The Past and The Post Information Age

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Outlines

- Prologue
- “WinTel Empire” is facing challenges
- Android vs. Windows
- Mobile is Flying
- ICT in Taiwan, the Past and the Post
- Disruptive Innovations for ICT
- Wearable Computing : Google, Windows, Apple
- Disruptive Innovation for Education
- Epilogue

Prologue

- In 20th century, Information,communication (ICT) is emerging
- Big Giants : Bell Telcom, IBM, Microsoft, Intel, Google, Apple .....
- "From Machine to People": IBM
- From Supercomputer via Minicomputer (Digital Equipment to PC, Notebook, Netbook, Tablet)
- Mobile is Flying (from Nokia to Smart Phone i.e Apple, Samsung, HTC...
- "Wearable Computing"
- "From People to Human Touch"
- Disruptive Innovation in Education

“WinTel Empire” is facing challenges

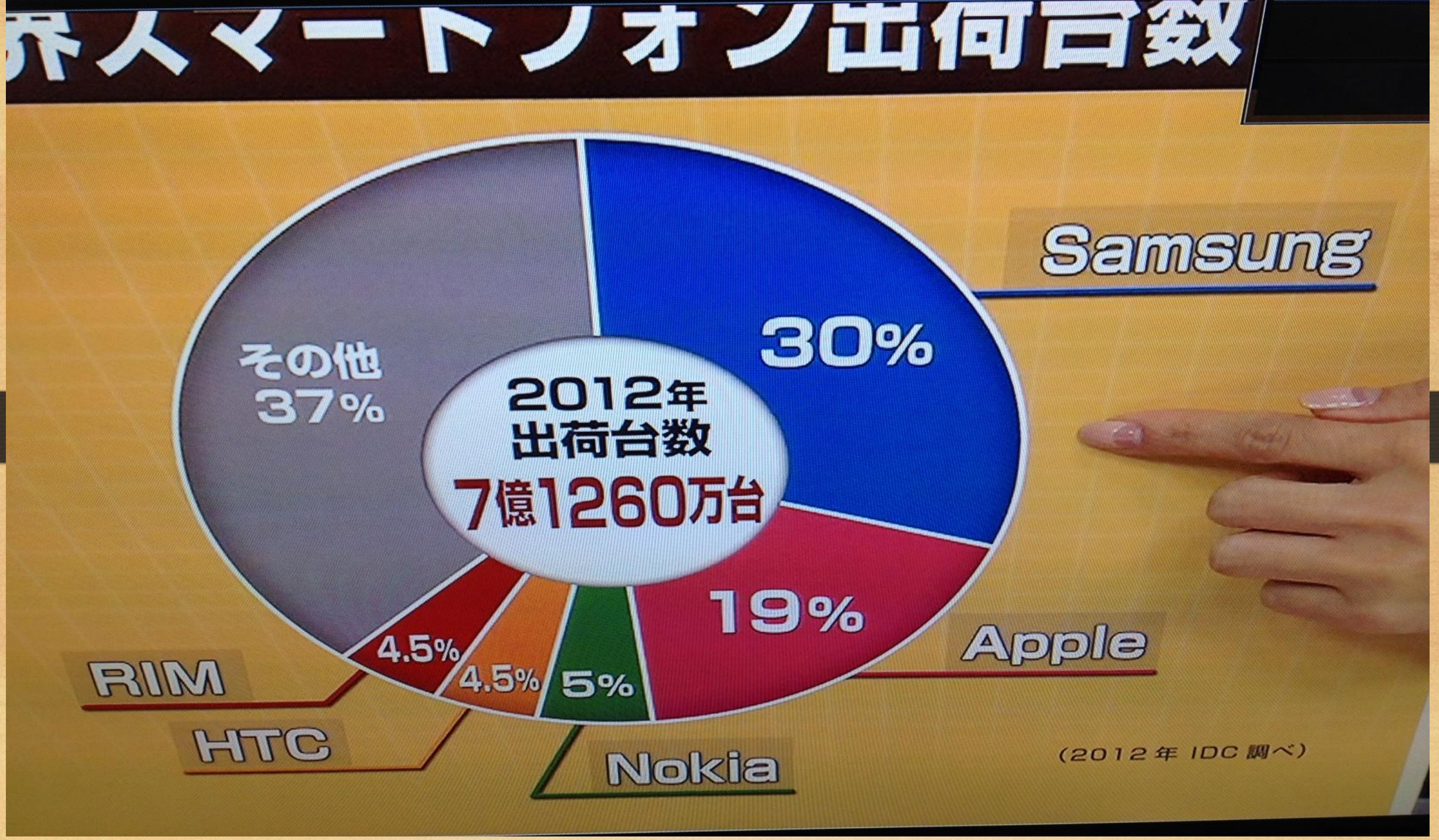
- Microsoft Windows was the King of OS
- Intel was the King of CPU
- Now ?
- How is the Rises of “Arm” and “Android”?

The War of OS and CPU

Tablet PC

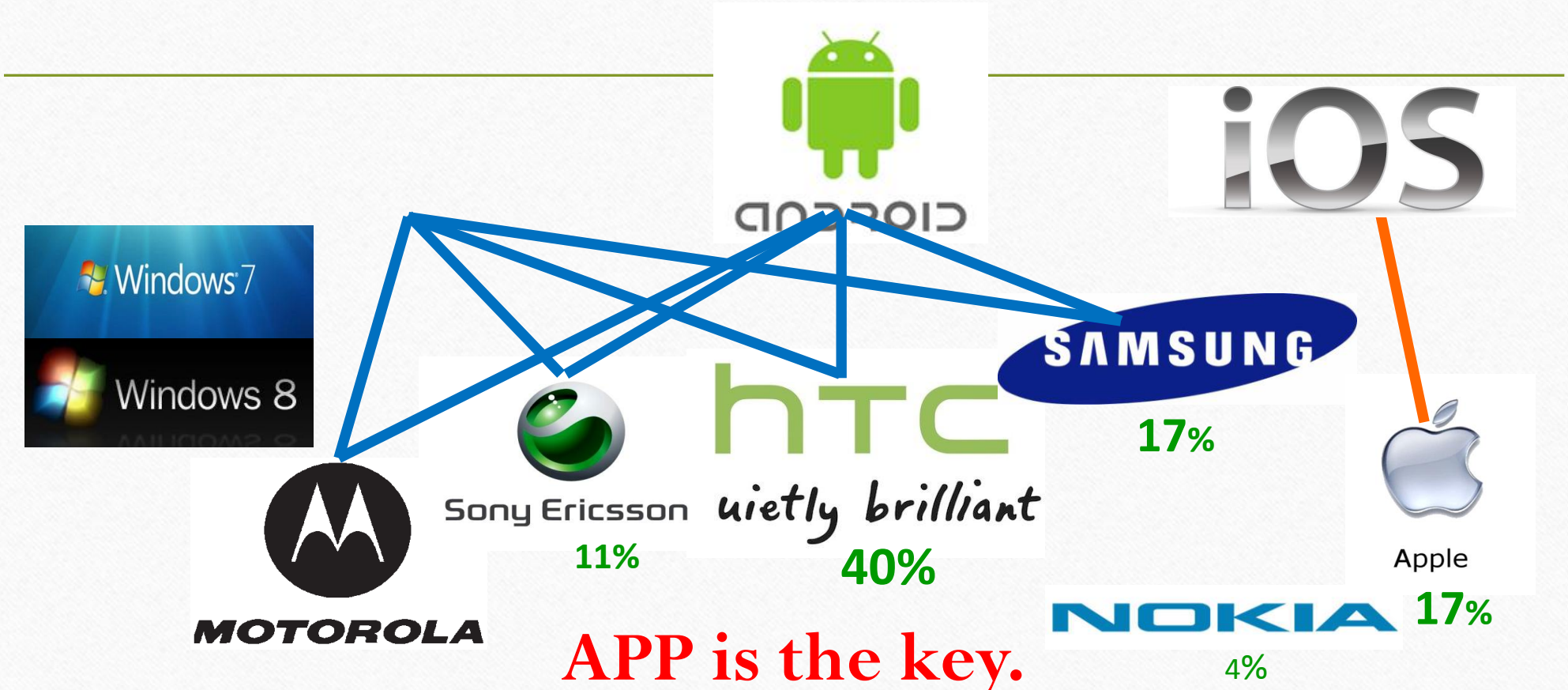
Smart Phone Market in Japan:

界スマートフォン出荷台数



The War of OS and CPU

Smart Phone: Google Android



APP is the key.

!!OS is Critical not CPU!!

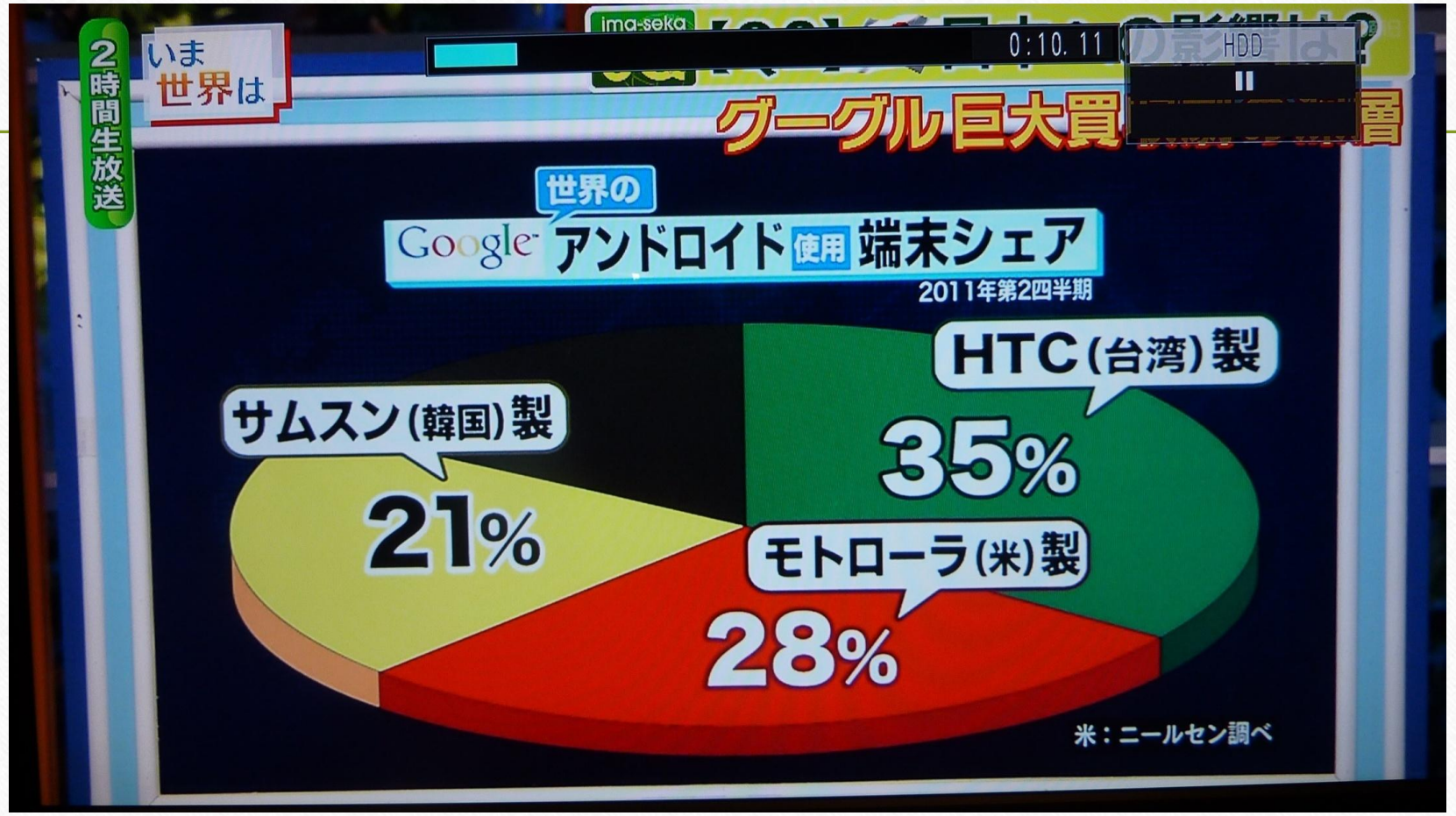
Android vs. i-OS vs. Windows for Mobile

- 75%; 20%; 5%

Transforming to Google Glass and i-Watch

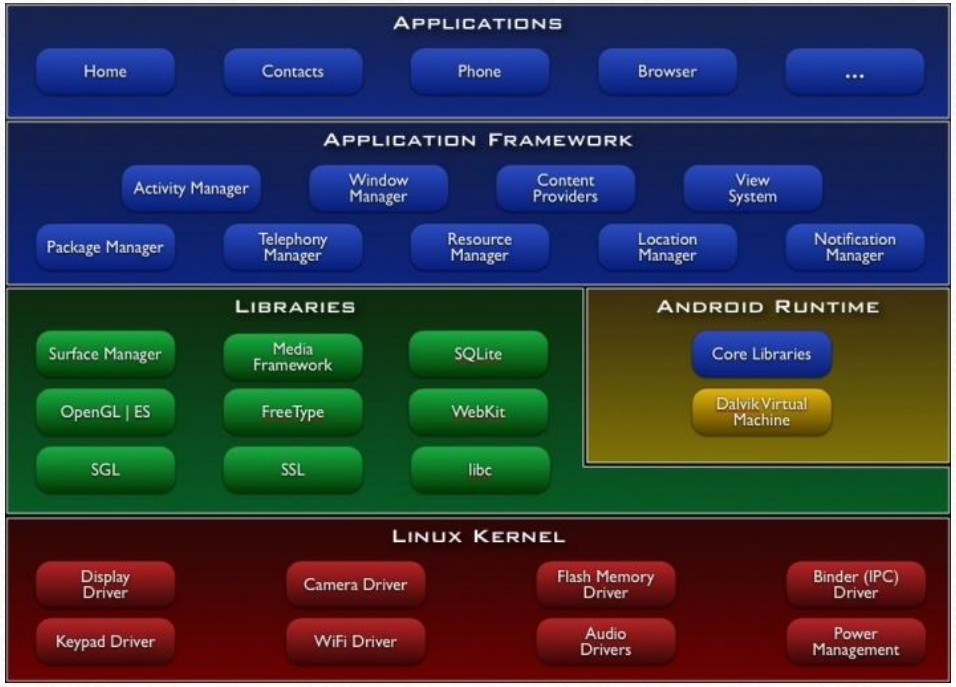
- Voice Control, Command

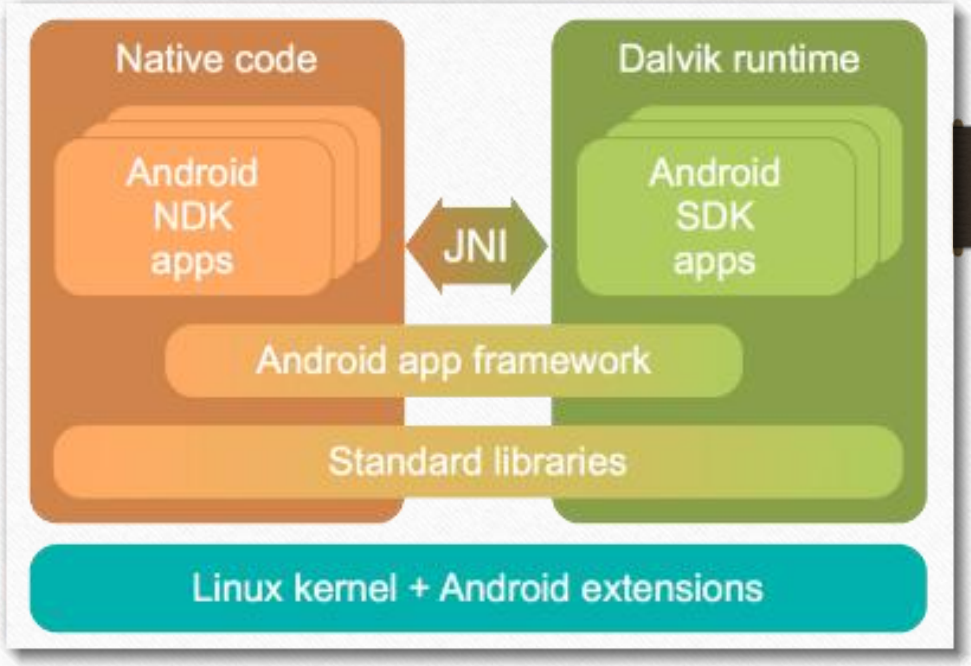
Android :


2時間生放送
いま
世界は
ima-seka
0:10.11
HDD
グーグル巨大買
世界の
Google アンドロイド使用 端末シェア
2011年第2四半期
HTC(台湾)製
35%
サムスン(韓国)製
21%
モトローラ(米)製
28%
米：ニールセン調べ

Open System VS. Close System

Linux,ANDROID VS Window,i-OS





★Hardware and OS are free but service is charged !

Disruptive Innovation :Clayton Christensen Harvard U. 1997

- Disruptive Innovation (DI) in ICT*
- DI in Sociology
- DI in Economics
- DI in Sustainability
- DI in Humanities
- DI in Education*

Google's Global Strategy :

Disruptive Innovation: Wearable Computing: Google, Windows, Apple

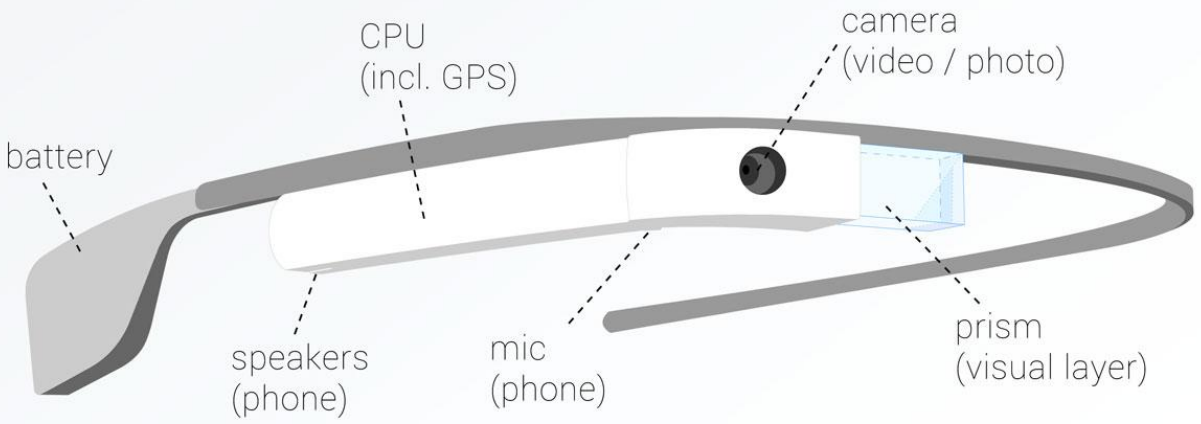
- Google Glass :40”display panel on your Glass Contains GPS, Medical, Game, Search Engine, Entertainment, Voice Commend, etc.
- i:Watch : Health Care (blood pressure, body temperature, breath, body movement, brain waves, cardiac graph,...), micro-netbook,.....compliance with a pico-display on your Glass, ...
- The Art and Science of “Combination & Integration “
- There is No hand-hold devices ,Your hands are free to do anything you like.

Google Glass

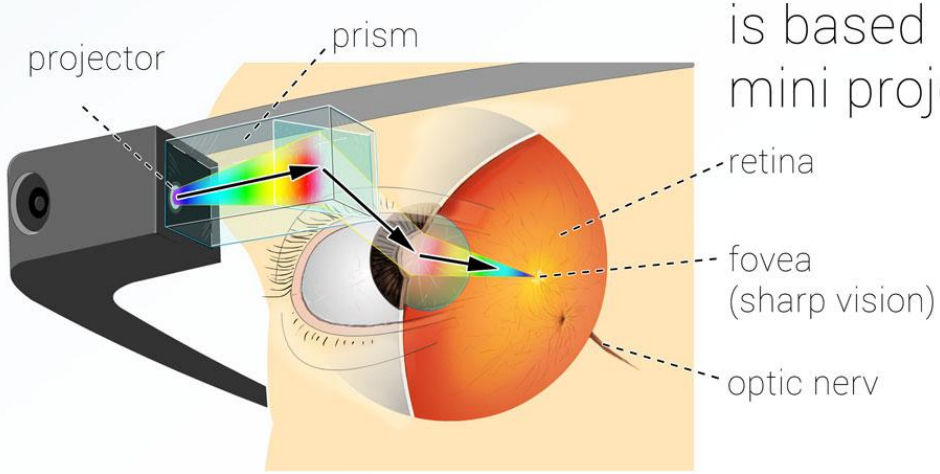
How Google GLASS works

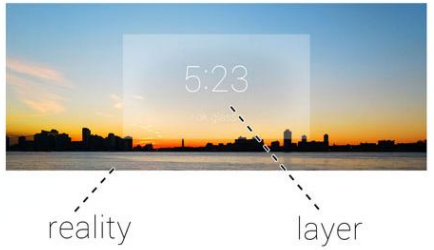
Why can you see a sharp image?

Infographic by M. Missfeldt
www.brille-kaufen.org

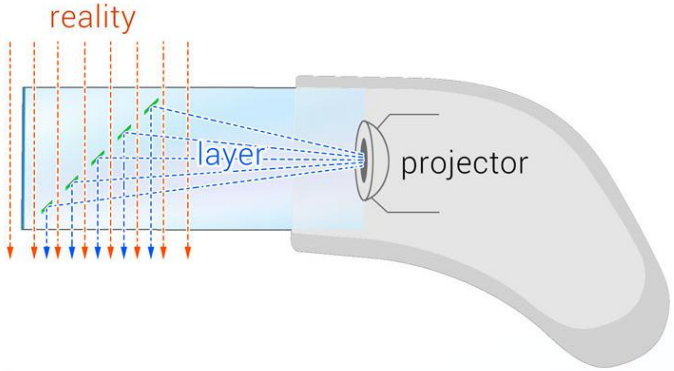


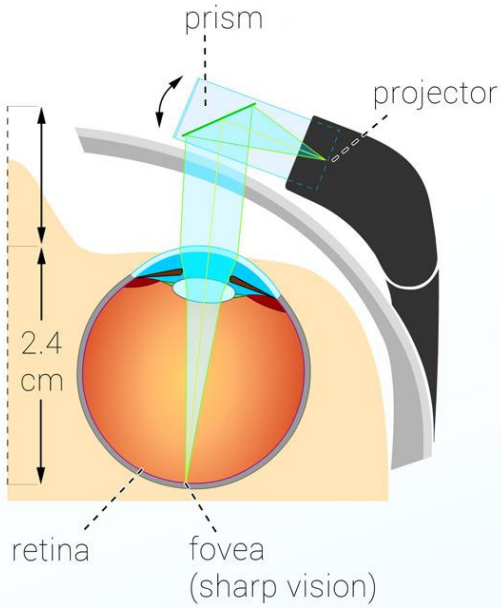
Its main function is based on a mini projector.





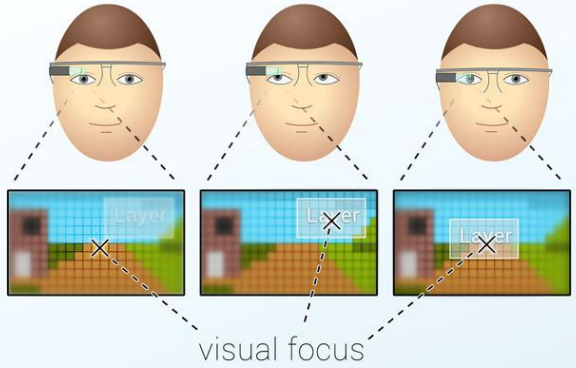
A visual layer is placed over reality.





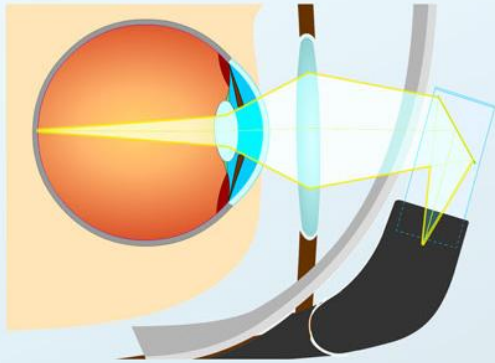
Via a prism, the layer is projected directly onto the retina of the eye.

The position of layer depends on how you wear Google Glass:



Challenge:
What about people with normal glasses?

(more than 50% in most countries)



greater distance -> does not feel and look as if wearing glasses

individual production is much more expensive

Conclusion:

Google Glass is a technical masterpiece. It is based on a projector and a very clever prism that projects the image directly onto the retina.

Sources: Patent No. 212686 -> http://goo.gl/5q6eC
Google Glass project -> www.google.com/glass/
Google Glass on Google+ -> plus.google.com/+projectglass/
Wikipedia: Virtual retinal display -> http://goo.gl/dMU9Y
The Verge: I used Google Glass. -> http://goo.gl/FzXhA
Wie funktioniert die Google Brille? -> http://goo.gl/Q5goF

Infographic by Martin Missfeldt
February 2013
http://www.brille-kaufen.org

Read more at:
www.brille-kaufen.org/en/googleglass

Source: http://www.brille-kaufen.org/en/googleglass/

Google Glass

http://www.google.com/glass/start/how-it-feels/

ICT in Taiwan,the Past and the Post

- The First Semi-Conductor Research in Taiwan, 1960.:State of the art: Si Planar technology : C.Y. Chang and his Colleagues.
- ITRI: 1973 , the CMOS pilot Facilities. C.Y. Chang's students
- Acer : founded by Stan Shih, NCTU's alumni
- Science Park & UMC ,the first CMOS Factory ,1980
- TSMC: the Largest Si Foundry in the World
- National Nano Device Laboratories. 1988; Founded by C.Y. Chang
- National SOC/SIP Program : Founded by C.Y. Chang. #SOC= System on Chip

Science Based Industrial Park: Hsinchu (1980), Taichung, Tainan

- Revenue reaches 3trillions in 2012
- Employee reaches 200k
- Semiconductor (Foundry, Fabless Design Houses), Photonics (LCD Display), PC : 50%

NDL: National NANO-Device Laboratories

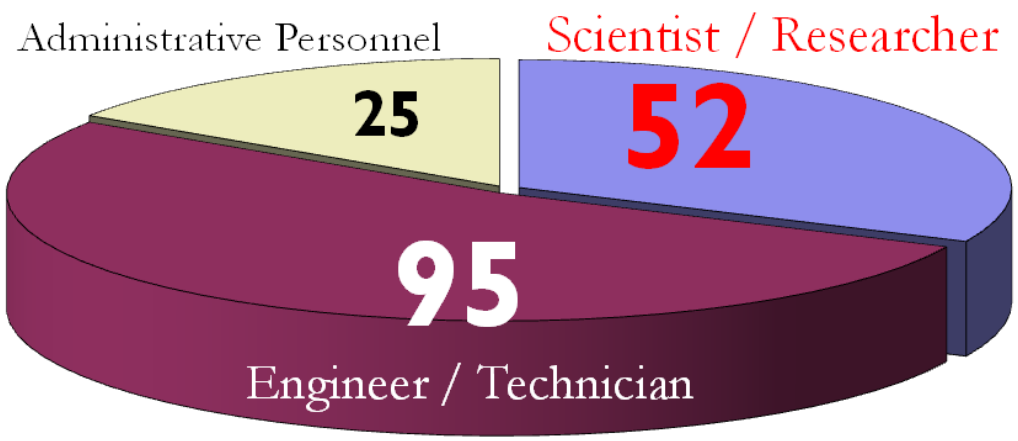
Founded in 1988 by Prof. C-Y Chang

- 1000 Users a year from 15 universities over the countries

- Total staff: 172 members
  + 10 Adjunct researchers from Universities
- Annual Budget: ~

Lab areas (m^2)

Class 10-100	1,400
Class 10,000	1000+1100
Office, etc	15,200



National SOC/SIP Program
國家矽導計畫

- Founded in 2002
- Program founded by C.Y. Chang
- SOC/SIP Competitiveness: No.2 in the world
- Representing enterprises: Mediatech, Himax, Andes, TSMC, UMC, etc…

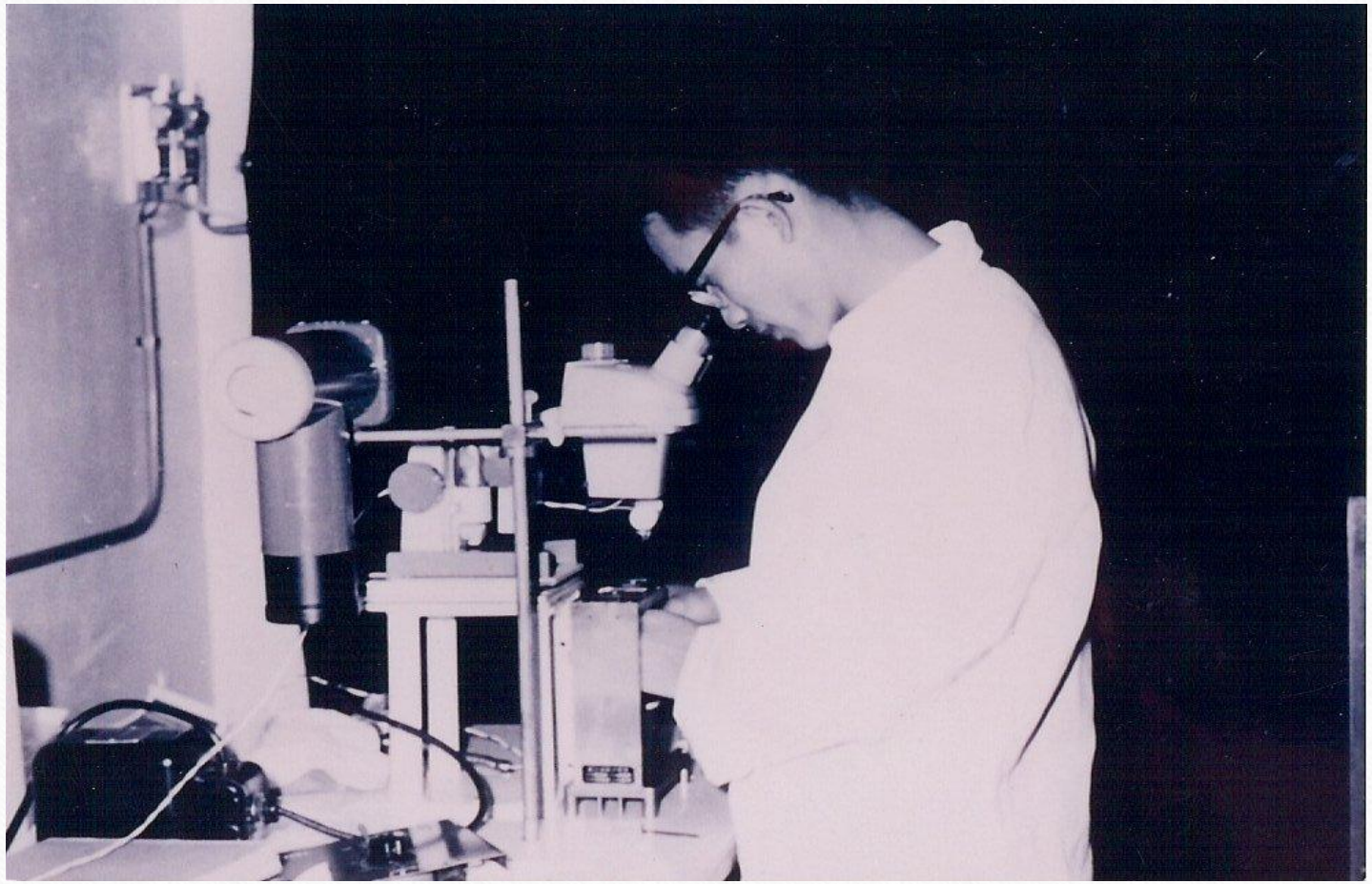
National Program: System on Chip: NSOC/SIP (2001-2005)
Founder: Chun Yen Chang

2002		2003		2004		2005		2006	
國家	篇	國家	篇	國家	篇	國家	篇	國家	篇
USA	84	USA	80	USA	82	USA	93	USA	117
Japan	30	Japan	37	Japan	44	Japan	45	Japan	43
Korea	12	Korea	19	Korea	17	Korea	17	Taiwan	18
Netherlands	8	Netherlands	13	Netherlands	11	Taiwan	15	Korea	16
Germany	6	Germany	10	Germany	8	Netherlands	10	Germany	13
Belgium	4	Italy	5	Belgium	7	Switzerland	10	Netherlands	8
Finland	4	Canada	4	Taiwan	6	Italy	8	Italy	7
Italy	3	Switzerland	4	Switzerland	5	Canada	7	Austria	6
Canada	2	France	4	Italy	4	France	6	Switzerland	5
China	2	Belgium	3	France	3	Germany	6	Belgium	4

Where We Have Started ?

Year	
1963-1966	NCTU established world class Si Planar Technology and MOSFET among Asia and and Europe, Attracted world experts to visit C.Y. Chang's Semiconductor Research Center (SRC/NCTU)
witness	Dr. Dawon Kahng ,姜大元who made the first MOSFET (1960, DRC@Carneige Tech)
	Dr. C.T.Sah,薩支唐who made the first CMOS (1966, DRC,U.Penn)
	Dr. G.L.Pearson The First PV Cell was Demonstrated at Bell Labs.,,Stanford U.
	Dr. F.Fang,方復I.B.M.T L Watson RC,IBM. Demonstrated the First QHE 1965 APL.
1970	CY Chang's Fine Product Microelectronic Corporation,萬邦電子公司, the first Si Planar Technology products was regarded as the "Fairchild of Taiwan".
1971	Stan Shih,founded acer co. Shih graduated from SRC/NCTU
1974	CMOS Pilot Plant led by Dr. D.H.Hu 胡定華with whole team member trained from from CY Chang's NCTU/SRC
1980	CMOS Co. UMC, successful sale of CMOS watch chips
1987	CMOS Co., TSMC, the world first foundry . Founded by M.Chang and F.C.Tseng.

Si Planar & MOS Technology in 1964,The First in Asia and Europe :The Precise Mask Aligner Made by C.Y.Chang



蔣經國來訪　1965：半導體對台灣未來的重要性

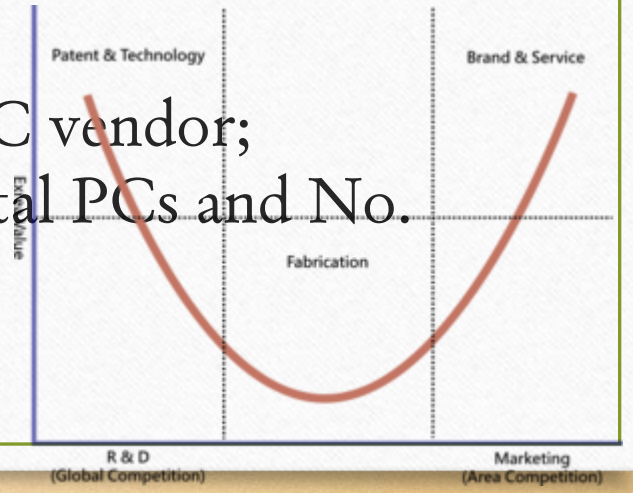
Chiang Chih-Kuo Ddecided to Develop Hi-Tech Infrastrcucture in Taiwan ,Visited SRC/NCTU in 1965

1965 初夏 蔣經國來訪 ：決心發展台灣高科技,1970 再諮詢張教授

蔣經國先生參觀交大半導體實驗室的鋁合金爐，左起張俊彥、張瑞夫、蔣經國與張去疑合影

Stan Shih and ACER & U- Theory

- A graduate of NCTU, Conferred Bachelor (1968), Master's (1971), and honorary Ph.D. (1992)in Dept. of Electronics Engineering.
- In Sep. 1976, together with four partners, Mr. Shih co-founded Multitech International Corp., the forerunner of Acer, with US$25,000.
- led Acer to become a global PC vendor; today Acer ranks No. 3 for total PCs and No. 2 for notebooks worldwide.
- U-THEORY



"Without Prof. Chang's leadership, Taiwanese Electronics Industry could not so flourish, not only to the economy of Taiwan but also to the would",
by C. T. Sah/NAE

2000 National Academy of Engineering, USA

JAPAN NIKKEI ASIA PRIZES

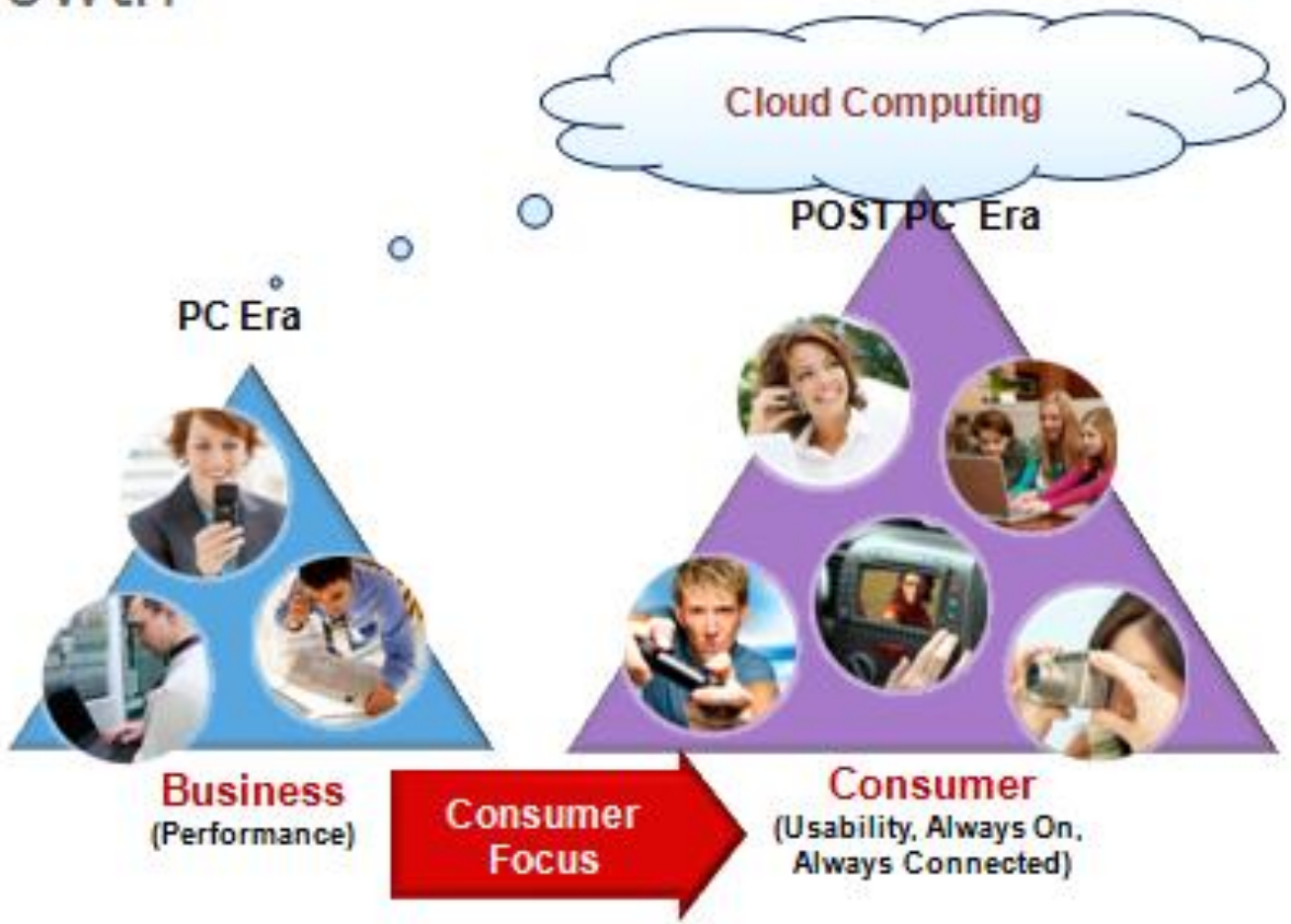
On May 22, 2007, Prof. Chang was awarded the Japan Nikkei Prize: “ The Father of Taiwan Semiconductor Industry” as was cited.

Disruptive Innovations of ICT

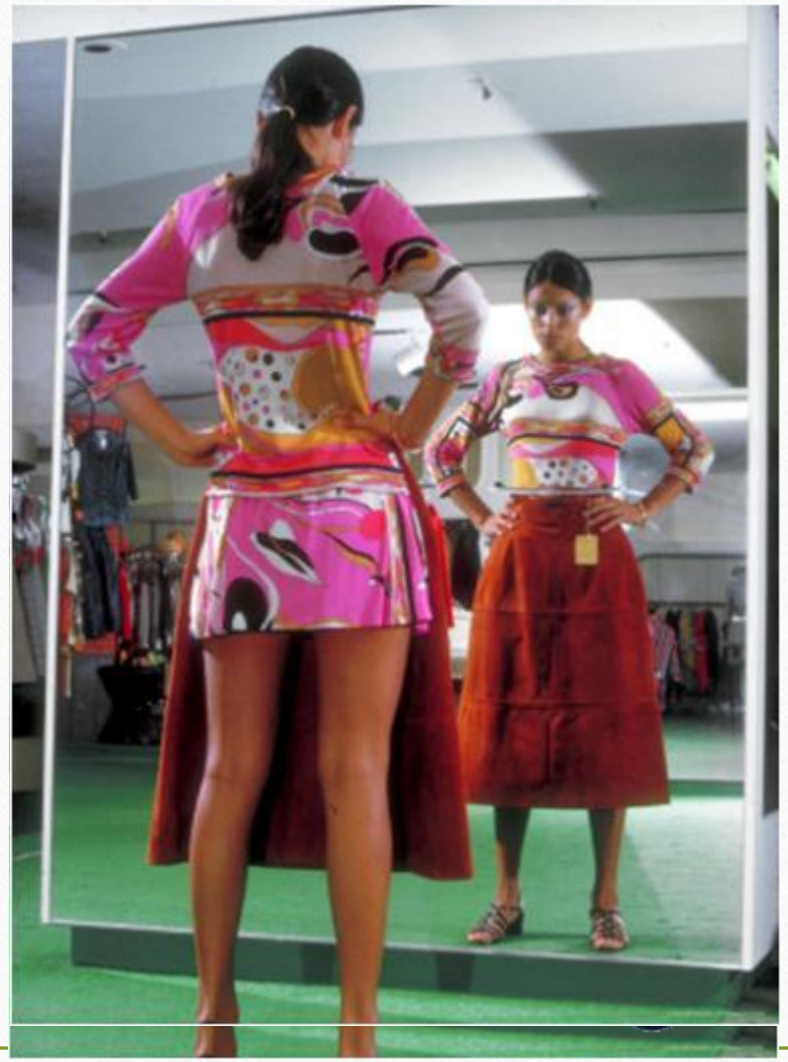
- Wearable Computing
- Google <
- Microsoft
- Apple
- Samsung
- TSMC, Himax :Wearable Computing Supply Chain <
- Taiwan ?Japan? ?
- Development Team including Psychologist, Software Expertise, Scientist, Humanitarian, …

Google's Global Strategy :

Consumer-centric Innovation and Growth



Humankind Drives Integration



We like devices to be like ourselves: Full-featured

- Can think
- Can talk
- Can see
- Can hear
- Can feel
- Can smell
- Can manipulate
- Can ..Wearable Computing

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Wearable Computing Devices, Like Apple's iWatch, Will Exceed 485 Million Annual Shipments by 2018

Research News

London, United Kingdom - 21 Feb 2013

Wearable computing devices are projected to explode in popularity over the next year and with a wave of new gadgets set to hit the consumer market, could soon become the norm for most people within five years. ABI Research forecasts the wearable computing device market will grow to 485 million annual device shipments by 2018.

Currently, sports and activity trackers account for the largest chunk of wearable technologies shipped today. Smart activity trackers are widely available, and the device's trendy and stylish appearance makes them very popular with a broad range of customers. It is estimated 61% of the wearable technologies market is attributed to sport/activity trackers in 2013. Smartphone compatible watches are beginning to emerge, and rumors have materialized regarding Apple releasing a smart watch some time this year. Furthermore, we will see the arrival of the much anticipated, smart glasses later this year.

"The furor about wearable technologies, particularly smart watches and smart glasses is unsurprising," says Josh Flood, senior analyst at ABI Research. Both technologies are very stimulating and some of the applications for the device are rather inspiring. "Apple's curved glass-based watch could prove to be a revelation in the wearable technologies market. The major question is whether the digital time piece will act as a complimentary device to the company's iPhone smartphones or as a standalone product with other functionalities like health or activity tracking capabilities."

Additionally, smart watches offer extra usages for an item most people already own and commonly purchase. It may become universally expected for watches to include this functionality as feature in the future. Furthermore, the capabilities of smart watches could lead to the device being used as a wearable remote for home automation systems. A quick shake of your wrist to turn off/on room lights would be a very convenient tool.

ABI's latest "Wearable Computing Technologies" report analyzes and provides forecasts for wearable cameras, smart clothing, smart glasses, healthcare, activity trackers, 3D motion sensors, and smartphone compatible watches. Regional device shipments and some extra segment splits are also included in the report. It forms part of ABI Research's Mobile Device Technologies Research Service.

ABI Research provides in-depth analysis and quantitative forecasting of trends in global connectivity and other emerging technologies. From offices in North America, Europe and Asia, ABI Research's worldwide team of experts advises thousands of decision makers through 70+ research and advisory services. Est. 1990. For more information visit www.abiresearch.com, or call +1.516.624.2500 .

ABI Research: wearable computing

2014:Apple, Samsung

2018:485M

2022:completely replace smart phone

TSMC: The World No.1 Foundry

- MARKET CAP: $97B US IN 2012 VS: INTEL'S $103.57B US IN 2012
- MARKET CAP EXCEED 105B US SURPASS INTEL IN 2013 (F)
- Intel is declining?

Himax's "LCOS Display " for Google, Microsoft, Apple

- LCOS is "Liquid Crystal on Si" ,a miniaturized Display, measured 5cc and can embedded on Google 's glass.
- On Google Glass ,you can see a 40" Display

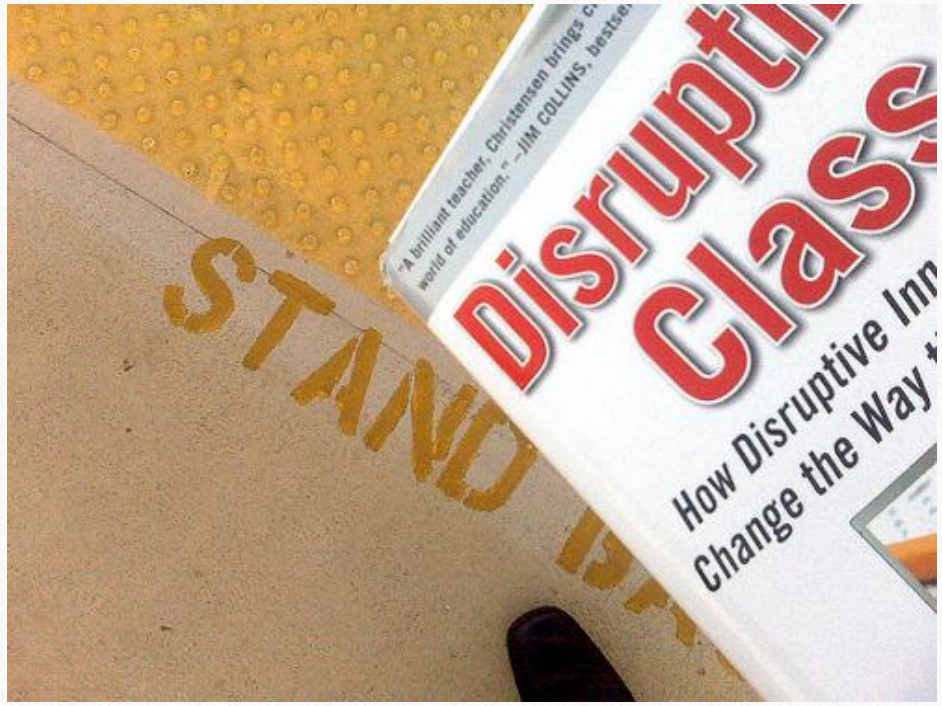
- Now what: Himax is expected to be a beneficiary of a larger shift toward higher resolution panels within mobile devices, since it supplies panel driver integrated circuits. Himax has been on an incredible run lately, in part on hopes that the company will be a supplier for Google's upcoming Glass product. I think shares have gotten a little frothy, which is why I've given it an "underperform" CAPScall that's currently going against me.

Why Himax Technologies Shares Soared

By Evan Niu, CFA

- What: Shares of Himax Technologies (NASDAQ: HIMX) have soared today by as much as more than 180% on positive analyst sentiment regarding the company's upcoming earnings.
- So what: Wedge Partners believes that Himax is set up for a first-quarter beat, thanks to strong sales related to tablet and smartphone form factors. The firm believes that Himax has won deals with Microsoft, Sony, and Samsung, which will help boost first-quarter sales above its own
- Dr. B. S. Wu is the Chairman of Himax

Disruptive Innovation in Education for 2020



Disruptive Innovation in Education for Asian Countries

- Eastern Culture vs. Western Culture
- Confucianism, Buddhism, Hinduism :Peaceful merciful Life(慈悲,)Middle Way ,Continuous Conduct (中庸之道, 致中和, Continuous hierarchy（天地君親師）

However, we are in need of

- "Disruptive Innovation" as Clayton Christensen of Harvard U. Proposed in 1997

Learning Mind Set makes Disruptive Innovation in Education :"DIE"

- Motivation for Learning
- Active vs. Passive
- Rebuttal vs. Obeying

DIE 1: Students who were at Bottom of the Class, However, in one Semester, They are the Top in their Class and Consecutively 12 Semesters Remaining at the Top :

- Dr. B. Wu, Contributed 60% IP for ITRI, and Now is the Chairman of a Company with the Market Cap. Exceeding One Billion
- Dr. H. Chen, Contributed to VLSI, Becoming the World Renowned Scholar. Gives Invited Talks.
- Dr. W. Lin, Contributed Major IP to a Nonvolatile Memory Company,
- M/S Y. Li, in her Master Class, Competing with PHD's of MIT, Stanford, UCB, Oxford, Cambridge, and Earned TSMC's International Award,..... etc.

DIE2: World Renowned Students: The Powerfulness of DI in Education,

- Prof. F. Chang, The Chairman of EECS of UCLA
- Dr. F. Tseng, the Co-founder of TSMC
- Dr. H. Cheng, invented the World First Blue Laser. Ln 1990
- Dr. C. N. Zah, Invented The World Class Communication Laser, Corning Communication Co. Corning, N.Y.
- Dr. W, Teng, Fellow of Texas Instruments.
- Presidents of Universities : Profs.Y. K. Su, C. Wu, C. King, T.Li, C. Lin,.....

UCLA

Henry Samueli School of Engineering and Applied Science

Electrical Engineering

M.C. Frank Chang

Distinguished Professor and Chairman

Wintek Professor of Electrical Engineering

Ph.D., National Chiao-Tung University, Taiwan, R.O.C., 1979

High speed electronics including ultra high speed/ frequency devices and integrated circuits for radio, radar and imaging system applications.

- National Academy of Engineering, 2008
- IEEE David Sarnoff Award, 2006
- Fellow, IEEE, 1996

DIE 3: 5th TSMC-Outstanding Student Research Award

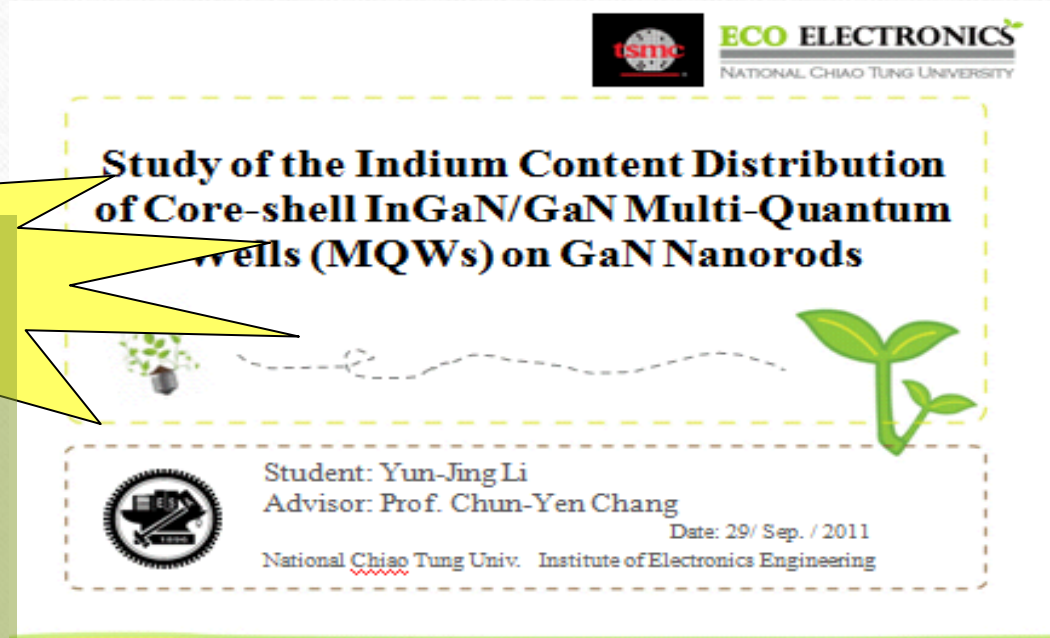
台積電傑出學生研究獎 2011

A Master Student is Competing with PHD's of MIT, Stanford, UCB, Cambridge, Oxford, Keio etc.

Congratulations to our MS student, M/S LI YUN-JIN

恭喜李昀瑾同學

2011台積電傑出學生研究獎



http://www.tsmc.club.tw/tsmc.php?PA=osr

The Mentor :Prof. Lan Jen Chu, C. Y. Chang's Mentor, since 1961 through 1973

- MIT Webster Chair Professor
- Led the Radar Development in World War II. Ended the War quickly.
- Awarded US Presidential CETIFICATE OF MERIT, 1956

DIE4: We are Close in Education

John Hannesey / Stanford C.Y. Chang / NCTU John and Chun-Yen

WEARABLE COMPUTING is Arriving because of Himax's LCOS +i-Watch

- *Although we don't believe in timing the market or panicking over market movements, we do like to keep an eye on big changes -- just in case they're material to our investing thesis.*
- **What:** Shares of **Himax Technologies** (NASDAQ: HIMX) have soared today by as much as 13% on positive analyst sentiment regarding the company's upcoming earnings.
- **So what:** Wedge Partners believes that Himax is set up for a first-quarter beat, thanks to strong sales related to tablet and smartphone form factors. The firm believes that Himax has won deals with **Microsoft**, **Sony**, and Samsung, which will help boost first-quarter sales above its own guidance.

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Epilogue

- Disruptive Innovations for Education 2020
- From Mobile to Wearable Computing : G-Glass +i-Watch +.....
- Human Touch
- Software-Hardware Fusing
- Science, Humanity meet Psychology

交大半導體新突破 奪世界第一

中時電子報
chinatimes.com BETA

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交大半導體新突破 奪世界第一

稍後再讀

台灣醒報 楊智強 2013年04月15日 17:21

A- A A+

交大半導體新突破 奪世界第一

team develops new superfast transistor

HEMT: The team has inked cooperative projects with Japanese and US firms, and hopes to work with local companies for application to everyday products

STAFF WRITER, WITH CNA

A research team led by a professor from National Chiao Tung University yesterday said it had built a new type of high electron mobility transistor (HEMT) that has the highest oscillation frequency in the world.

The research paper on the latest HEMT technology, which could be applied in the fields of imaging systems and biomedical testing, was published by the Japan Society of Applied Physics, the team said.

The transistor could be reduced to as small as 40 nanometers, the researchers said, adding that 3C — computers, communications and consumer — products are trending toward high speed and small size.

HEMTs play an important role in speed performance, they said.

National Chiao Tung University professor Edward Chang, center, smiles during a press conference in Taipei yesterday announcing a new high electron mobility transistor his team developed. The transistor has the highest oscillation frequency in the world.

交大高頻微電子研發成果 破世界紀錄

收聽 分享

時間：2013/4/15 撰稿‧編輯：江昭倫 新聞引據：採訪

在「兆赫波高頻電子元件」領域研發向來領先國際的交通大學研發團隊，最近開發出世界最高Ft~710GHz的砷化銦高電子遷移率電晶體(InAs High Electron Mobility Transistor, HEMT)，頻率是世界最高、速度世界最快，未來將可應用在影像雷達及生醫檢測，潛力無窮。