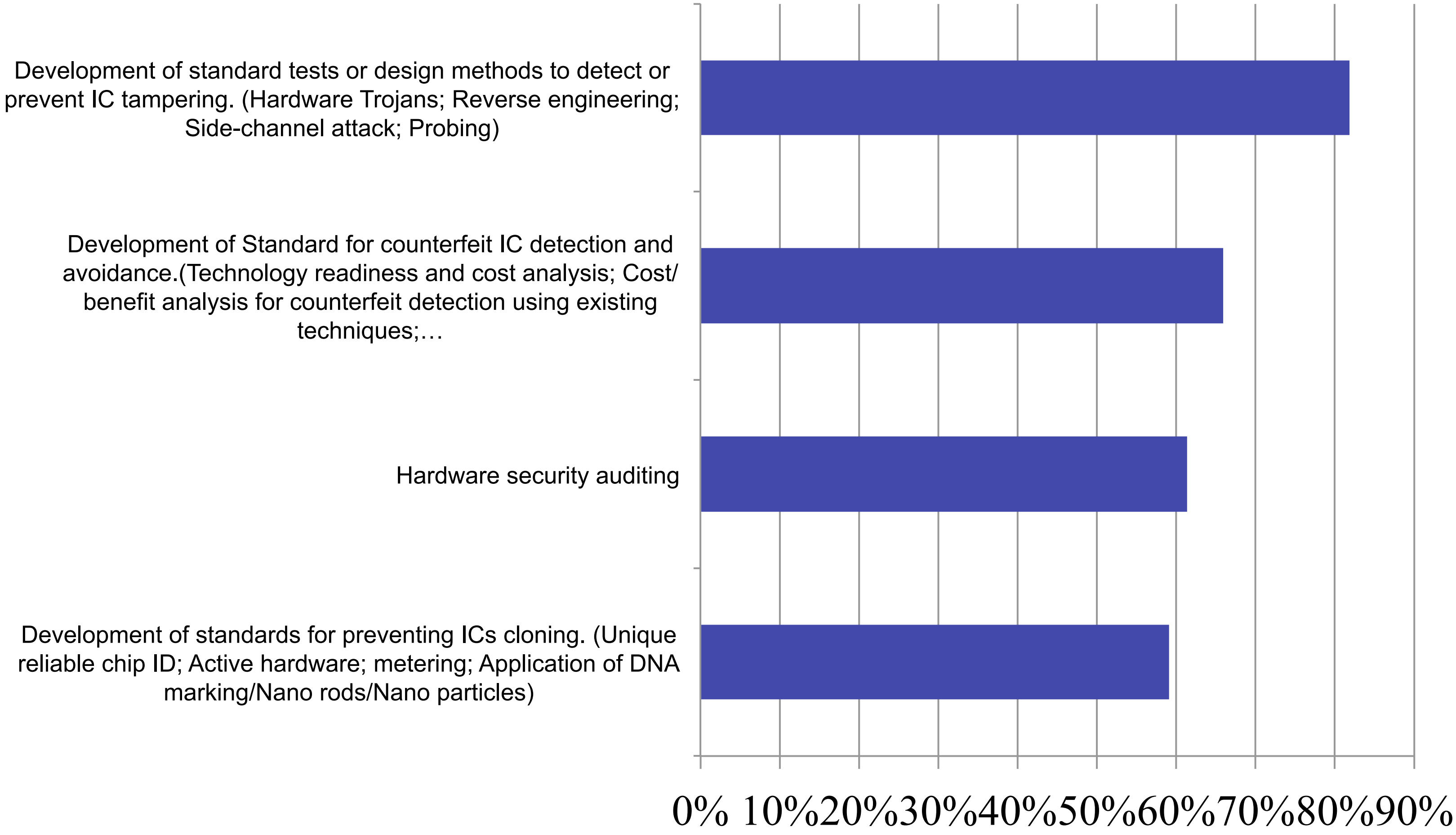
System Security



Standard Development

Answer Choice	Responses in %	Responses in #
Development of standard tests or design methods to detect or prevent IC tampering. (Hardware Trojans; Reverse engineering; Side-channel attack; Probing)	81.82%	36
Development of Standard for counterfeit IC detection and avoidance.(Technology readiness and cost analysis; Cost/benefit analysis for counterfeit detection using existing techniques;…	65.91%	29
Hardware security auditing	61.36%	27
Development of standards for preventing ICs cloning. (Unique reliable chip ID; Active hardware; metering; Application of DNA marking/Nano rods/Nano particles)	59.09%	26

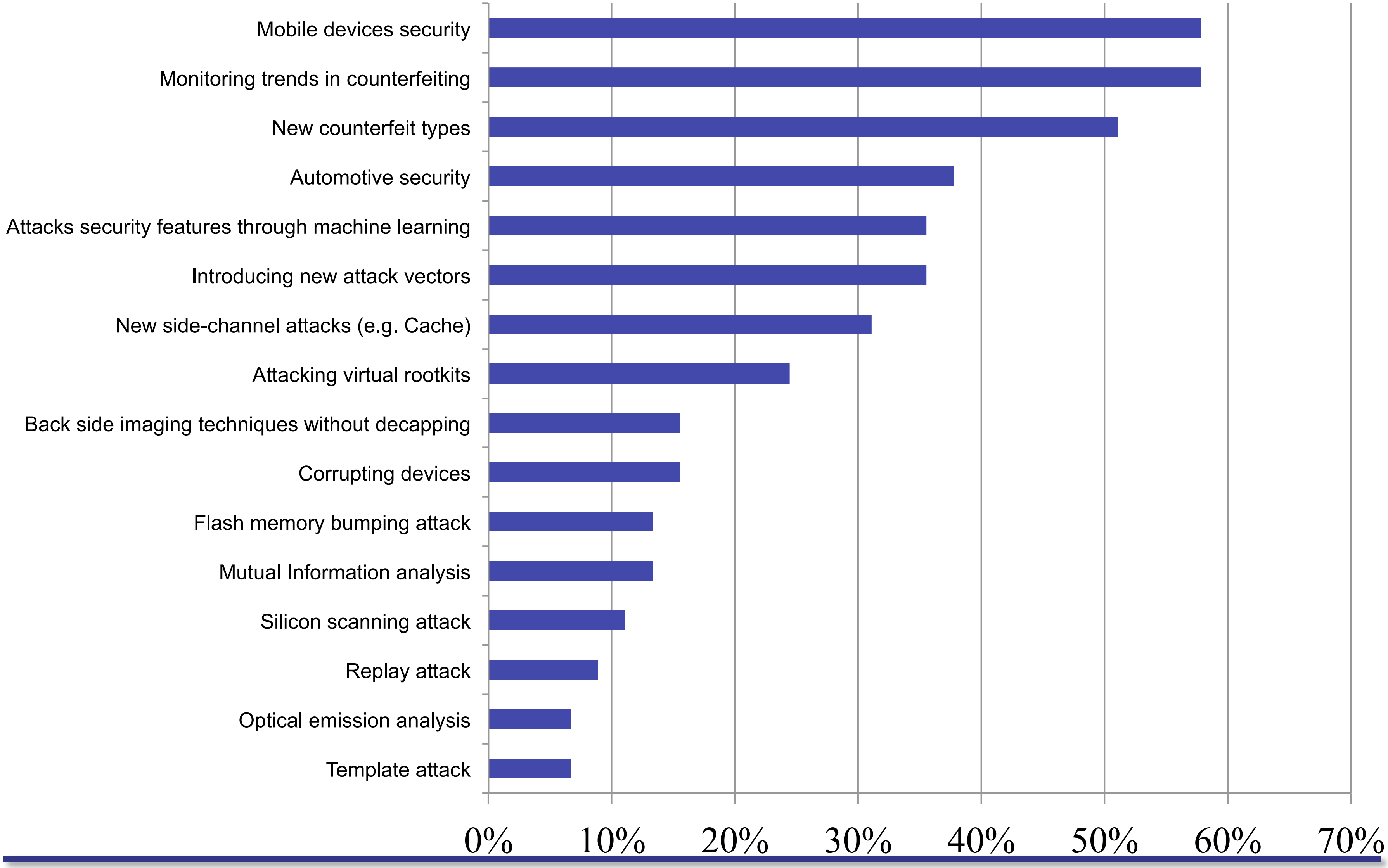
Standard Development



Emerging Threats

Answer Choice	Responses in %	Responses in #
Monitoring trends in counterfeiting	57.78%	26
Mobile devices security	57.78%	26
New counterfeit types	51.11%	23
Automotive security	37.78%	17
Introducing new attack vectors	35.56%	16
Attacks security features through machine learning	35.56%	16
New side-channel attacks (e.g. Cache)	31.11%	14
Attacking virtual rootkits	24.44%	11
Corrupting devices	15.56%	7
Back side imaging techniques without decapping	15.56%	7
Mutual Information analysis	13.33%	6
Flash memory bumping attack	13.33%	6
Silicon scanning attack	11.11%	5
Replay attack	8.89%	4
Template attack	6.67%	3
Optical emission analysis	6.67%	3

Emerging Threats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