



Circuits **M**ulti-**P**rojets

Manufacturing Main Results in 2016

MPW Services Center for IC / MEMS Prototyping

<http://cmp.imag.fr>

Grenoble - France



web





Technology Processes in 2016

IC:

ams

0.35μ CMOS / CMOS-Opto
0.35μ SiGe
0.35μ HV CMOS
0.35μ HV CMOS EEPROM

0.18μ CMOS

0.18μ HV CMOS

STMicroelectronics

65nm CMOS 7LM
130nm CMOS 6LM
130nm HV-CMOS 4LM

28nm FDSOI
130nm SOI (FEM)

130nm SiGe BiCMOS
0.18μ BCD
55nm SiGe BiCMOS

3D:

CEA-LETI

UBM, micro-bumps, RDL, TSV / 3D assembly / Open3D

ams

0.35um 4 LM Active or Passive Interposer + UBM

New

ams

UBM + Bumps at Wafer Level on 0.35um & 0.18um

New

Photonics:

CEA-LETI

Silicon Photonics / Si310-PHMP2M

New

MEMS:

CMP / ams

0.35 μ CMOS front-side bulk micromachining

ams

0.35 μ CMOS backside bulk micromachining

MEMSCAP

PolyMUMPS

SOIMUMPS

PiezoMUMPS

Teledyne-DALSA

MIDIS

Micralyne

MicraGEM-Si



2016 : Main Results

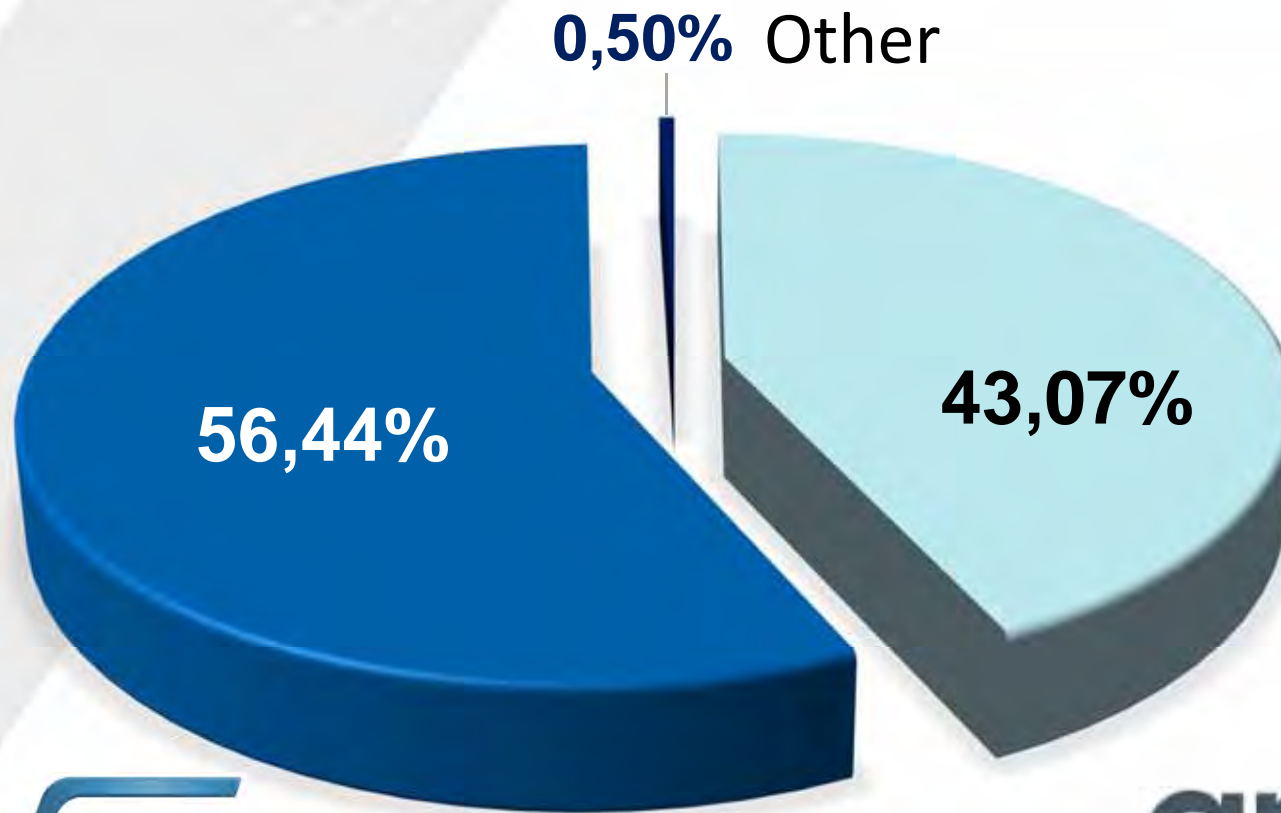
202 Circuits
83 Institutions
25 Countries

265 Circuits in 2015
90 Institutions in 2015

	2016	2015
Prototypes	185 Circuits 81 Institutions	254 Circuits 89 Institutions
Low Volume Prods	42 Circuits 21 Institutions	49 Circuits 16 Institutions
Industrial circuits	52 Circuits 13 Institutions	72 Circuits 17 Institutions

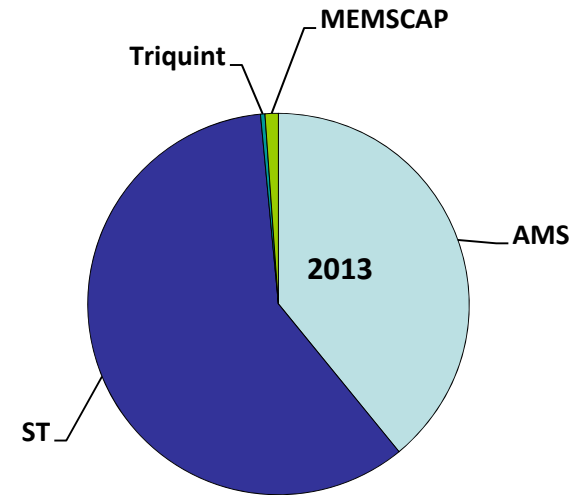
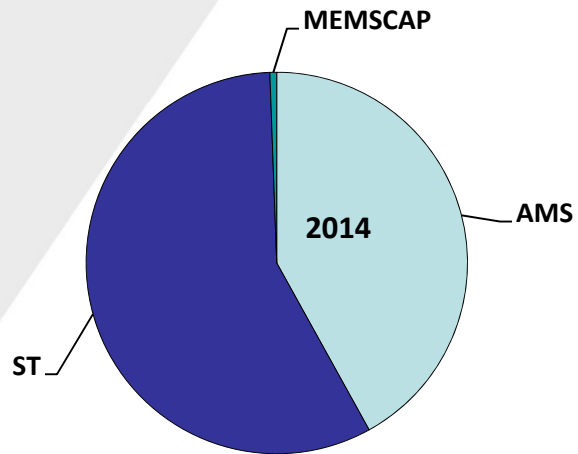
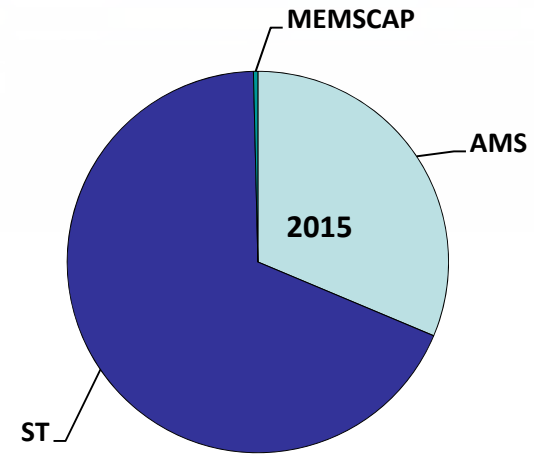
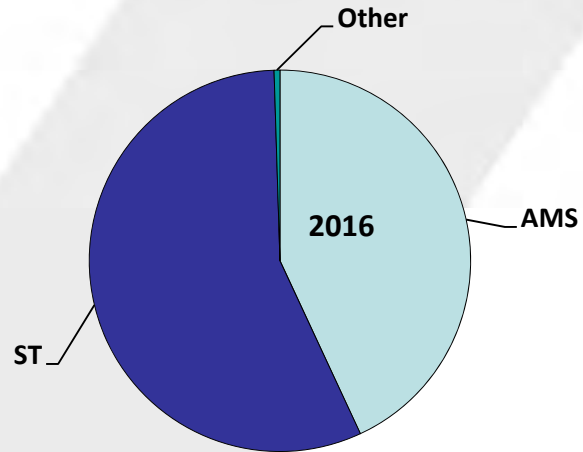


Circuits per Foundry in 2016



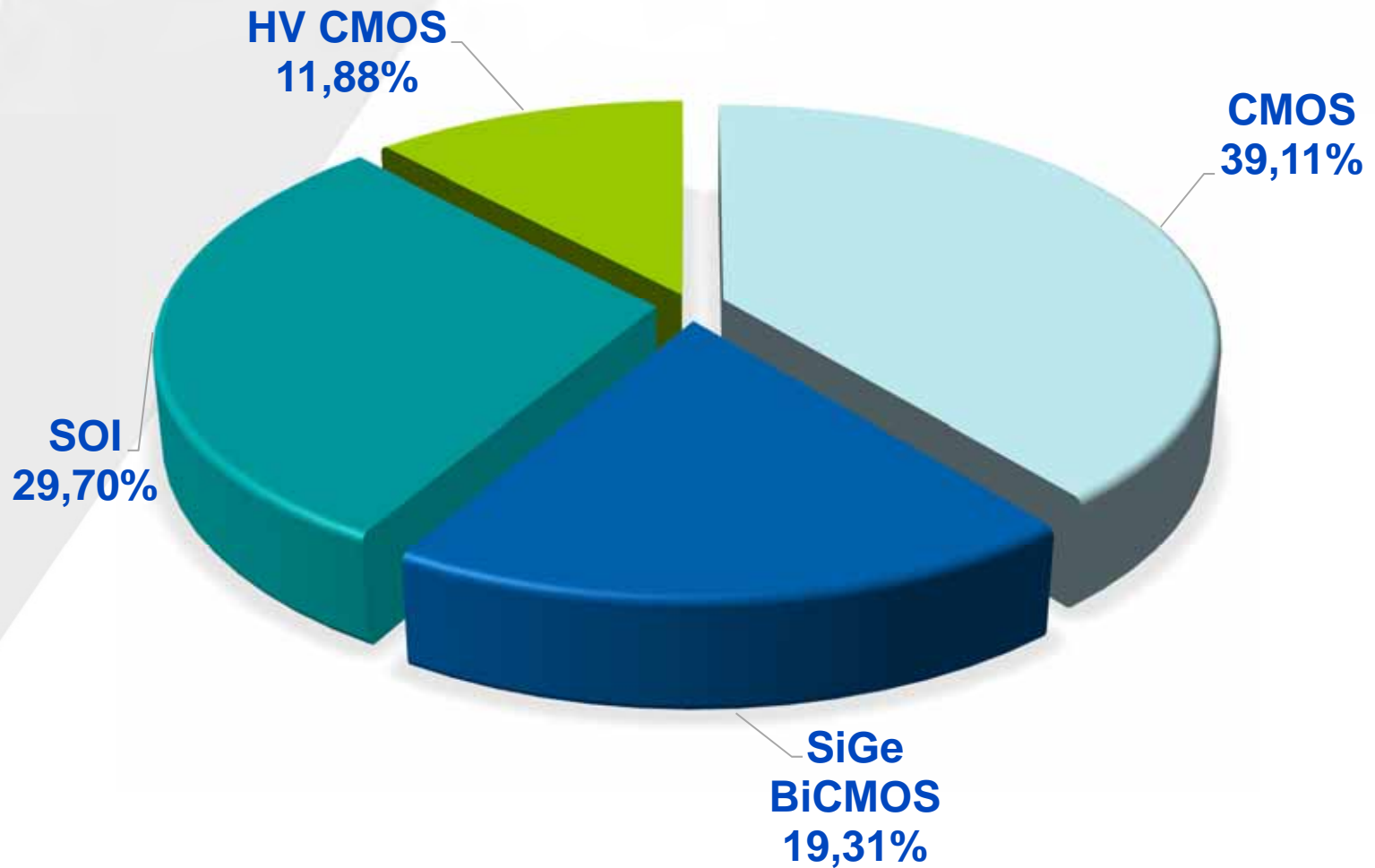


Circuits per Foundry



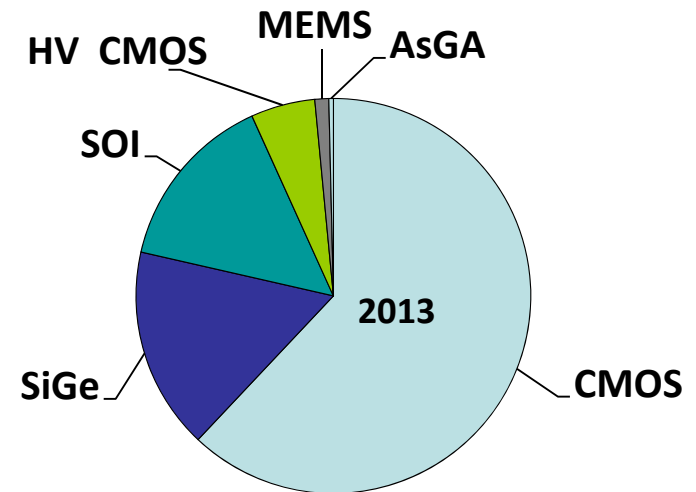
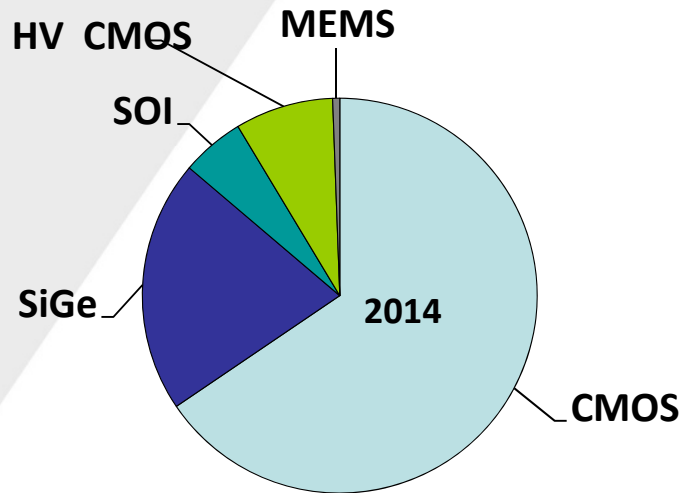
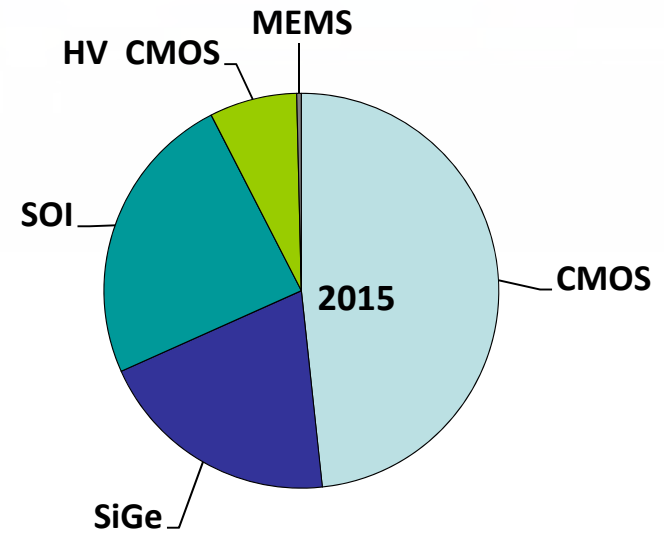
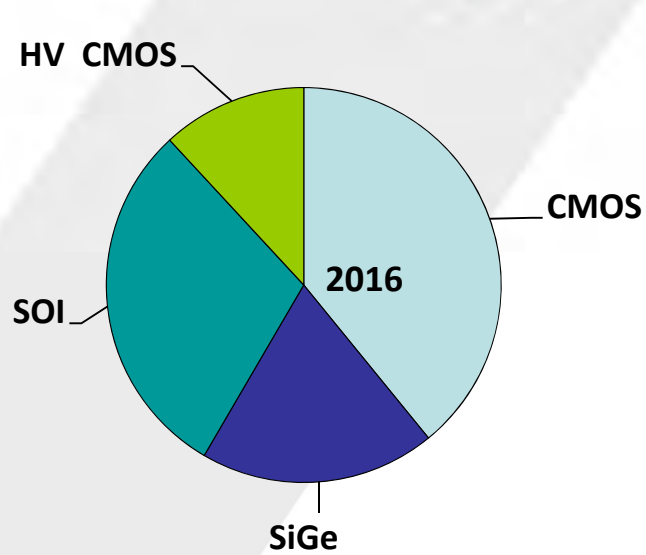


Circuits per process family in 2016



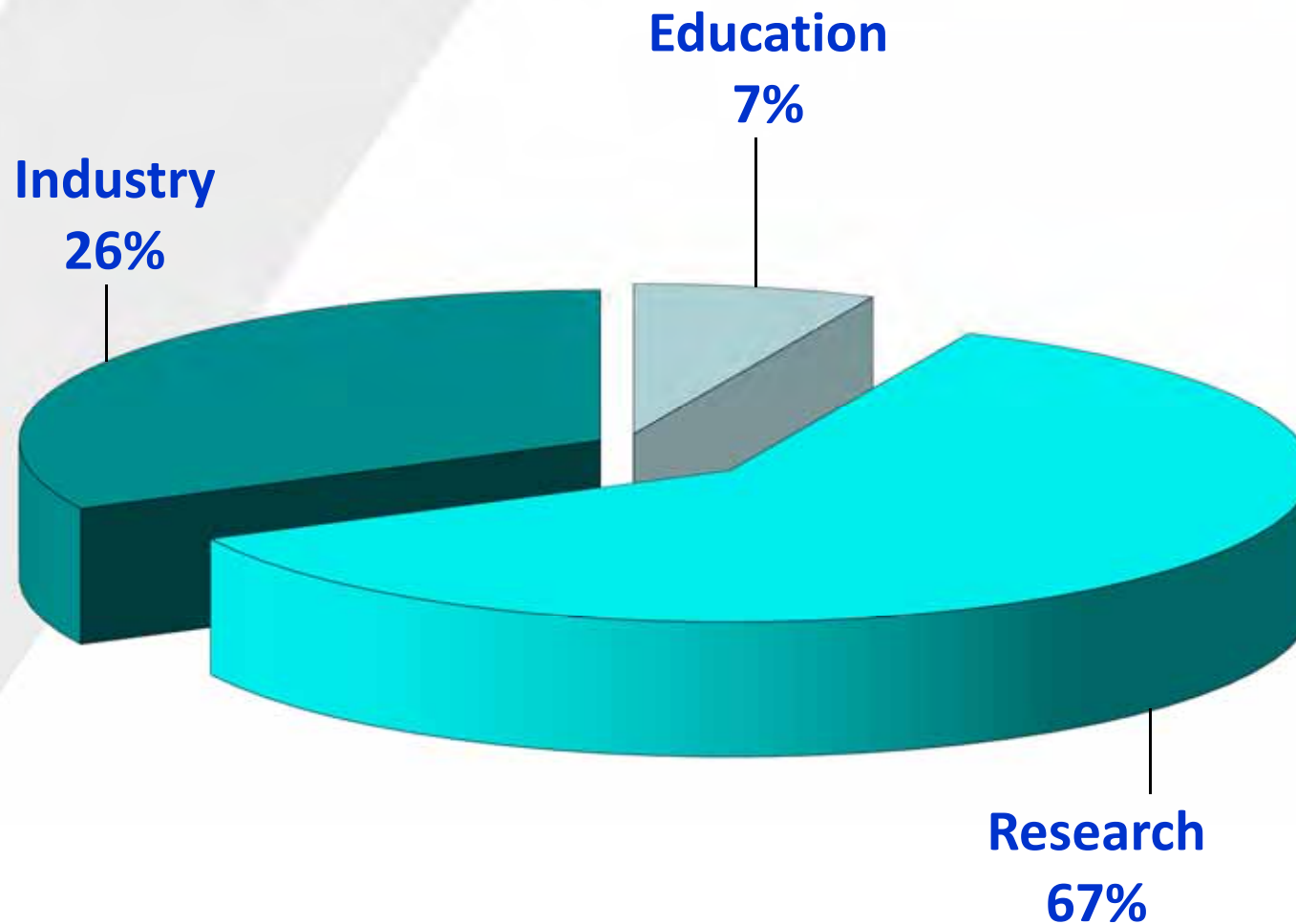


Circuits per process family



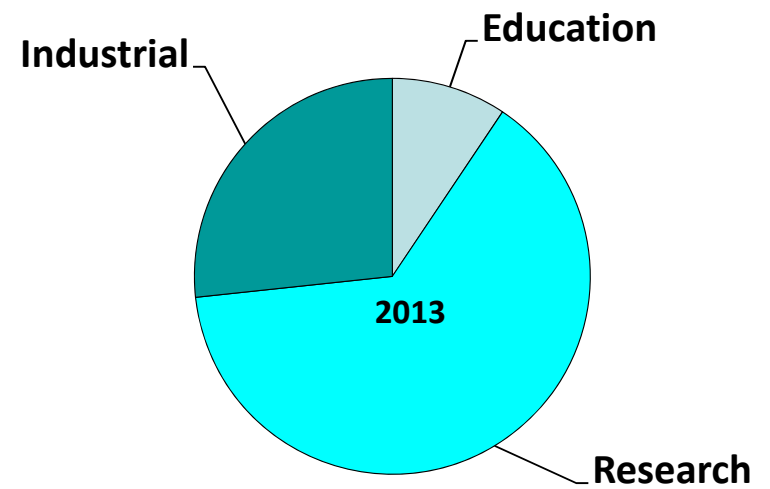
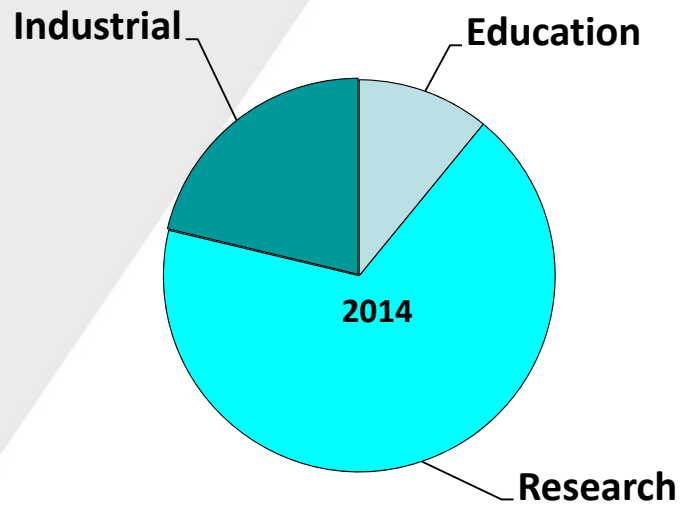
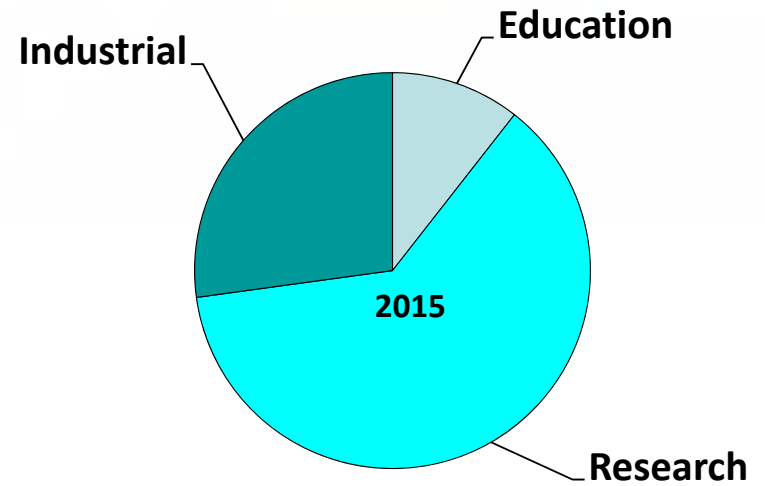
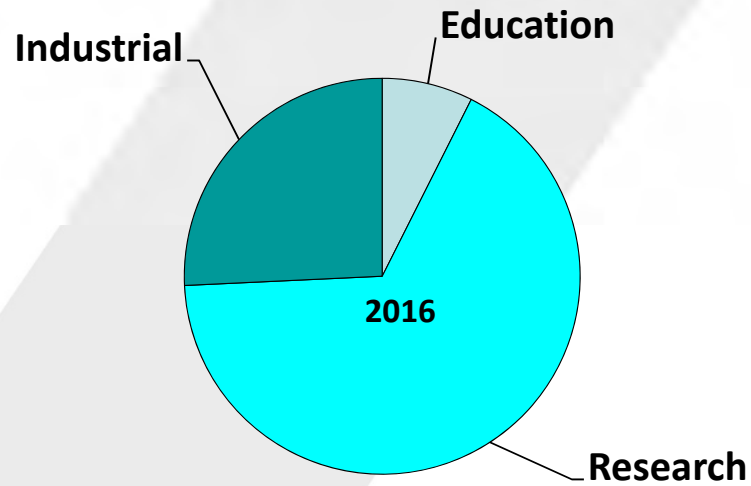


Circuits E - R - I in 2016



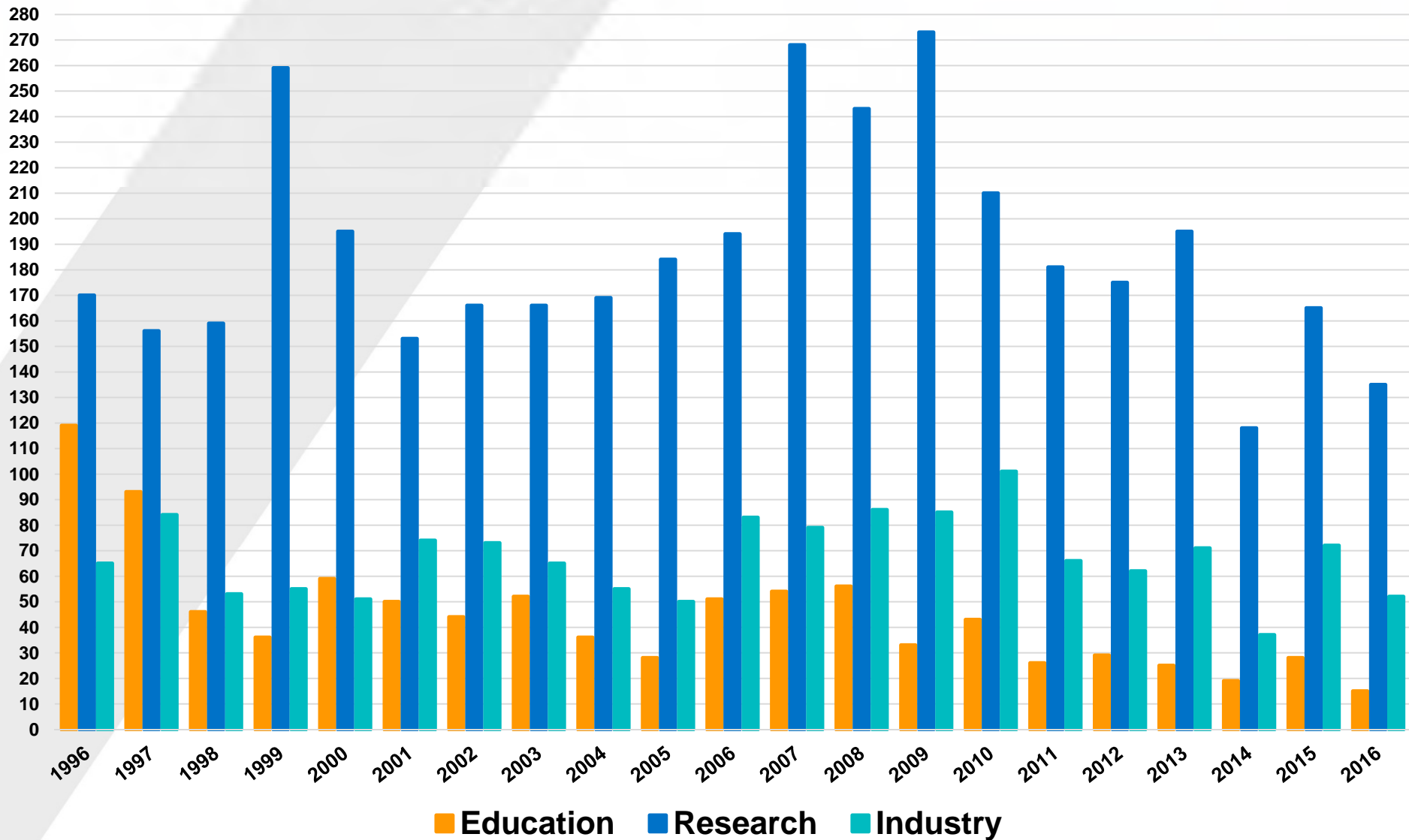


Circuits E - R - I



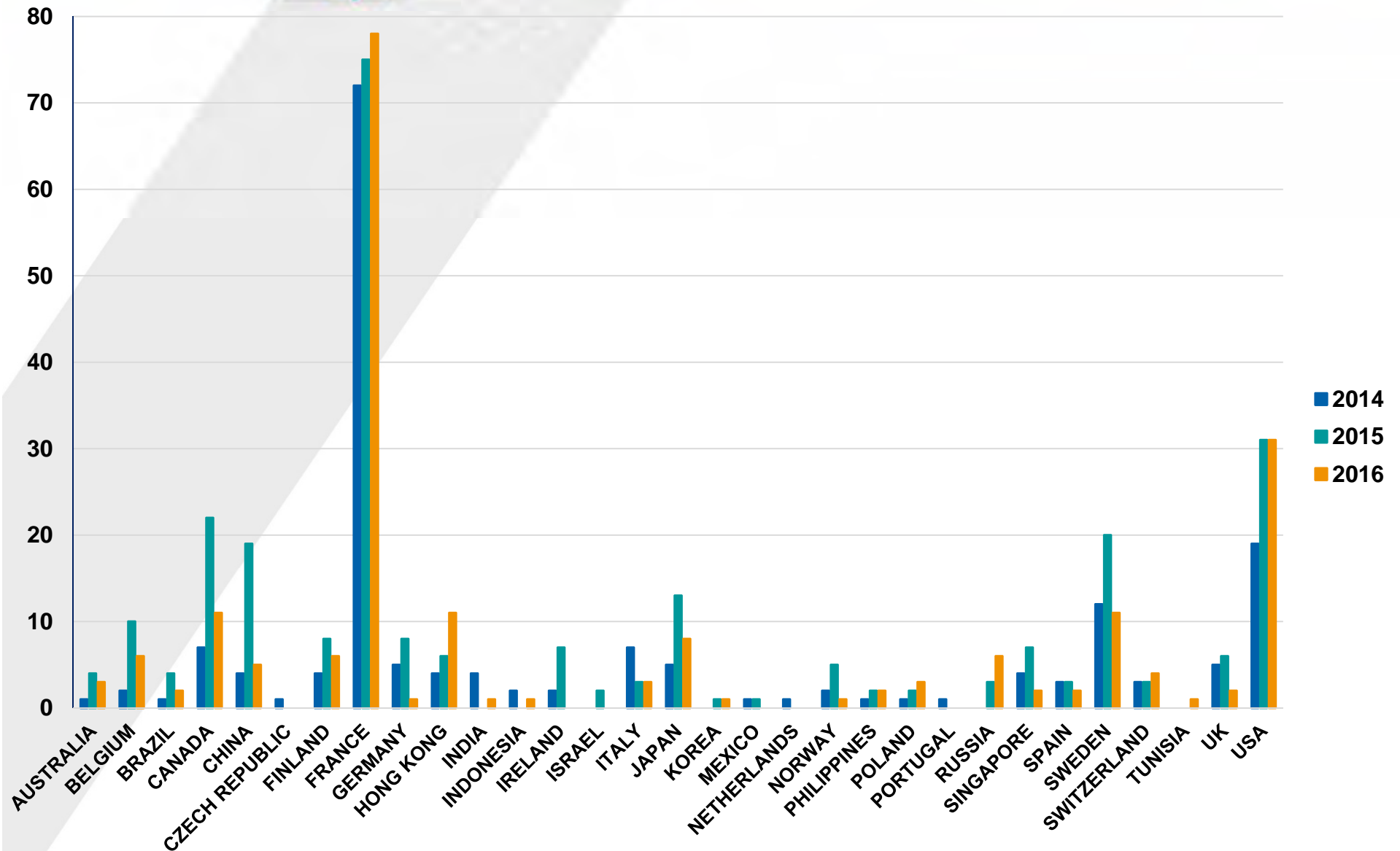


Circuits E - R - I



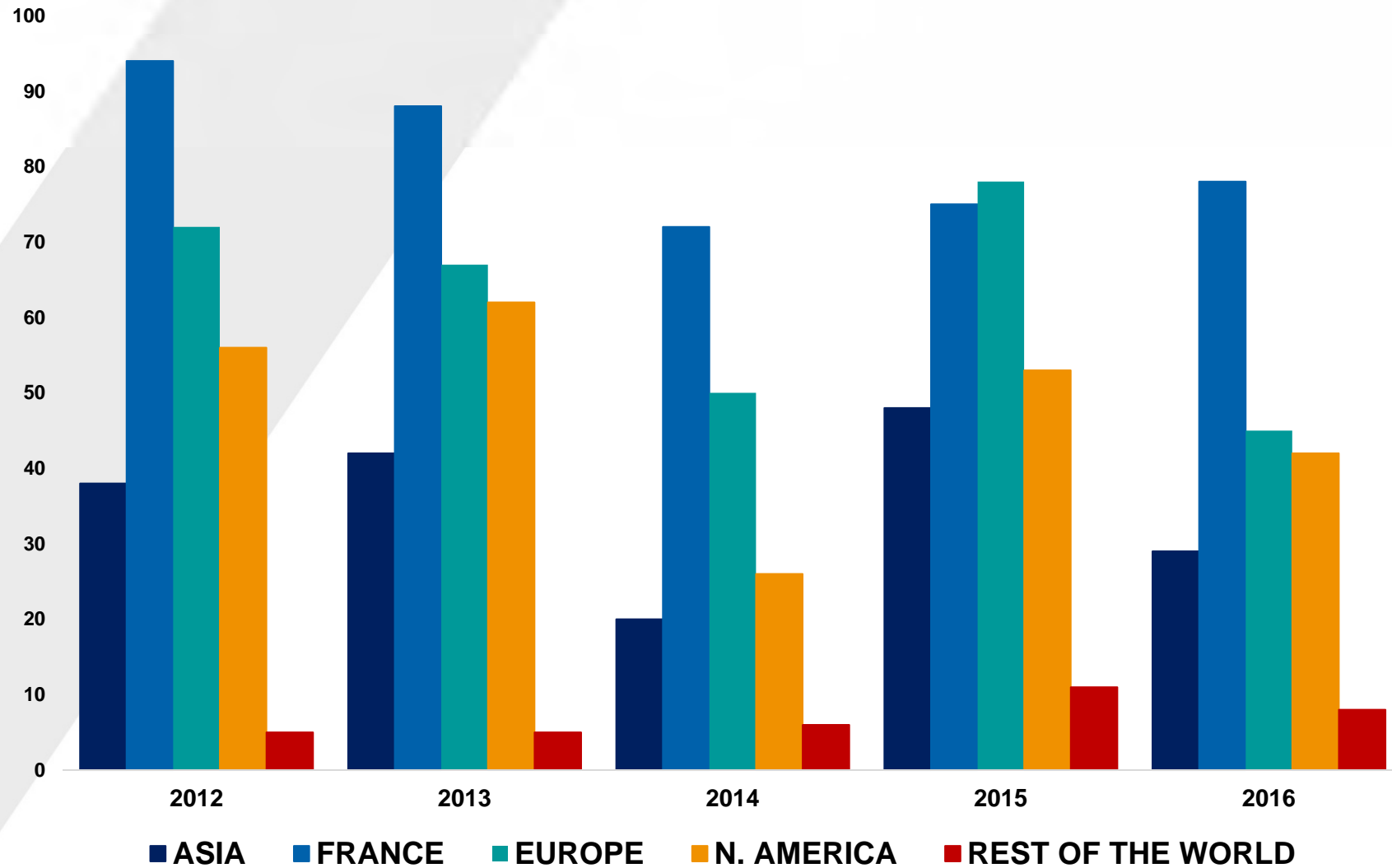


Circuits per country



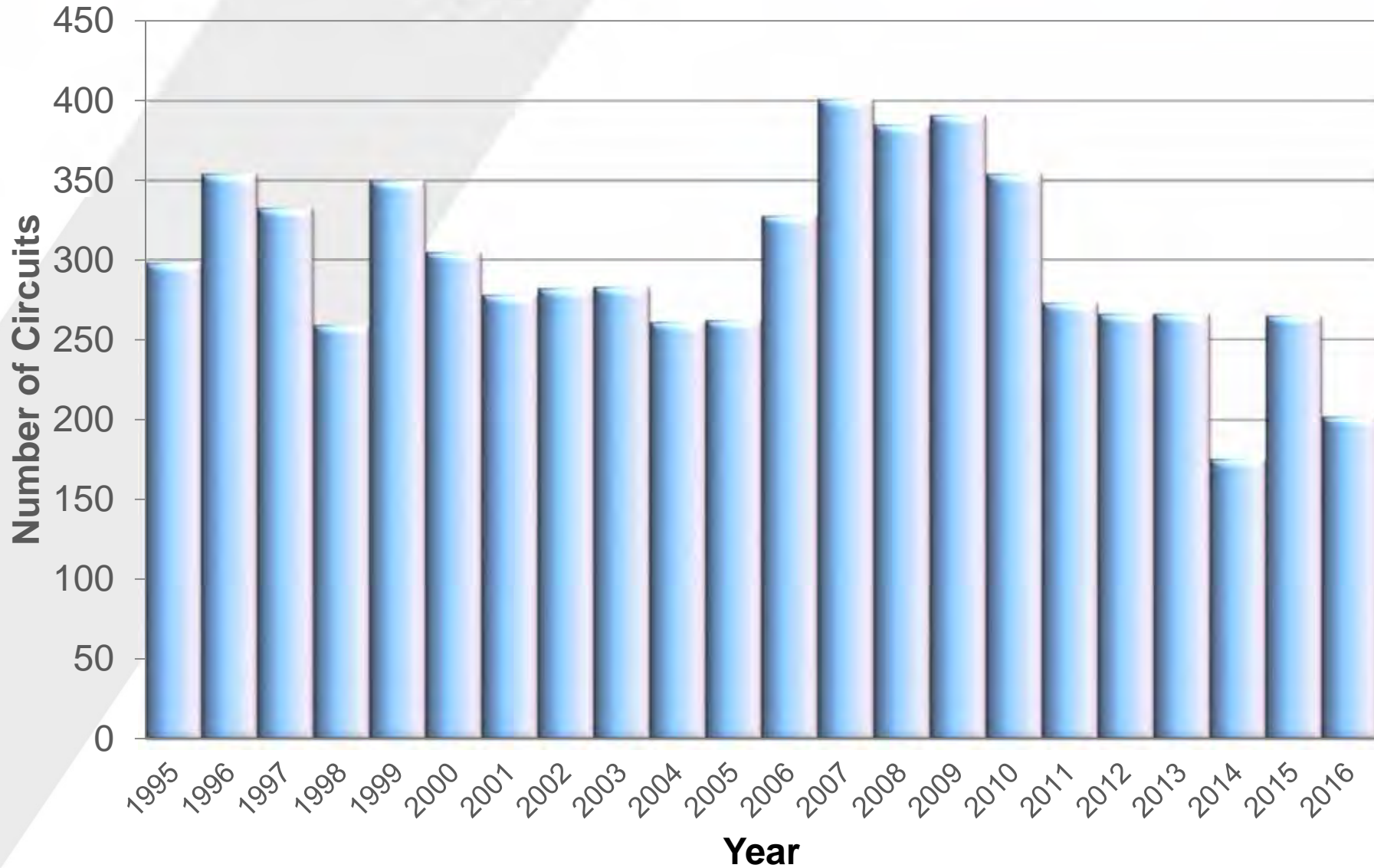


Circuits per geographical area





Total number of circuits





Non academic Centers in 2016

Institution Name	Town	Country	Number of Tape-out
Lab. de Physique Corpusculaire	Aubièrre	FRANCE	1
CEA - Saclay	Gif s/Yvette	FRANCE	2
ONERA	Chatillon	FRANCE	1
Thales Systems Aeroportes	Elancourt	FRANCE	3
SL3J Systems	Gardanne	FRANCE	1
CEA-LETI	Grenoble	FRANCE	17
LPSC	Grenoble	FRANCE	3
imXPAD	La Ciotat	FRANCE	1
OMEGA	Palaiseau	FRANCE	10
Thales Alenia Space	Toulouse	FRANCE	2
Newronika s.r.l.	Milan	ITALY	1
Siliconsortium ltd.	Hyogo	JAPAN	7
Krakow Design Consultants	Krakow	POLAND	2
Sygnal Semiconductor LLC	Tempe	UNITED STATES	1

13 Institutions in 2016



New Users in 2016

13 new users ordered prototypes for the first time.

University of Sydney	Darlington	AUSTRALIA
Phelma G-INP	Grenoble	FRANCE
ONERA	Chatillon	FRANCE
Thales Alenia Space	Toulouse	FRANCE
Indian Institute of Technology	New Delhi	INDIA
Newronika s.r.l	Milan	ITALY
Dongguk University	Seoul	KOREA
University of Zaragoza	Zaragoza	SPAIN
Ecole Nationale d'Ingénieurs de Sfax	Sfax	TUNISIA
Florida International University	Miami	USA
University of South Florida	Tampa	USA
Sygnal Semiconductor LLC	Tempe	USA
imXPAD	La Ciotat	FRANCE



Low Volume Productions in 2016

42 Low Volume Productions in 2016

- Low volume productions available in MPW runs.
- From tens to hundreds or thousands parts.
- Dedicated production runs of 6, 12, 18, 25, 50, or 100 wafers.
- Up to 300 wafers per project per year can be ordered through CMP.

Technology Process	Institution	Country	Total
0.35 μm CMOS C35B4C3	Siliconsortium Ltd.	JAPAN	50
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0.35 μm CMOS C35B4C3	Siliconsortium Ltd.	JAPAN	50
0.35 μm CMOS C35B4C3	Siliconsortium Ltd.	JAPAN	50
28 nm CMOS28FDSOI	Stanford University	UNITED STATES	50
28 nm CMOS28FDSOI	Stanford University	UNITED STATES	50
55 nm BiCMOS055	Ghent University	BELGIUM	50
55 nm BiCMOS055	Stanford University	UNITED STATES	50
65 nm CMOS065	LAAS	FRANCE	50
130nm HCMOS9GP	Swiss Federal Institute of Technology (EPFL)	SWITZERLAND	100
130 nm SiGe BiCMOS9MW	Thales Systems Aeroportes	FRANCE	100
28 nm CMOS28FDSOI	Stanford university	UNITED STATES	100
65 nm CMOS065	National Research Univ. of Electronic Technology	RUSSIA	100
0.35μm CMOS High Voltage H35B4D3	CEA-Saclay	FRANCE	100
0.18 μm CMOS High Voltage H18A6	Hong Kong University of Science & Technology	HONG KONG	125



Low Volume Productions in 2016 (continued)

Technology Process	Institution	Country	Total
130 nm SiGe	Thales Systems Aeroportes	FRANCE	200
0.35 µm CMOS	WeEn Semiconductors	U.K	200
90 nm CMOS	Maja Systems	USA	200
28 nm CMOS28FDSOI	Arizona State University	UNITED STATES	250
0.35µm SiGe BiCMOS	IM2NP	FRANCE	400
55 nm BiCMOS055	MICRAM	GERMANY	435
0.35µm SiGe BiCMOS	OMEGA	FRANCE	700
0.35µm SiGe BiCMOS	OMEGA	FRANCE	700
0.35µm SiGe BiCMOS	OMEGA	FRANCE	700
0.35µm SiGe BiCMOS	OMEGA	FRANCE	700
0.35µm SiGe BiCMOS	OMEGA	FRANCE	700
0.35µm SiGe BiCMOS	OMEGA	FRANCE	700
0.35µm SiGe BiCMOS	OMEGA	FRANCE	700
0.35µm SiGe BiCMOS	OMEGA	FRANCE	700
0.35µm SiGe BiCMOS	OMEGA	FRANCE	700
0.35 µm CMOS	IPN	FRANCE	700
0.35µm SiGe BiCMOS	LPSC	FRANCE	800
0.35 µm CMOS	CEA-Saclay	FRANCE	1700
28 nm CMOS28FDSOI	LETI/CEA Grenoble	FRANCE	1 wafer
28 nm CMOS28FDSOI	LETI/CEA Grenoble	FRANCE	1 wafer
0.35µm SiGe BiCMOS	WEEROCC	FRANCE	2 wafers
0.35µm CMOS High Voltage	APTASIC	SWITZERLAND	6 wafers
65 nm CMOS065	National Research Univ.	RUSSIA	25 wafers
0.25µm CMOS	imXPAD	FRANCE	25 wafers



Low volume Prod. Plastic Packaging in 2016

- Plastic Packaging can be provided from 20 to 100'000 parts
- A comprehensive set of packages is available : QFN, QFP, TQFP, BGA, DIP, SSOP,

Institution	Run Ref.	Technology Process	Number of parts	Package type
CEA Saclay	SA35C13_1	0.35um CMOS	150	QFN 44
LPC Clermont	A35C15_4	0.35um CMOS	5200	LQFP 64
IPN Lyon	A35C15_3	0.35um CMOS	750	LQFP 100
Thales	A35S14_4	0.35um SiGe	130	QFN 40
OMEGA Palaiseau	SA35S16_1	0.35um SiGe	800	QFP 160
OMEGA Palaiseau	SA35S16_1	0.35um SiGe	800	TQFP 144
OMEGA Palaiseau	SA35S16_1	0.35um SiGe	800	QFP 160
CEA Saclay	SA35C13_1	0.35um CMOS	1790	TQFP 128



Examples of prototyping pricing

CMOS	.35 μ m	ams	650 €/mm ²
CMOS opto	.35 μ m	ams	810 €/mm ²
CMOS HV	.35 μ m	ams	850 €/mm ²
CMOS	.18 μ m	ams	1'200 €/mm ²
CMOS HV	.18 μ m	ams	1'200 €/mm ²
CMOS	130nm	ST	2'500 €/mm ²
CMOS	65nm	ST	6'500 €/mm ²
FDSOI	28nm	ST	12'500 €/mm ²
SiGe BiCMOS	.35 μ m	ams	890 €/mm ²
SiGe BiCMOS	130nm	ST	3'100 €/mm ²
SOI-FEM	130nm	ST	2'400 €/mm ²
SiGe BiCMOS	55nm	ST	7'900 €/mm ²
BCD	.16 μ m	ST	2'800 €/mm ²
Poly-SOI-Metal	MUMPS	MEMSCAP	3'900 €/cm ²



Typical Cycle time

ams		STMicroelectronics	
0.35 μm CMOS	10-12 weeks	180nm BCD8SP	18-24 weeks
0.35 μm HV CMOS	10-12 weeks	130nm CMOS	16-18 weeks
0.35 μm SiGe BiCMOS	10-12 weeks	65nm CMOS	20-26 weeks
0.18 μm CMOS	14-16 weeks	55nm BiCMOS	24-28 weeks
		28nm FDSOI	28-36 weeks

Including : 1-3 weeks data preparation

2-3 weeks wafer dicing and packaging



Conclusion

- ☹️ Less number of tape-outs in 2016 vs. 2015.
- ☹️ Less number of Low Volume Productions in 2016 vs. 2015.
- 😊 Low volume productions in 2016 with higher numbers of parts.
- 😊 Number of Plastic Packaging significantly increased in 2016.

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