

Transformational and disruptive silicon storage



Development update - February 2016



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- Silicon Valley memory technology developer
- US\$10m invested in development over 8 years
- Wholly owned, in-house developed, intellectual property (IP) anchored by 15 US patents granted and 8 US patents pending
- Non-filamentary resistive random access memory (ReRAM)
- For next generation mobile and cloud silicon storage
- Demonstrated a critical milestone of ReRAM cell size at a 50 nanometre (nm) lithography, a breakthrough in ReRAM technology



Jim Dorrian

BA
Chairman

Served as CEO and director of several Silicon Valley companies with in depth experience in M&A and IPOs gained through founding and managing successful technology exits. Partner at Crosspoint Venture Partners, an early stage venture capital firm.

Dr Guido Arnout

PhD, Electrical Engineering
CEO and Managing Director

Specific expertise over 30 years in commercialising electronics technology from concept to product including Power-Escape, CoWare, CrossCheck Technology and Silvar-Lisco.

Howard Digby

BE (Hons)
Non-Executive Director

Former senior roles at IBM, Adobe, Gartner and the Economist Group. Director of Estrella Resources (ASX:ESR).

David McAuliffe

LLB (Hons), BPharm
Non-Executive Director

Experienced company director, has been involved in numerous capital raisings and in-licensing of technologies and founder of several companies in Australia, France and the UK, many of which are now publicly listed.

Guido Arnout

Refer to previous slide.

Michael Van Buskirk

Chief Engineering Officer

Executive roles with a number of leading memory companies in Silicon Valley including Adesto Technologies Corporation, Innovative Silicon Inc, Spansion Inc (the flash memory JV between Advanced Micro Devices (AMD) and Fujitsu).

Melanie Buffier

Director, Corporate Strategy and Investor Relations

Over 15 years' experience in investor relations, communications and financial reporting gained at some of Australia's leading public companies including Scentre Group, Westfield Retail Trust, Mirvac Group and Westfield Group.

ASX Code	4DS
Last traded closing price ¹	\$0.035
Market capitalisation	\$23.1 million
Ordinary shares on issue ^{1,2}	659.2 million
Escrowed performance shares	67.6 million
Unlisted options ³	106.1 million
Top 20 Shareholders	50.4%
Cash (at 31 December 2015)	\$2.4 million

1. At 29 January 2015.

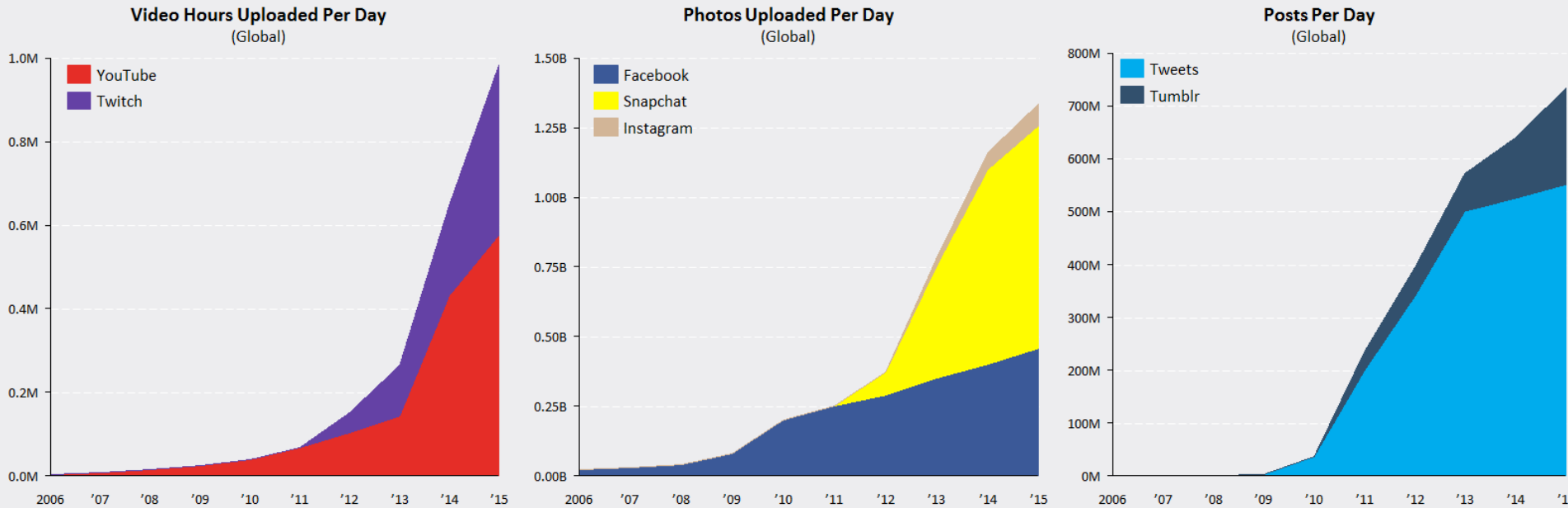
2. Including 114.6 million escrowed shares on issue.

3. Including 66.5 million escrowed unlisted options.

- Today, the majority of non-volatile memory (NVM) storage is NAND Flash (Flash), used in billions of mobile phones, tablets and laptops.
- Memory storage use is growing exponentially:
 - Increasing use of cloud storage
 - Continued proliferation of mobile devices
 - The Internet of Things, connected devices
- The opportunity?
 - To replace existing Flash technology which has a diminishing ability to scale further, while still remaining fast and reliable, and meet the future need for more storage in less physical space

4DS opportunity: the perfect storm

4DS



Notes: Data points publicized by each platform are irregularly provided and typically rounded for convenience

MEDIA REDEF

KPCB, Twitch, YouTube, Twitter, Tumblr, Author's analysis | @tweettal

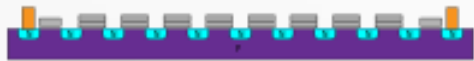
- Staggering growth has seen 90% of data stored today created in the last 2 years
- Cloud storage is moving to silicon storage
- Flash is exhausted

1. MEDIA REDEF : Age of Abundance: How the Content Explosion will Invert the Media Industry, January 2016

- Hard drives in the Cloud
 - Great retention and recovery, but:
 - Power hungry
 - Heat producing
 - Inferior latency
- Cloud players are moving to silicon storage

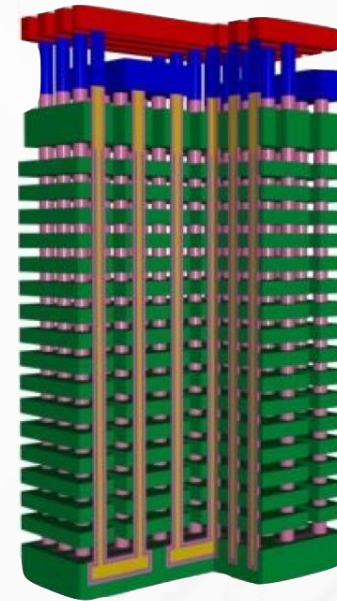


NAND Flash currently dominates the US\$40bn GB silicon storage market



2D Flash

16nm to 20nm cell size
Limits are # of electrons



3D Flash

40nm to 50nm cell size
Limits are structural

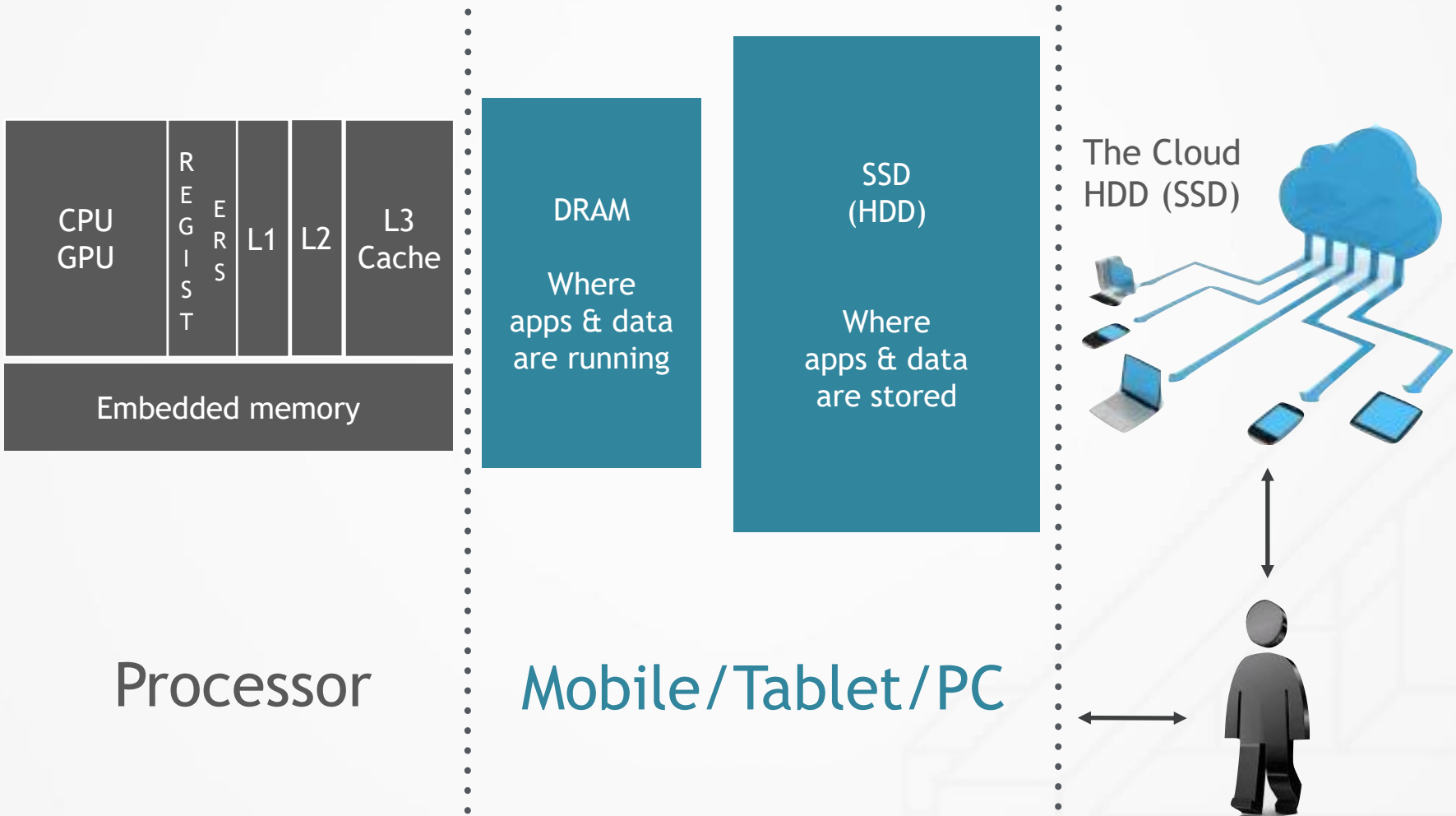
- 4DS next generation memory:
 - higher density / potential for better scalability
 - cooler / consumes less power
 - faster
 - better reliability; retention and endurance
- Why is 4DS ReRAM the solution?
 - Changes resistance of switching material
 - Operates without filaments

Two approaches to ReRAM

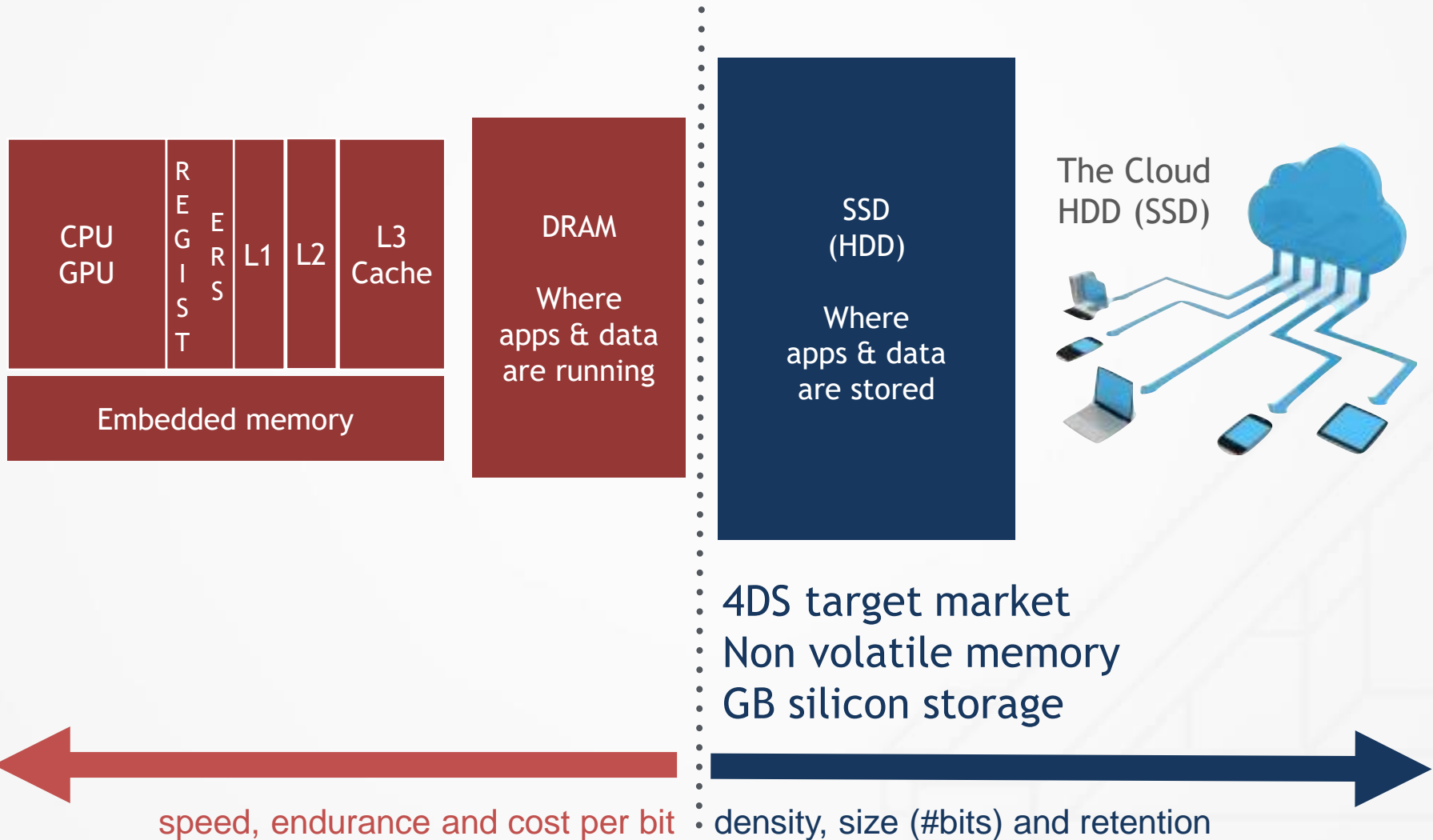
	ALL FILAMENTARY ReRAM	4DS NON-FILAMENTARY ReRAM
DATA RETENTION	Switching current high	Switching current low*
SWITCHING CURRENT	Constant	Scales with cell size
EFFECTIVE CELL SIZE	Switching current determines size	Lower current allows smaller cells
MARKET SWEET SPOT	Low density: Connected devices	High density: Mobile and Cloud

The 4DS memory cell uses no filament to switch= no scaling and retention issues

Memory hierarchy



Memory hierarchy



Industry & transportation



Industrial Automation



Smart Meter



Automotive

Smart Card MCU



SIM Card



ID Card

Cache Memory For Enterprise storage



Journal Memory



Other Cache Memory applications

Mobiles Phones

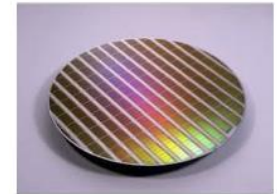


Entry mobile phone

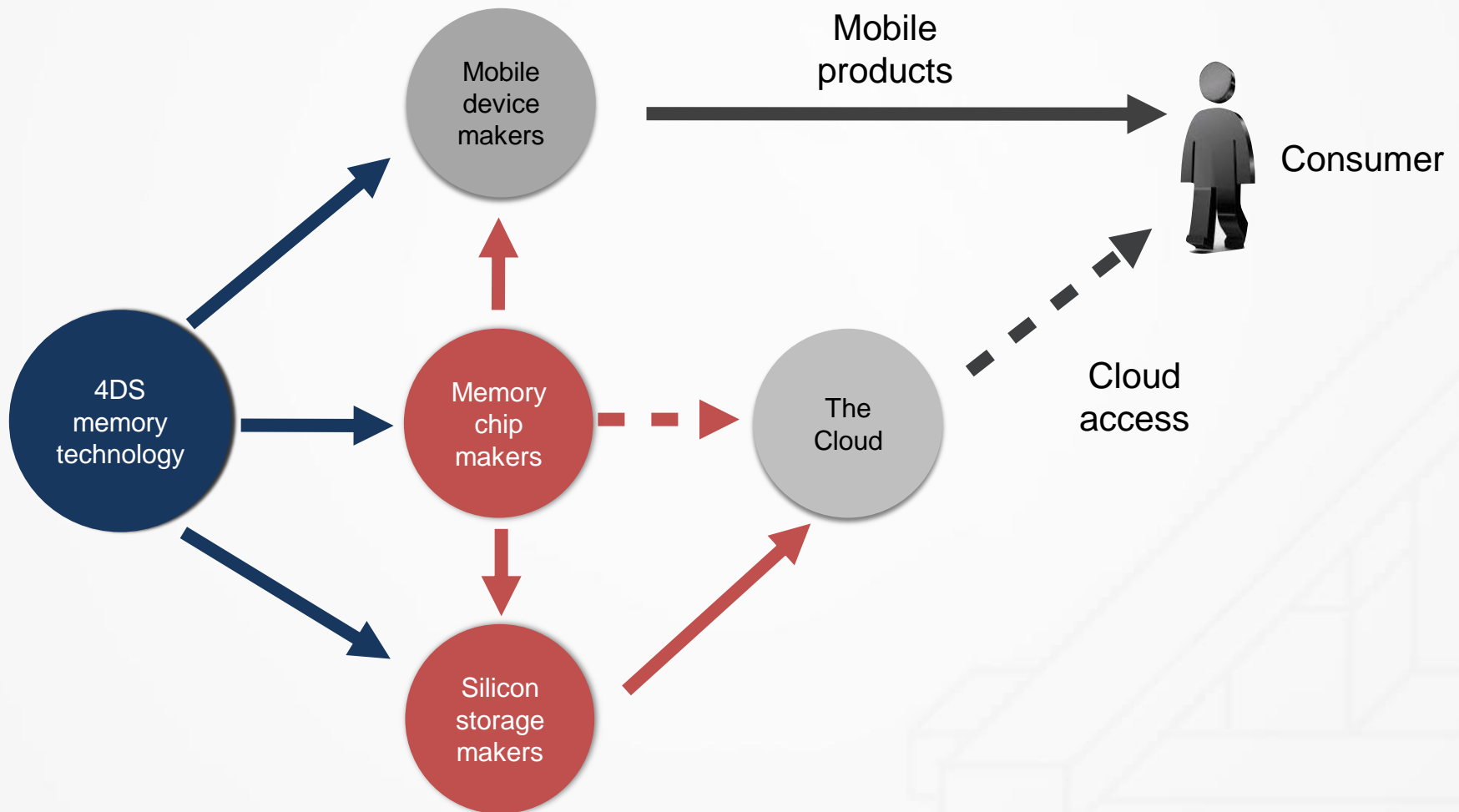


Smart phones

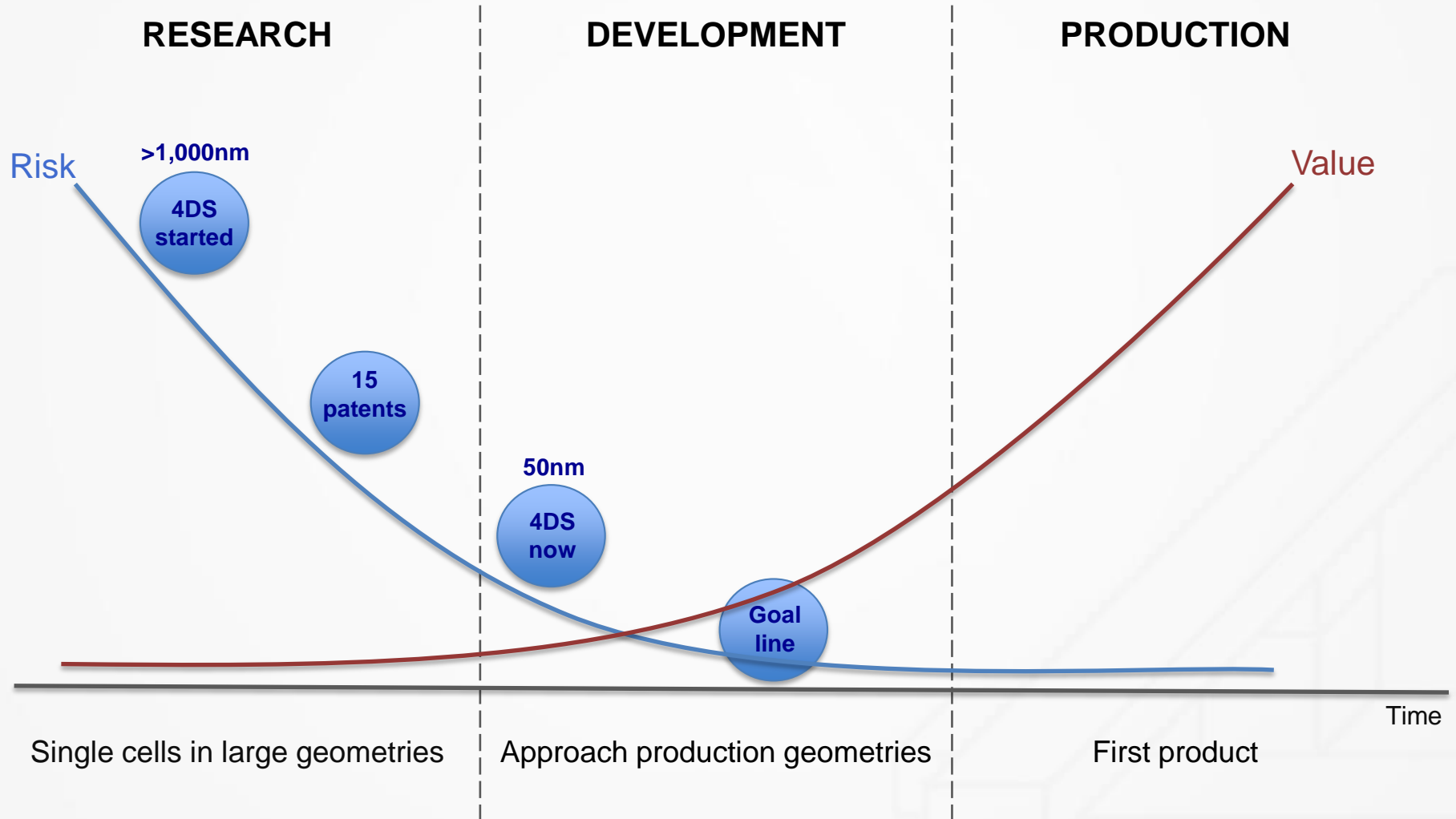
Mass storage Memory



NAND Memories



Memory development phases



Today: **4DS demonstrated ReRAM cells at 50nm lithography**

- Significant progress in scalability and yield
- This is where 3D Flash is today, Flash is an estimated US\$40bn market
- Approaching production geometries
- An essential step towards viable GB silicon storage

Tomorrow: **demonstrate viable scalability below 50nm with JDA partner, HGST**

- Endurance
- Retention
- Speed
- Yield

- Strategic partnership established in 2014 with HGST
- HGST is a global storage leader that strategically invests in high growth and emerging technology segments and innovative product development¹
- Provides access to resources and expertise
- Accelerates our development program

1. Source: <https://www.hgst.com/company/company-info>

- Target the fast growing GB silicon storage market
- Develop & own strong IP for GB silicon storage
- Leverage strategic partnerships
- Move technology to where only “time and money” is needed to go to market
- Create window for tremendous shareholder value creation

Recent transactions

Acquirer	Transaction	Date	Value (US\$)	Technology	Market
Apple	Acquired Anobit	2011	\$390m	Flash controllers	Mobile
Western Digital	Acquired startup Virident	2013	\$685m	Flash controllers	Cloud
Western Digital	Acquired sTec	2013	\$340m	Solid state drives	Cloud
Seagate	Acquired LSI	2014	\$540m	Flash controllers	Mobile
Cypress	Merger with Spansion	2015	\$5bn	Flash memory	Flash systems
Western Digital	Acquiring Sandisk		\$19bn	Flash memory	Cloud

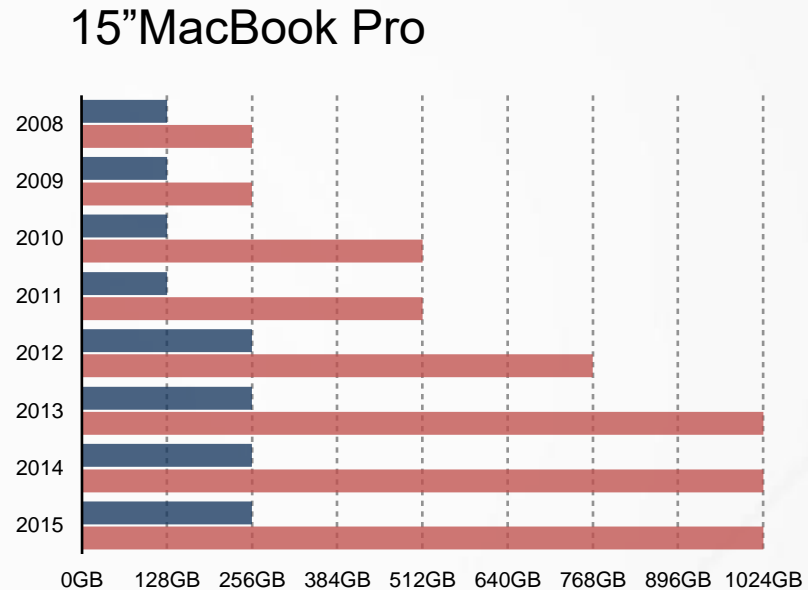
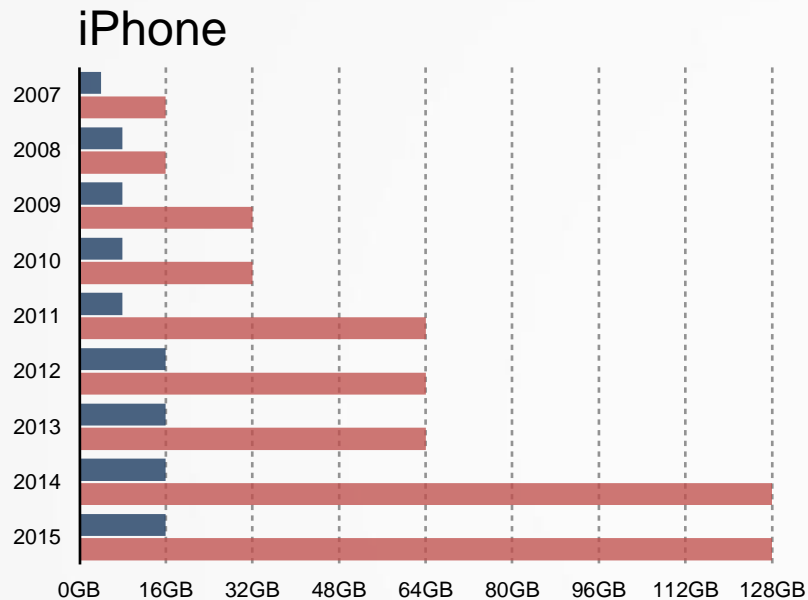
- 4DS is targeting a massive and fast growing segment at the right time
- Transformational and disruptive Silicon Valley memory platform
- 4DS non-filament based ReRAM, unique among other next generation players
- Developed over 8 years, US\$10m invested in R&D, 15 US patents granted
- JDA with HGST, a significant player in the storage market
- Small R, Big D
- Experienced high tech management and industry respected scientists
- Complemented by a Board with significant M&A and IPO experience
- Significant progress demonstrated in scalability and yield at 50nm lithography

APPENDIX



4DS

- Developer of next generation Resistive Random Access Memory (ReRAM)
- Established in 2007 in Silicon Valley with US\$10m invested in R&D over last 8 years
- Listed on ASX in December 2015, \$2.4m cash on hand (at 31 December 2015)
- 4DS has developed a scalable non-filamentary ReRAM memory cell at a 50nm lithography, a breakthrough in ReRAM technology
- 50nm represents significant progress towards the development of next generation mobile and cloud silicon storage
- Wholly owned, in-house developed, intellectual property (IP) with 15 US patents granted and 8 US patents pending
- Annual global memory market valued at US\$79 billion annually with a CAGR of 16%
- Flash is an estimated annual US\$40 billion market
- Renewal of Joint Development Agreement with HGST, a global storage leader that invests in high growth and emerging technology segments
- High tech experienced management supported by a team of industry respected scientists and developers and complemented by a Board with significant international M&A and IPO experience
- Strategy is to prove the value of technology and leverage IP through strategic alliances

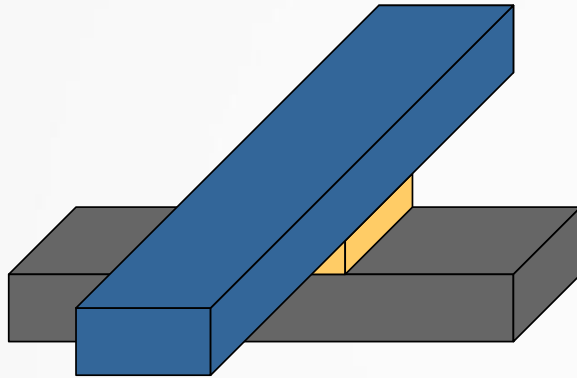


Minimum
Maximum

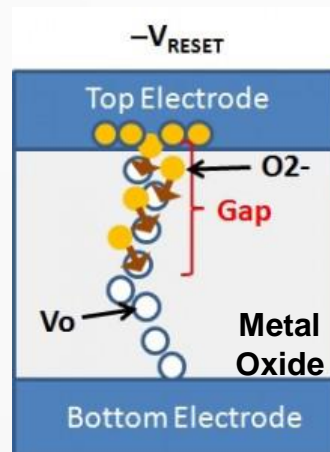
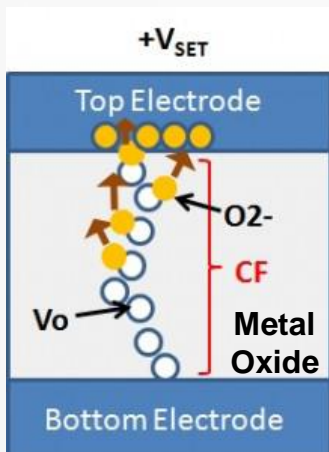
- Mobile lifestyle uses silicon storage: smart phones, tablets, laptops
- More power hungry HD displays & multi-core processors
- More battery for longer mobility
- Ever thinner & lighter devices
- Less physical space for silicon storage

How does filamentary ReRAM work?

Filamentary ReRAM consists of a switching material sandwiched between two electrodes



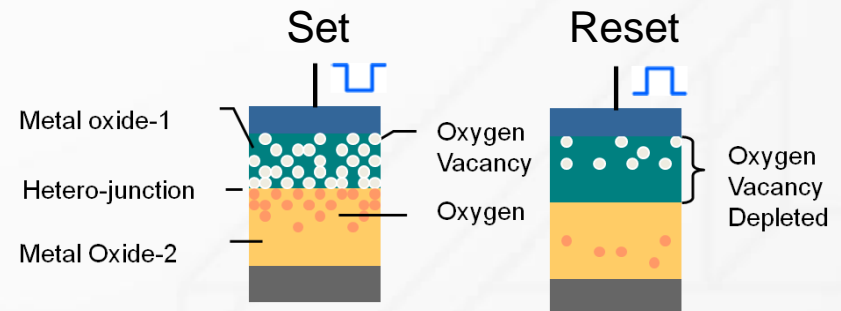
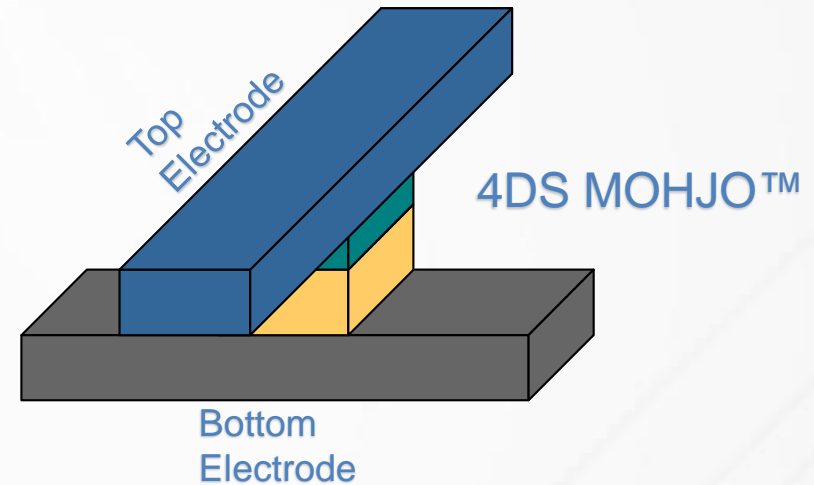
- A voltage pulse reversibly changes resistance (typically reversing voltage polarity)
- Resistance change establishes “On” and “Off”
- Switching materials range from simple (binary) metal oxides to multiple element composites
- Most ReRAM create/eliminate conductive “filaments”
 - Either oxygen vacancy creation or metal injection into switching material
 - Filamentary conduction independent of cell size - potential future scaling issue
 - Poor “on” state retention if incomplete filament created



Why is 4DS ReRAM better?

4DS ReRAM technology is non-filamentary = no filamentary scaling and retention issues

- 4DS MOHJO™
 - Metal Oxide Hetero Junction – patented cell structure and operation
 - Oxygen exchange across hetero-junction
 - A voltage pulse reversibly changes resistance
 - Reversing voltage polarity switches resistance
 - Non-filamentary switching mechanism
- 4DS patented ReRAM
 - Inherently scales well beyond mainstream memories
 - Ideal candidate to replace Flash as dominant future non volatile memory



- 4DS has 15 US patents granted and 8 US patents pending
- Our granted patent portfolio contains a balance between ReRAM cell structure patents and manufacturing process patents and is split evenly between patents with a broad scope and patents that specifically relate to PCMO
- Hetero junction non-filamentary switching is at the core of 4DS' wholly owned MOHJO™ technology and materials deposition process IP portfolio, developed in house through an US\$10 million R&D program over the last 8 years

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