ECE Department
University of Connecticut

Counterfeit Chips: What Are The Threats?

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Who Develops the IPs? Who Designs the ICs? Who Fabricates Them?

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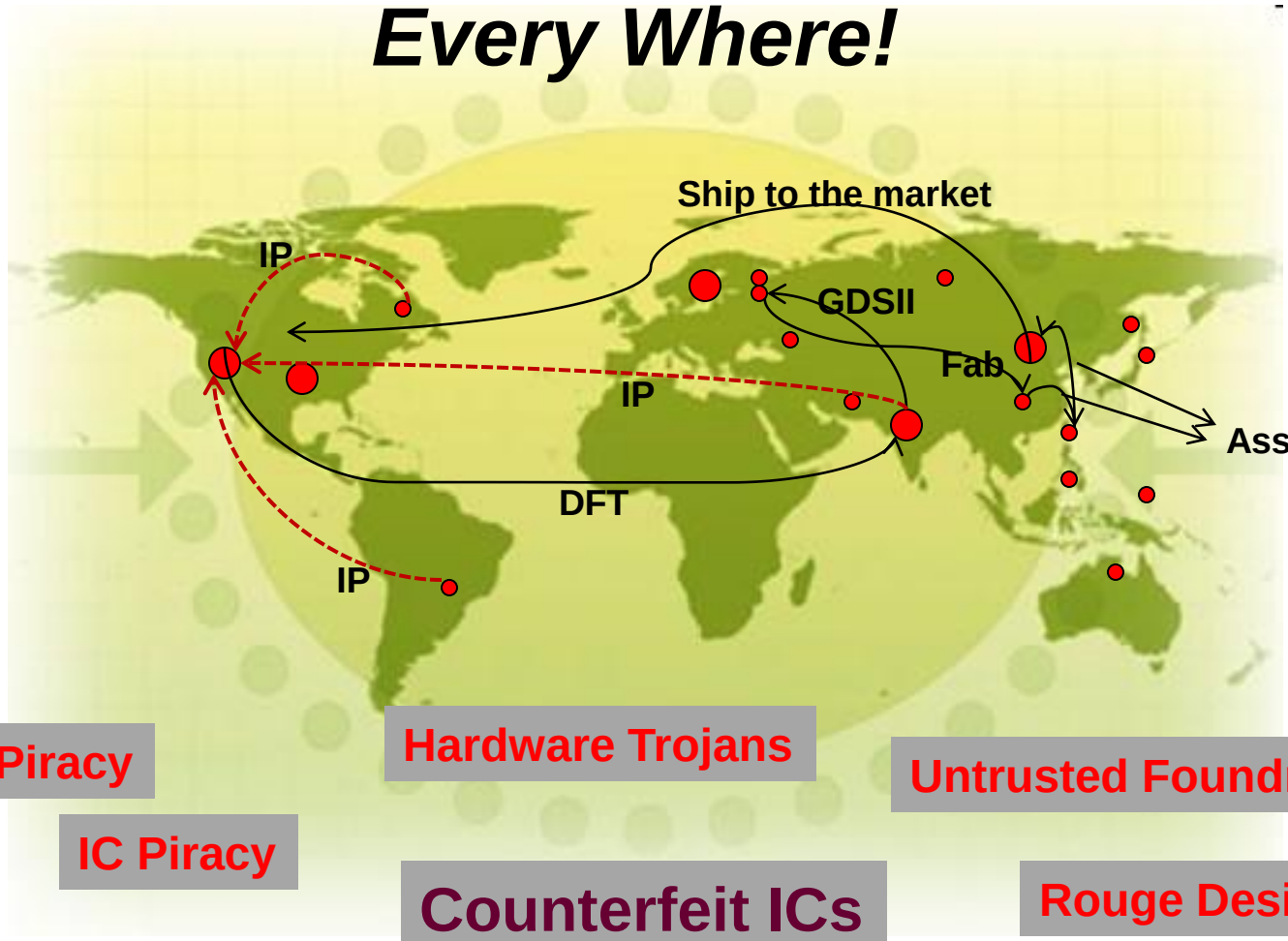
Who Develops the IPs? Who Designs the ICs? Who Fabricates Them?



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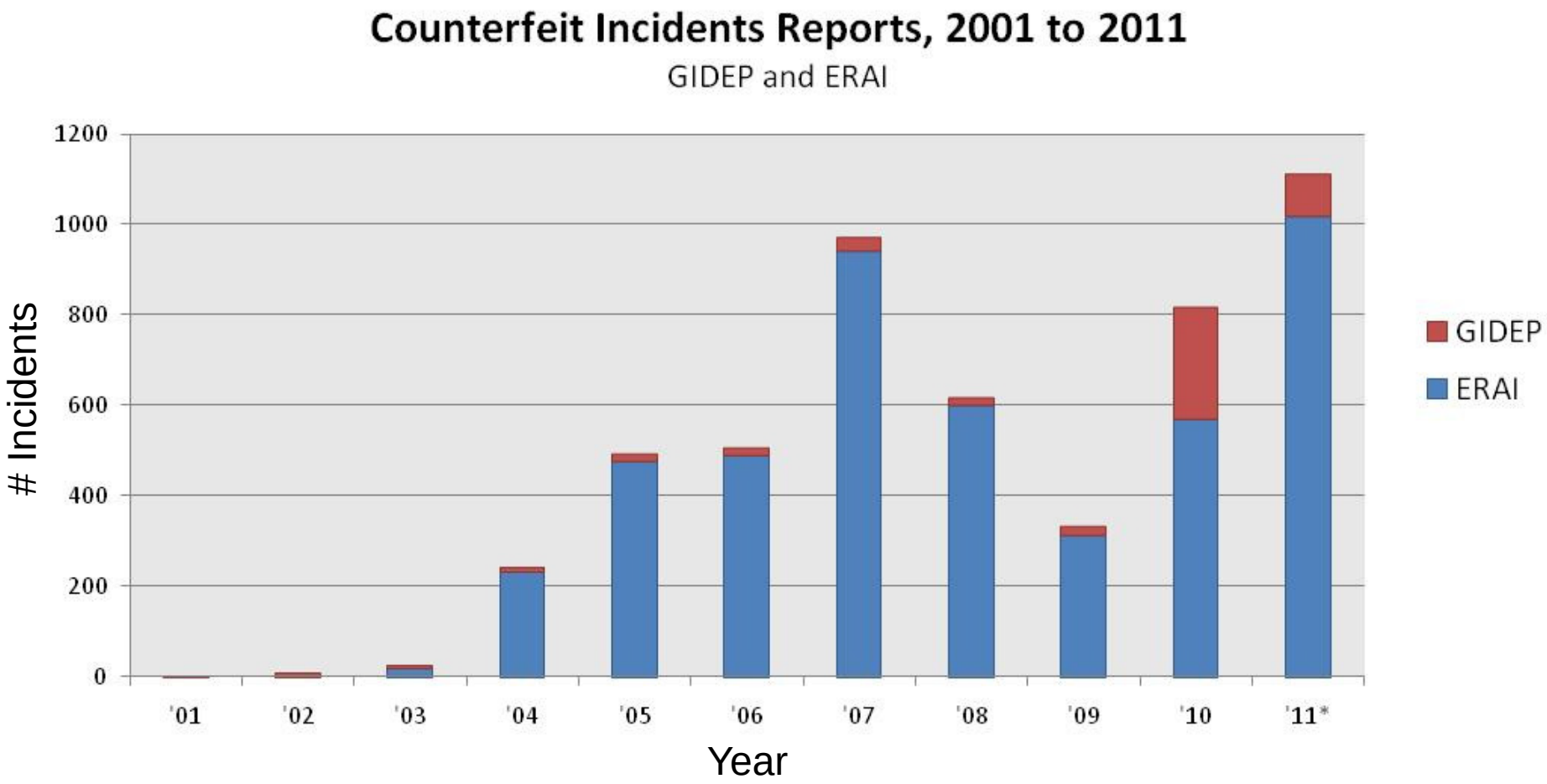
Reports of Counterfeits in the Last Ten Years



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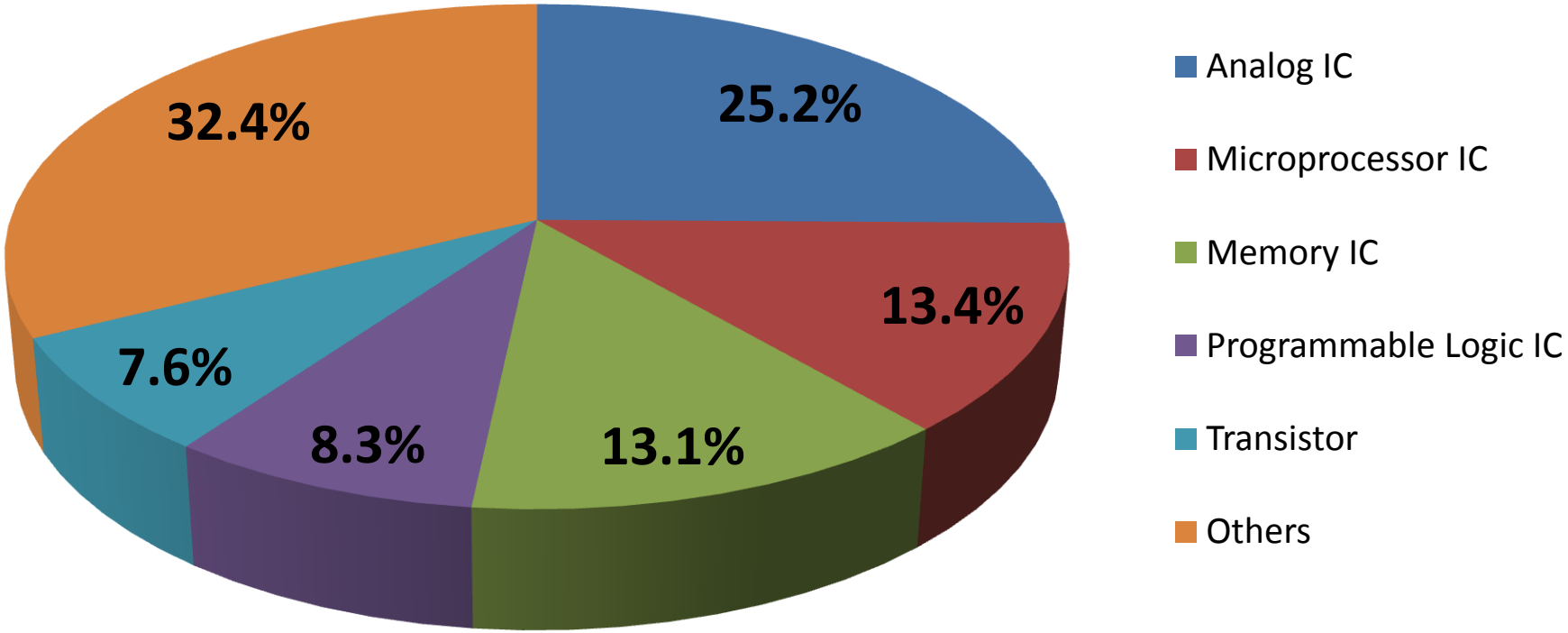
Most Counterfeited Parts in 2011 (% of Reported Incidents)



IHS reports a $169B annual risk

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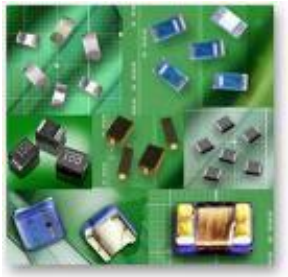
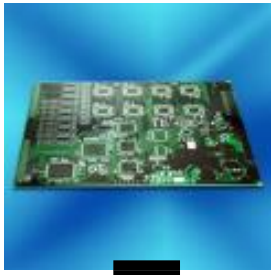
Applications and Threats

Thousands of chips are being fabricated and tested in untrusted foundries, assemblies, and supply chains





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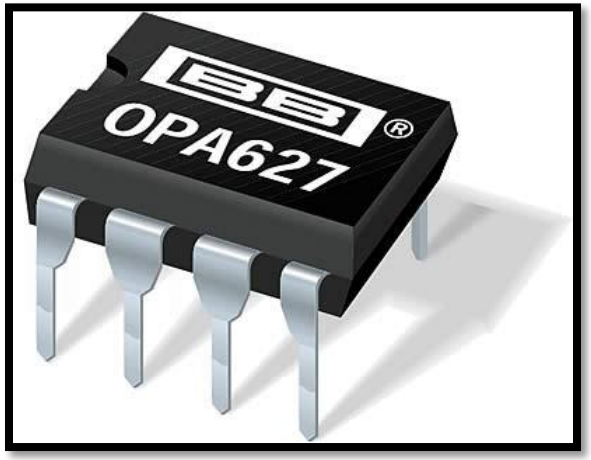
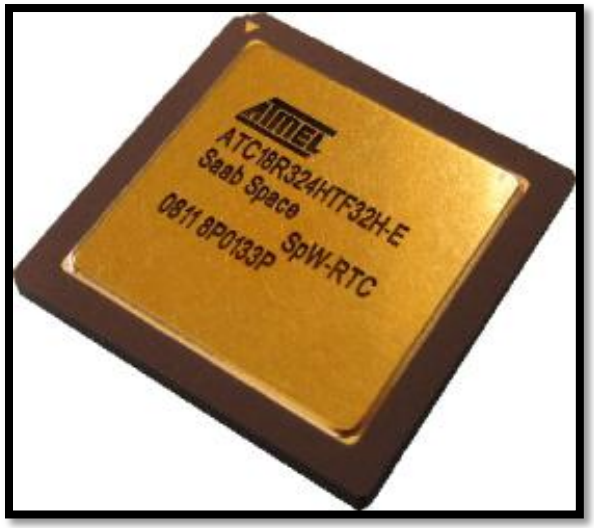
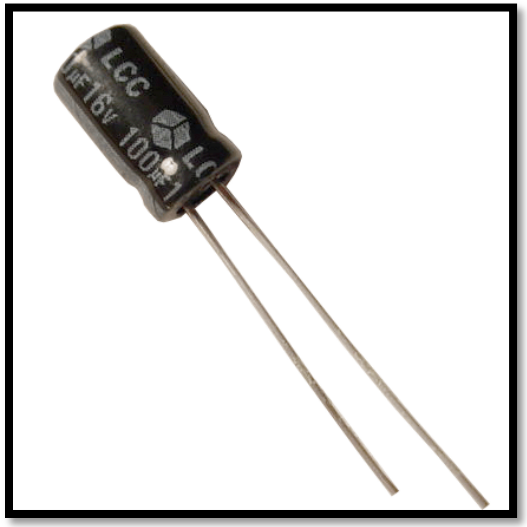
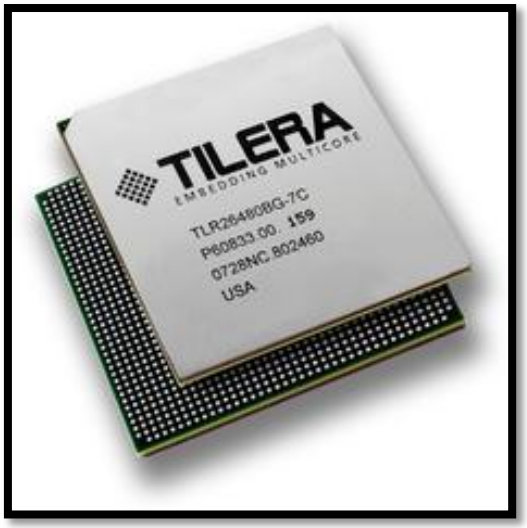
Any Component can be Counterfeit









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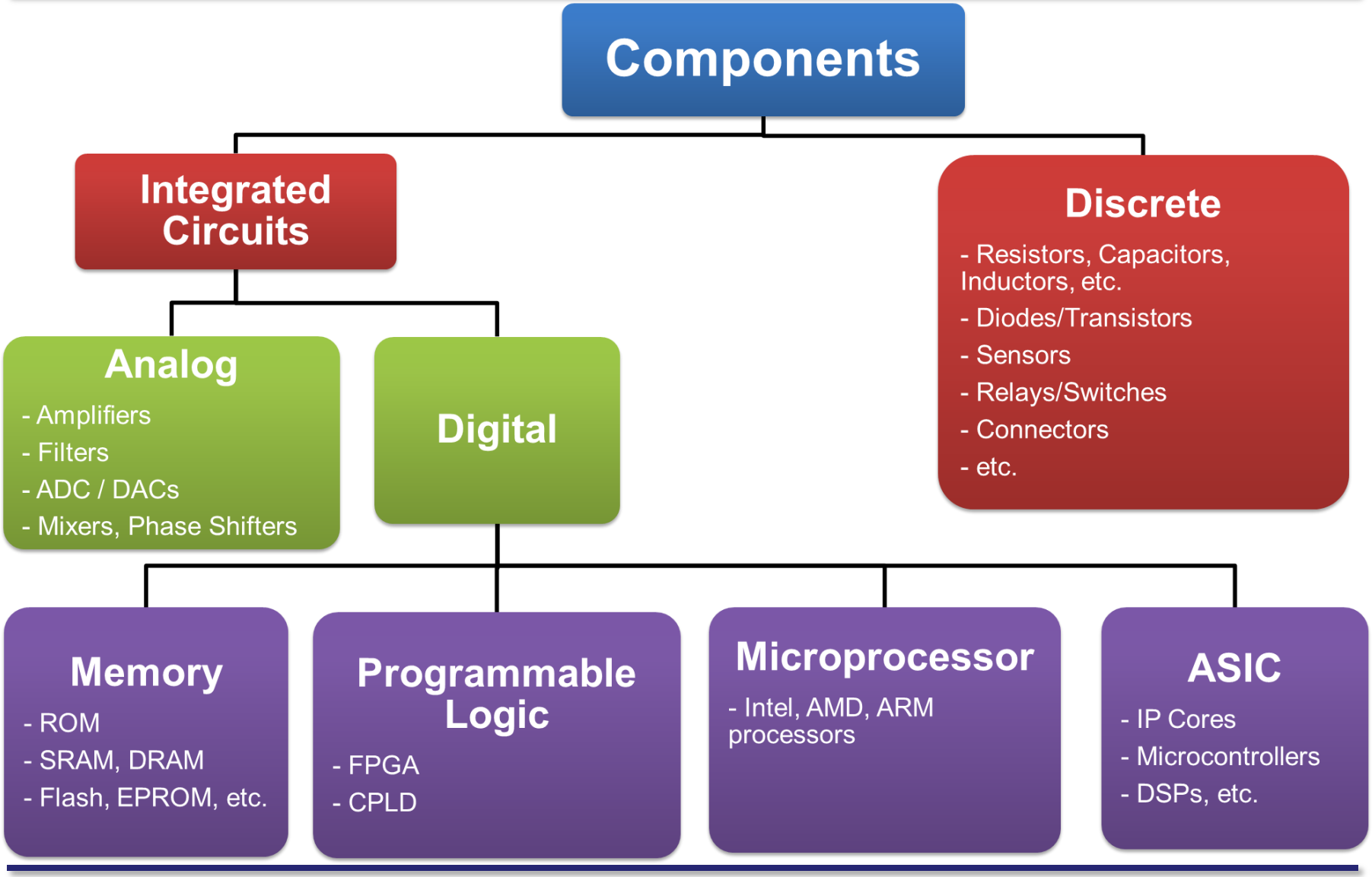
Taxonomy: Components



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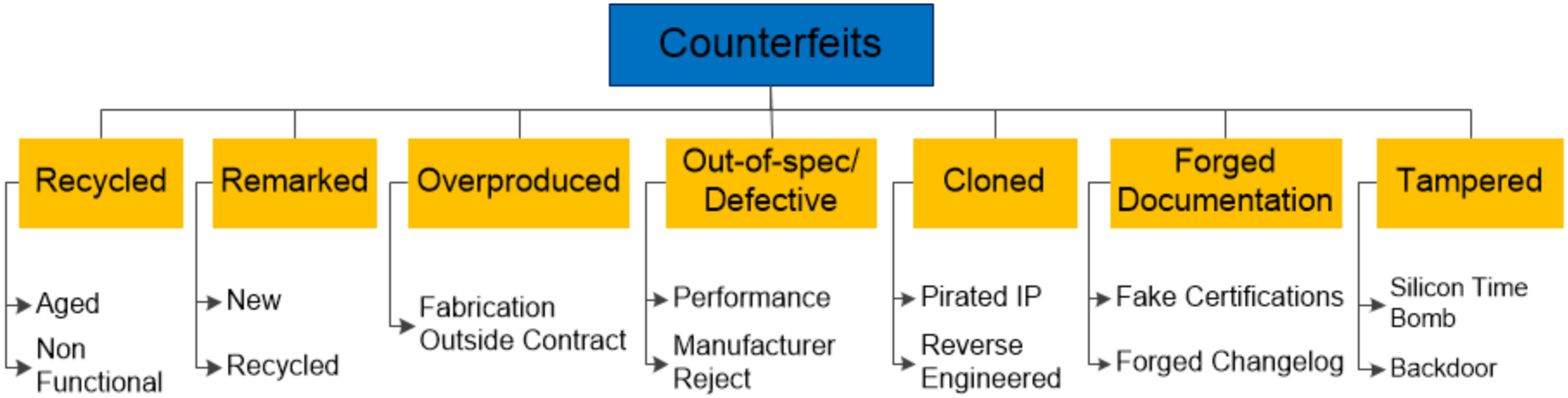
Taxonomy: Counterfeits



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Recycled ICs

A recycling center

PCBs taken off of electronic systems

ICs taken off of PCBs

Refine recycled ICs

Resold as new

Critical Application

Identical:

Appearance, Function, Specification

Consumer trends suggest that more gadgets are used in much shorter time – more e-waste

Source: Images are taken from google

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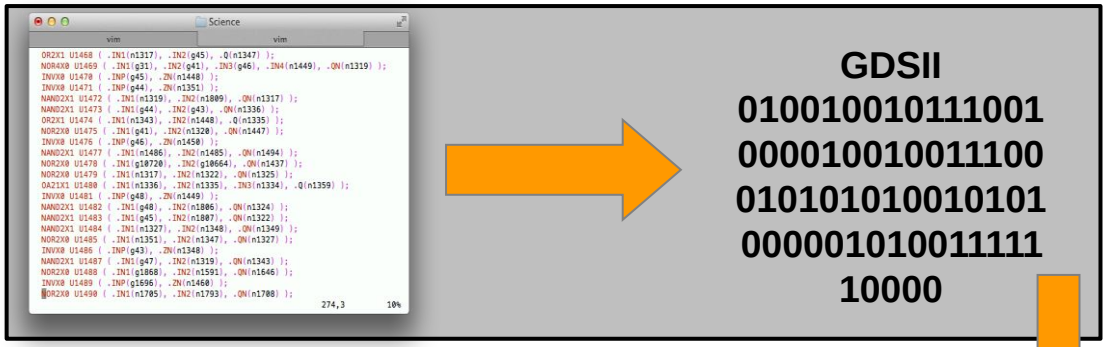
Design & Fabrication



GDSII
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000010010011100
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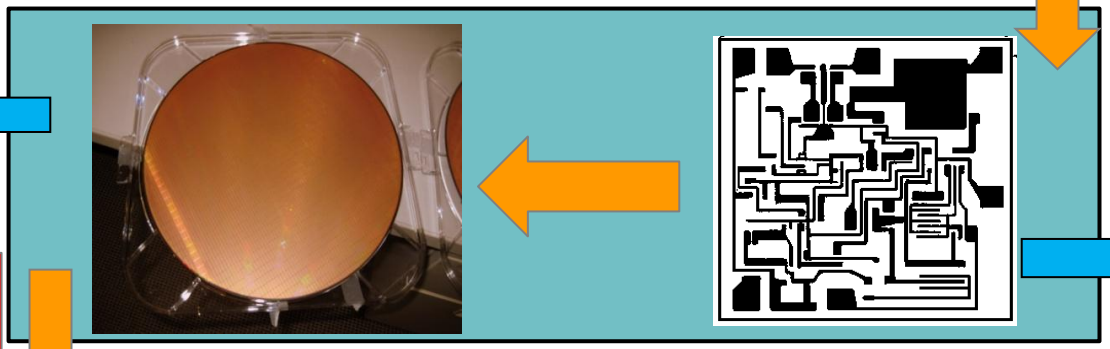
IP Owner



Foundry

Over-produced ICs

Defective or Out-of-spec ICs

Assembly

Market

Google image

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Current Manufacturing and Test

Designer

Test Patterns
Test Responses

Foundry & Assembly

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Think Different!

Designer

Foundry & Assembly

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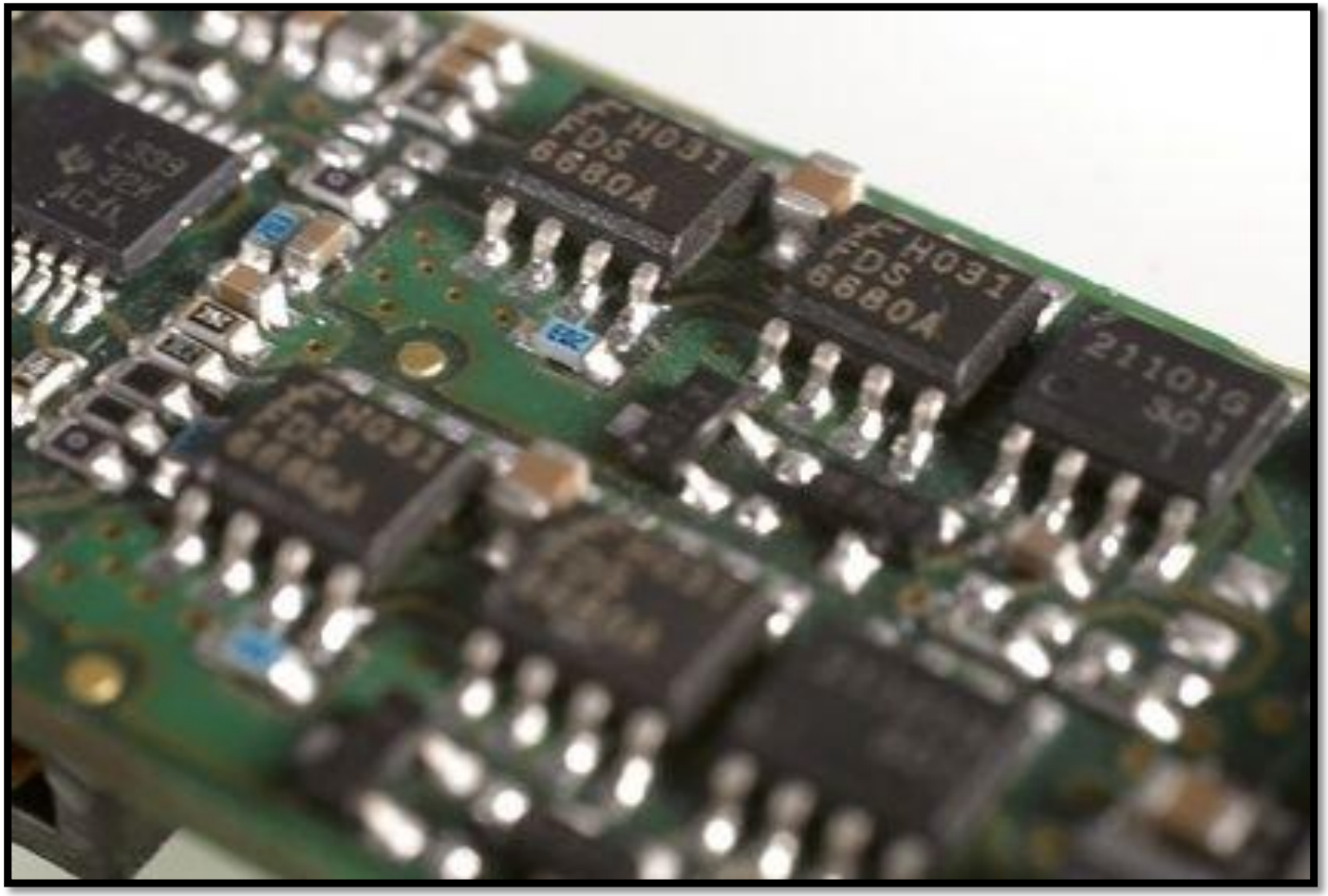
Counterfeit Detection

Counterfeits are Defective



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Testing for Defects

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Detection and Avoidance

CHALLENGES / ROADMAPS

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Technology Gaps

	Obsolete Parts		Active Parts		New Parts	
Recycled	70%	EVI//HPVI/DNA /FT/ET	80%	EVI/marking/HP VI/DNA	>80%	CDR Sensors, SST, Unique ID, PUF, Functional Locking Mechanisms, RON, Prevention, Etc.
Remarked	60%	EVI/HPVI/FT/ET	60%	EVI/HPVI/FT/ET		
Cloned	10%	HPVI/FT/ET/PT	30%	HPVI/FT/ET/PT		
Over-produced	10%	HPVI/FT/ET/PT	30%	HPVI/FT/ET/PT		
Out-of-spec	70%	ET/PT	80%	ET/PT		
Defective	50%	FT/PT	70%	FT/PT		
Tampered	10%	FT/PT	30%	FT/PT		

FT: Functional Test
ET: Electrical Test
HPVI: High Power Visual Inspection
EVI: External Visual Inspection
PT: Parametric Test

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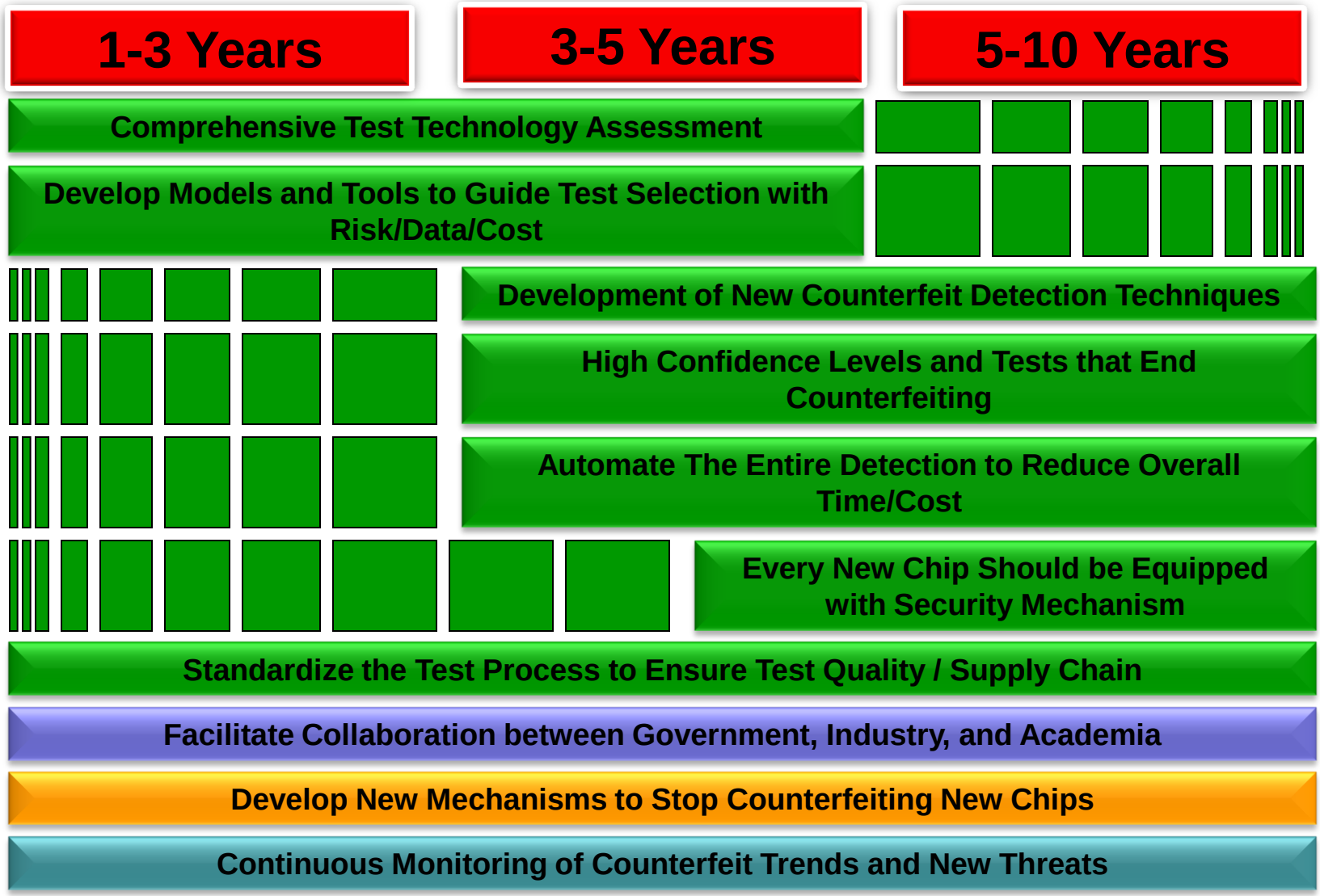
Technology Roadmap



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Conclusions

Counterfeit industry is growing and is here to stay

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