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## Market Briefing

**Weebit Nano CEO on developing the next generation of memory technology**

**Interview with Yossi Keret (CEO)**

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*In this Market Briefing interview, Yossi Keret, Weebit Nano CEO, discusses the company's exciting technology and the market opportunities:*

- *Weebit's technology and what its competitive advantages are*
- *The market opportunity represented by huge growth that is expected in memory storage and emerging technologies that require ReRAM*
- *Strength of its Board and Management, and its partnership with Leti*
- *What the future holds for Weebit*

### Market Briefing

Weebit Nano (ASX: WBT) listed on the ASX in August 2016. Tell us about Weebit Nano, its technology, and why it decided to list on the ASX.

#### **Yossi Keret**

Weebit Nano is an Israel-based semiconductor technology company that is developing the next generation of memory technology. With the explosion in demand for memory storage in today's world, the existing memory technology is struggling to keep up and will likely be obsolete in the not-so-distant future. Weebit is developing a technology that seeks to offer a quantum leap in memory and data storage that aims to allow faster, more reliable, and more energy efficient memory through Non-Volatile ReRAM technology.

Weebit has licensed the original the Silicon Oxide (SiOx) concept from Rice University, where the concept was first developed and patented by Professor James Tour. Weebit is now utilising a pre-industrialisation cleanroom at CEA-Leti for further development. Weebit holds several patents protecting its technology. The importance of the SiOx technology is discussed further in this interview.

Weebit decided to access the Australian capital markets for a number of reasons. Firstly, Australia's focus on becoming an 'Innovative Nation' strikes a chord given that we are working to develop a breakthrough technology, and is similar to Israel, the "Start Up Nation", in this respect. Secondly, the sophistication of the Australian capital markets, along with the highly respected regulatory and governance environment, was very appealing. And thirdly, the political and economic stability of Australia, and its proximity to the Asia Pacific market, were also very attractive.

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What is the market opportunity that Weebit is seeking to address, and what is the size of this opportunity?

### Yossi Keret

World memory storage use is growing at an exponential rate, and as such, the world is becoming increasingly desperate for a higher performance memory device. The current flash technology market is estimated to be worth US\$37B, and is rapidly growing. With the proliferation of devices connected to the internet, and new technologies requiring additional memory, the current flash memory technology is hitting a scalability wall.

Weebit's technology is aiming to offer a faster, more reliable, and more energy-efficient memory storage solution.

Flash technology has progressed to 3D, which is prolonging its life, but we firmly believe that the 3D flash will soon reach its physical scaling limit, and that ReRAM technology will take over. We believe that ReRAM technology has significant speed, power and capacity advantages over flash technology and can enter new markets that require low power and speed characteristics that the existing flash technology cannot meet. These opportunities are expected to be in various areas such as big data analytics, where there is a need for significantly faster and more energy efficient memory devices, and new applications such as machine learning and deep learning systems. The "internet-of-things" is anticipated to have 50 billion devices connected to the internet by 2020, and other applications may exist with autonomous cars, drones and robots to name a few.

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Weebit has built a very strong team across its Board, advisory board and management team. Can you tell us a little more about the people involved in Weebit?

### Yossi Keret

We are very proud of the people that we have associated with our business, and we believe it is testament to the bright future for Weebit.

David (Dadi) Perlmutter is our Chairman – he is a 34 year Intel veteran and was the Executive Vice President and Chief Product officer of Intel until 2014. David is now investing in growing technology companies in Israel and we are very fortunate to have David as our Chairman. David led the team of original inventors of the Pentium® Processor, and he also led Intel into data centres with Pentium® Pro in the 90's and Multi Core Xeon® in the 2000's, where Intel continues to hold a dominant market position today as a result of these technologies. David also led the transformation of the PC market from desktop to mobile while making wireless (WiFi) ubiquitous as he was involved with the team that was tasked with inventing and bringing to market the Centrino™ Mobile technology.

Professor James Tour, the man who re-discovered SiOx as ReRAM in 2008, is one of the most cited researchers in the academic world and he is one of the world's most renowned scientists in the field of nanotechnology. He was recently inducted into the National Academy of Inventors, and is considered to be among the "50 most influential scientists in the world today".

Before commencing as CEO of Weebit, I have had extensive managerial and financial experience gained in a variety of international companies, including significant experience in equity raisings for public companies. Our Vice President of R&D, Amir Regev, has spent two decades in leading chip and manufacturing companies, such as Intel and SanDisk, in which he has held roles in memory technology development. Amir has spent most of his career in Flash technology development and production and is well placed to lead Weebit towards manufacturability of its technology.

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Given the market opportunity, and the clear need for a new memory solution, why has something not been developed to date? Is this not something that the large companies like Samsung, Intel, and Micron would be looking to develop a solution for?

### **Yossi Keret**

It is no secret that some significant technology companies have invested large resources into finding a replacement for flash technology, however, whilst we see their efforts in this space, we also witness their difficulties.

Weebit has the advantage of being nimble, having talented people, and having a great partnership in place with a leading microelectronics research institute that is fully motivated to succeed in bringing the ReRAM technology to market. This allows us to develop our technology freely and rapidly.

In the technology world, new things are often invented by new players who develop solutions that no one thought about before – think about social networking before Facebook or search engines before Google disrupted the industry. While technology advances rapidly, many of the larger players are focused on evolutions of their core business, rather than on any major new innovation. Flash 3D memory technology is a prime example of this in the memory storage industry.

It must be said, however, that the market opportunity we are tapping into is huge, and we believe that there will be more than one winner in this race to develop a new memory solution.

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Weebit has a significant collaboration agreement with CEA-Leti, a leading French microelectronics research institute. Can you please provide some more details on this partnership?

### **Yossi Keret**

CEA-Leti, is a Grenoble, France-based research institute for electronics and information technologies, and one of the world's largest organisations for applied research in microelectronics and nanotechnology. To put Leti into perspective, in Australia it could be compared to the CSIRO, where great talent resides and tomorrow's innovations are born. Leti, like the CSIRO, is a respected and much-admired scientific research organisation that holds a wealth of intellectual property and realises significant commercial opportunities by pushing the boundaries of great science and great technology. Leti is one of only four major global research institutes, and arguably the most recognised in the field of nanotechnology.

Leti has just celebrated its 50<sup>th</sup> year of providing research and innovation for many leading semiconductor companies and universities. Their skillset covers the entire product chain from basic research, design platform, advanced process development up to pilot lines. They have an impressive

team of talented scientists and engineers with vast experience in the semiconductor industry and specialisation in emerging memory fields, and they also offer cutting-edge cleanrooms and facilities that are worth billions of dollars. The Leti team working with Weebit has years of industry experience in the semiconductor industry, including flash memory.

Weebit is proud to have Leti as a partner in the development of our technology, and we believe that we are very well placed to develop and commercialise our technology by working closely with them.

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There are other companies also trying to develop their own ReRAM memory technology. What is it that makes Weebit different, and in particular, what is Weebit's advantage?

#### Yossi Keret

As previously mentioned, we strongly believe that ReRAM technology has the potential to be the dominant Non-Volatile memory device in the future. And of course, there are other companies trying to develop their own ReRAM technology. What makes Weebit's technology unique is the Silicon Oxide (SiOx) material, which is more manufacturable, reliable and cost-effective than any other material in this industry. This is the part of our technology that has been patented.

Silicon Oxide is the most common material used in the semiconductor industry and is therefore the easiest material to process and work with, and will not require any capital intensive retooling or new processes.

As previously mentioned, the memory market is huge, and is big enough for more than one solution.

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Where is Weebit currently at with its development, and what is next for the company?

#### Yossi Keret

Weebit recently announced the successful electrical results of its Silicon Oxide ReRAM memory technology at Leti, which was a very significant milestone for the company. These results validate the memory behaviour of our technology.

The successful electrical results meant that our technology achieved competitive voltage levels, which is critical for cost effective and low power devices. Pleasingly, voltage levels are usually the best predictor for the success of a semiconductor technology and its ability to operate at low power, and we have now passed this hurdle.

We are now moving forward with our 2017 plans of scaling down our ReRAM technology towards the miniaturisation target of 40 nanometers (nm), which is the dimension of the existing 3D-NAND technology that is used in advanced devices like the iPhone. Following this miniaturisation process, we expect to be ready to scale up the capacity towards Kb and Mb array blocks which have meaningful commercial viability.

The next stage of the development will utilise Leti's exclusive Memory Advanced Demonstrator vehicle (MAD), which is a fully integrated chip that includes all the components a real memory device requires, such as memory arrays, CMOS logic and full interconnects. The MAD vehicle chip

development is on track to enable scaling of the technology towards the miniaturisation target of 40nm by the end of this year, consistent with the previously announced timeline.

Achieving the miniaturisation target of 40nm will be a significant technical milestone to allow commercial collaboration with key players in the industry, which includes possible licensing opportunities. Whilst we have had discussions with possible future partners since day one, as our technology continues to mature, we are confident that interest levels around licensing agreements and future collaborations will continue to build.

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Thank you, Yossi.

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