













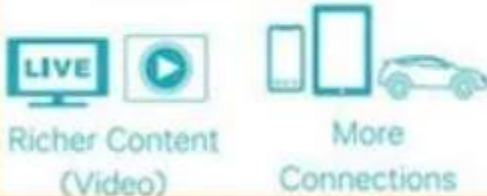
PATENT DATA ANALYSIS

Student Name and Surname: Marco Belardinelli

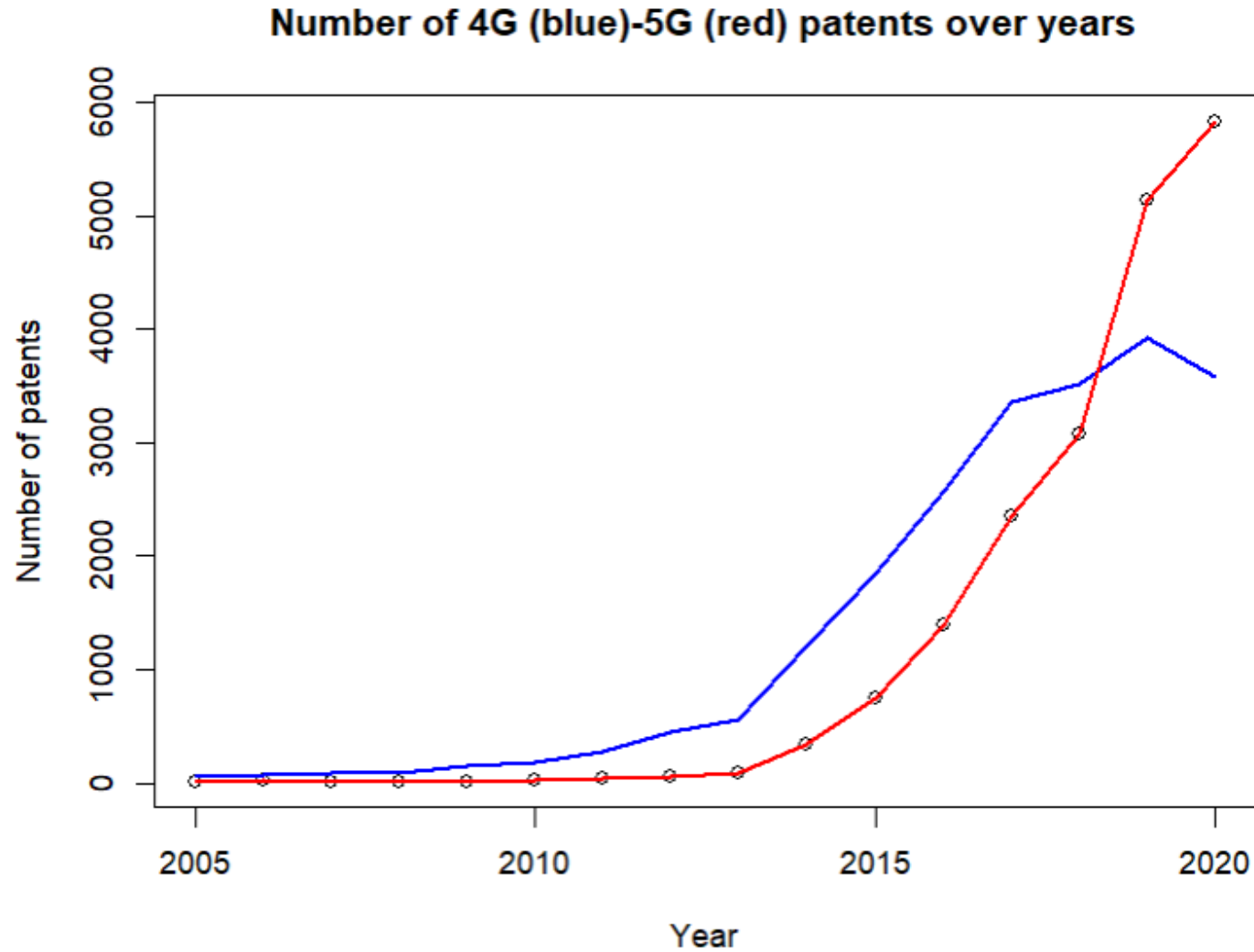
Matricula Number: S1107328

Focus on Technology

- Evolution of Mobile Standards (from 1G to 5G)

 1G	 2G	 3G	 4G	5G
speed in kilobit per second 2.4 Kbps 	speed in kilobit per second 64 Kbps 	speed in kilobit per second 2,000 Kbps 	speed in kilobit per second 100,000 Kbps 	speed in kilobit per second 1Gbps 
Analog Voice 	Digital Voice + Simple Data 	Mobile Broadband 	Faster and Better 	Real World Applications

Switch from 4G to 5G?



Leaders changing over time?

Applicants	TECH_1G	Applicants	TECH_3G	Applicants	TECH_5G
SONY CORP	135	HUAWEI TECH		SAMSUNG ELECTRONICS	
MATSUSHITA		CO LTD	475	CO LTD	2930
ELECTRIC IND CO		ZTE CORP	363	HUAWEI TECH CO LTD	493
LTD	134	STATE GRID		LG ELECTRONICS INC	386
MITSUBISHI		CORP CHINA	249		
ELECTRIC CORP	103				

Concentration ratio (CR4) = 0.2536 Concentration ratio (CR4) = 0.2994 Concentration ratio (CR4) = 0.4196

NB: Applicants= name of the applicant; **TECH_1G**: number of patents in 1G technology; **CR4**= four-firm concentration ratio

Sources: TECH_1G; TECH_3G; TECH_5G

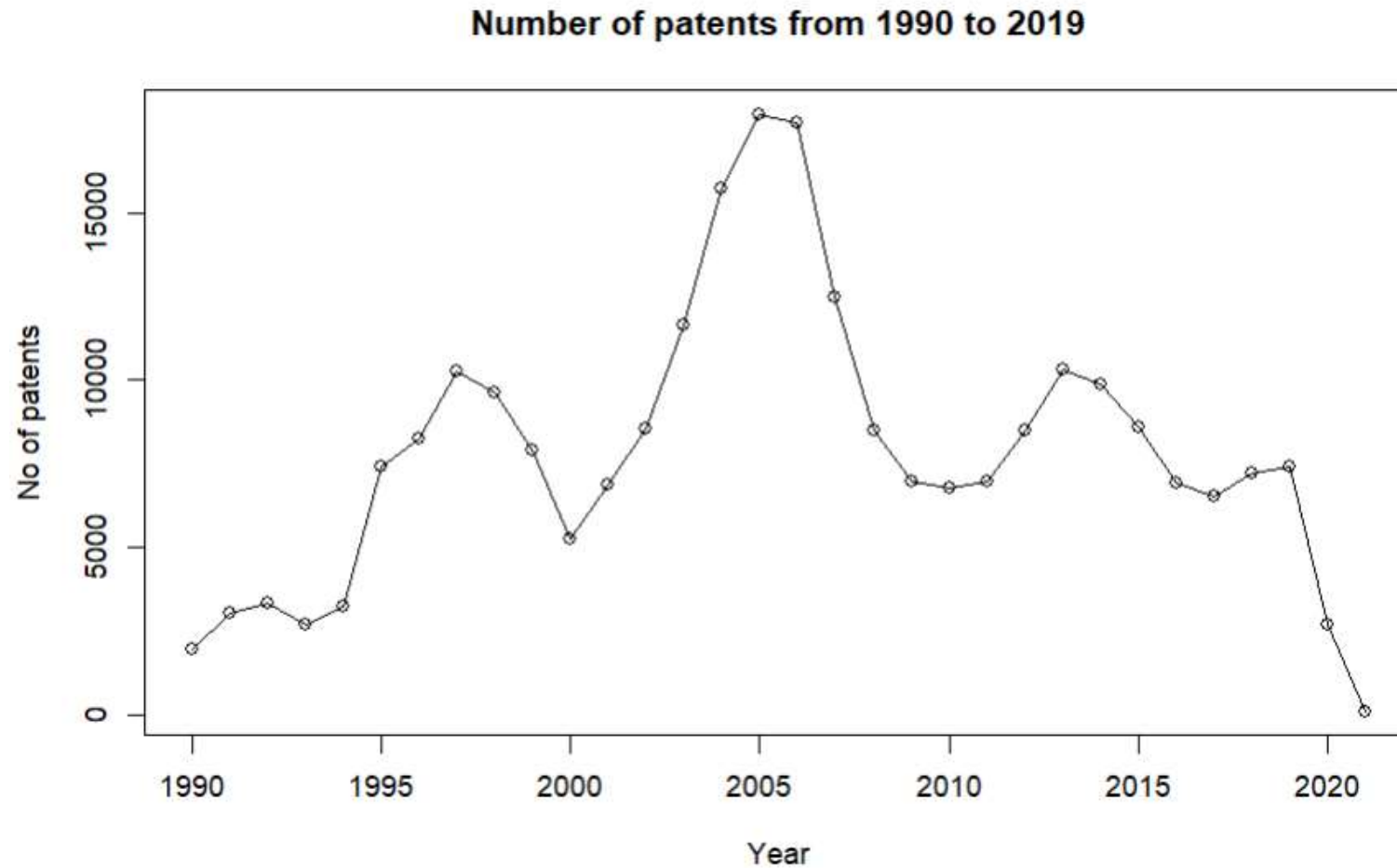
Comments about the previous two slides

- Unlike the switch from 3g to 4g, that was only an upgrade in term of «how fast we can send datas», the switch from 4g to 5g represents a switch of technology and it opens doors to a fully new way of interactions. We can remember how, during pandemic, in Whuan some surgical operation where done by remote thanks to the new 5G antennas that where built by Huawei in the city. And this is just a way! As we learnd if for one company there is a product innovation for another company there could be a process innovation.
- In the second slide (the one who shows the leading change over time) we can see how the companies who adopt the technology at his beginning doesn't appear at all nowadays. Maybe the high development costs lead them thoughts that that kind of market wasn't good for them (maybe there weren't enough complementary goods). We can see instead how Huawei joined as an entry follower and keep maintaining a nice position. In the end Samsung, as late entrant, who didn't have to develop all the previous technologies entered aggressively with all his financial capital and now is the leader. We can also talk about the Concentration Ratio that grows up in an insane way with the 5G income, this could be explained by the high capital invested by Samsung and his well-chosen timing to join the market.

Focus on technological leader

- SAMSUNG

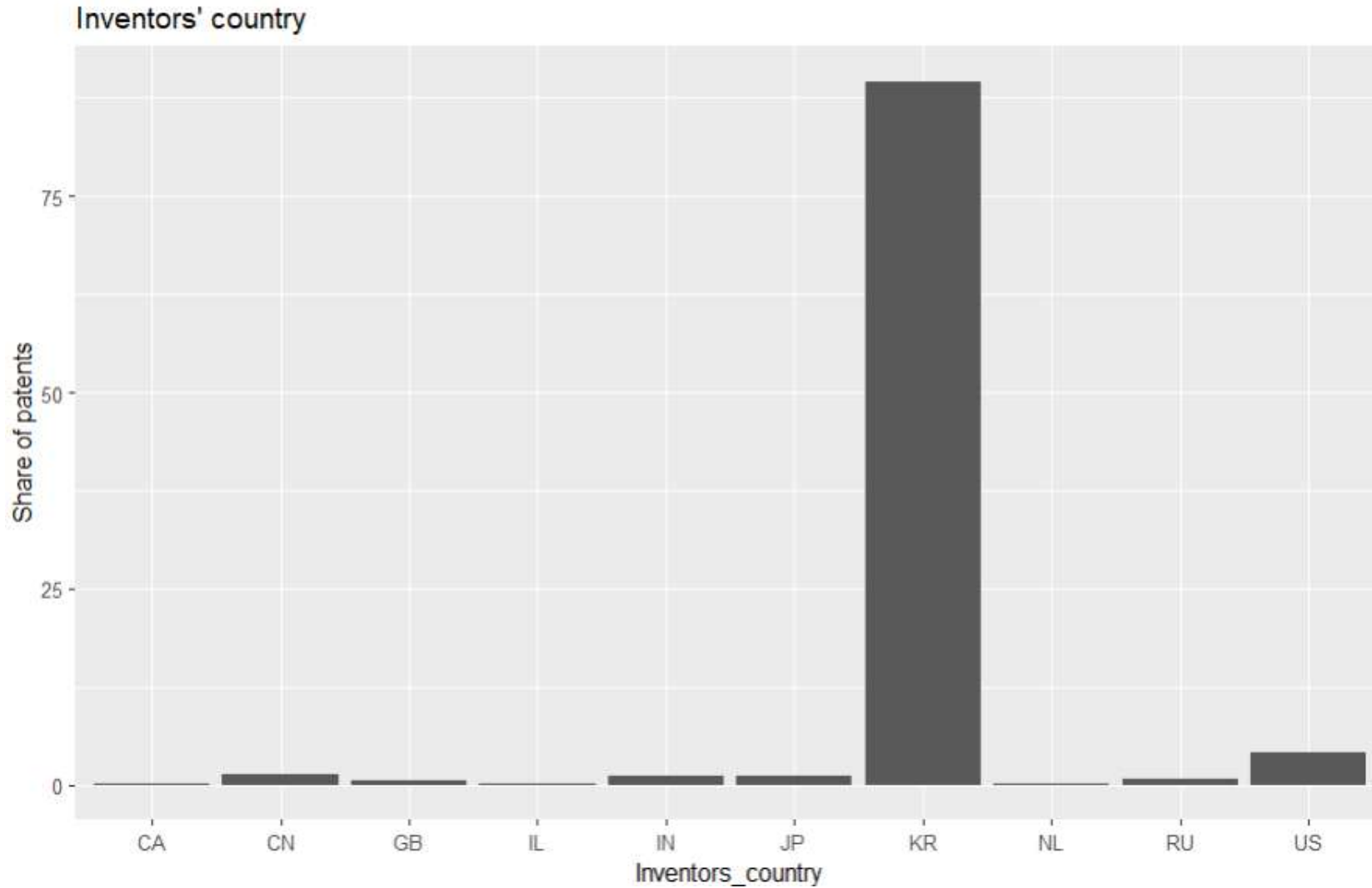
Number of patents



NB: Number of patents from **1990** to **2019**

Source: SAMSUNG

Number of Patents by inventors country



Source: SAMSUNG

Top 10 IPC 4-digit class

	IPC4	Num_pat
1	H01L	76552
2	G06F	55647
3	H04N	42005
4	H04W	37423
5	H04L	31015
6	H04B	25787
7	G11C	20838
8	G02F	16197
9	G11B	15930
10	G09G	10419

Concentration ratio (CR4) = 0.5143

To export a table: write.table
Source: SAMSUNG

Before and after 2000

BEFORE 2000

IPC4	Num_pat
H04N	8944
H01L	7655
G11B	7492
G06F	3960
G11C	2946
F24F	2166
H04M	1822
F25D	1808
H04B	1597
D06F	1434

AFTER 2000

IPC4	Num_pat
H01L	69908
G06F	52741
H04W	39529
H04N	34672
H04L	30097
H04B	24704
G11C	18428
G02F	15235
G09G	10007
H04M	8451

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Sources: SAMSUNG_BEFORE_2000; SAMSUNG_AFTER_2000

H01L - Who are the main competitors?

- Construct a table with the top 10 applicants (IPC=H01L)

	Applicants	Num_pat
1	HITA	74077
2	SAMS	72090
3	TOSH	70098
4	FUJI	68403
5	MATS	52061
6	NEC	47737
7	MITS	46286
8	TOKY	31149
9	SONY	30915
10	SEIK	30680

Source: H01L