The Chip Insider®　　　

October 17, 2017 – Strategy and Tactics: A tribute to Paul Otellini. WildPhotons: If there ever comes a day …

Focal Points:

A tribute to Paul Otellini
- 1st to pass of the semiconductor industry's 2nd gen executive leadership
- Paul wasn't a character. He was a man of character.
    - His decision to retire — the real reason
- His positive approach to marketing and management
    - *"change before you have to."*
- Responding to Mega-Hertz era's end
    - And the rise of mobility
- Driving WiFi viral so an infrastructure would build out
    - Why this was a bigger feat than smartphones
- Few have done so much to change our world
    - While few have gotten so little credit

Chip History: Time Line
- Intel tackles Mobile with Centrino in 2003

"History never repeats itself but it often rhymes."
—as Mark Twain is reputed to have said

Paul Otellini was the first to pass from the semiconductor industry's second generation of executive leadership. The first generation of chip execs was filled with larger than life characters — like Robert Noyce, Andy Grove, and Gordon Moore — who got the industry off the ground with raw perseverance. They may have come from the Silent Generation, but they were seldom silent as they changed the world with technology. While second gen chip execs would come from the Baby Boomer Generation, few would boom, preferring to take a quieter, more methodical approach. They have expanded the semiconductor business model past raw technology to one that aligns the technology to focus beyond the customers they sell to and onto the needs of the end customers who used their products. In that light …

Paul wasn't a character. He was a man of character. If there could be one word to describe his time as CEO, it would be 'character.' This exhibited itself in many ways:

His decision to retire exemplifies this. Many have concluded privately that his death was linked to his early retirement. I can tell you it was not, as I know the real reason and it attests to his

character as well as his love of Intel — the company he devoted his entire professional life to. Just before his retirement, Paul told me the mandatory retirement age of 65 had been rescinded and that at 63 he had no intention of stepping down. Shortly afterward, explaining his change of heart — he laid out a vision of troubled waters a few years ahead, when it would be wrong to step down in the middle of such a storm. His love of Intel was so much that he put his personal ambitions aside, so the next CEO would have plenty of runway before the disruptive times of the IoT, AI, and cloud era hit.

Paul was a man who liked to quote, "*It was the best of times. It was the worst of times.* It was not uncommon for him to look ahead for the worst of times in the best of times. When times were good in 2006, he chose to restructure the company late that year. As it turned out, this decision would prepare Intel well for the coming global financial crisis that could not be seen just over the horizon. When asked why, he would reply that it was far better to "*change before you have to."* In that way, he would prepare Intel for the worst of times.

The restructuring was more than the typical cutting of overstaffed resources. It would set in motion a systematic improvement in operations. When started, the typical product cycle time in an Intel factory was 3 months. This would be drawn down to less than a month by 2013 when Paul stepped down, making Intel far more responsive to the silicon cycle's twists and turns.

Whenever in troubled waters, Paul always steered to the light of the positive, throwing emergent problems in the boat before they became big problems.   When named head of Intel in 2005, its flagship microprocessors were taking on water. AMD's Opteron was grabbing share due to the brilliant move of its architects to integrate the memory controller. AMD was beating Intel with one-fifth the resources. But he wouldn't attack AMD directly with marketing. Regaining the lost momentum would be the result of a multi-vectored effort that included revamping Intel's architecture design team, which reinvigorated Intel Architecture with dual-core, de-emphasizing the RISC based Itanium architecture, and shifting supply chain relationships from adversarial to partnering. Most importantly, he would go after a bigger customer problem than speed.

By that time, the two-year clock of Moore's Law was no longer fast enough. Consumers were now steering the boat, which meant a one-year clock was needed to keep up with the unmovable annual run-ups to Back-to-School and Christmas day. Yet structurally, it was impossible to speed up Moore's Law. To solve what was seemingly an intractable problem, Paul ushered the Tick Tock model back in.[1] It was a brilliant a tactical approach to separate the delivery of process nodes (the tick) and architecture nodes (the tock) by a year. That way OEMs could deliver new product generations based on new Intel chips every year. The resulting predictability would reverse AMD's gains while providing a new platform for steadier annual growth. Not just for Intel, but more importantly for its customers who needed to plan well ahead to deliver to a one-year clock.

The end of the Mega-Hertz era: This was another trouble that Paul was dealing with at the time. It started with what was seemingly a minor marketing problem: While their next

generation processor family would have more performance, it would be the first time Intel came to market with a slower clock speed.[2] But the more they dug, the deeper it got. This was no minor problem, it would prove to be the start of a new era: Mobile.

This 'minor' problem would be the seed for the decision to integrate WiFi into a new processor series that would be called Centrino®. Otellini's grounding in marketing would show in the approach he took, speaking well of the decision to appoint its first CEO without a technical background.

At the time, PCs were still desk anchors chained to a wall socket. But these anchors had shrunk from big beige boxes to notebooks that people carried around. The old paradigm had not pivoted enough to reveal a problem. The world had adjusted with conference room tables that had ditches in their center, which contained access to ethernet and power. Back then, a light notebook could be described as weighing five pounds with a two-pound power-brick. Yet, this was a cutting-edge improvement over the previous generation of "luggables" made famous by Compaq Computer. The question was, what really lay in the future?

Under Paul, Intel would develop a strategy based on "*The Four Vectors of Mobility: Performance, Battery Life, Form Factor, and Connectivity*." Of the four, only one was severely lacking: Connectivity. What connectivity there was meant connecting wires to a phone or ethernet jack. Connecting to a cell phone was virtually impossible. Seen this way, you can see why WiFi was such an obvious technical choice. But it wasn't that simple. Nor was the problem technical. They couldn't just sell chips. They had to ignite an infrastructure of WiFi hot spots in the wild for connectivity to be real. They would start with airports, then bus and train terminals, and then with Starbucks. By the time they hit Starbucks, customers were coming for the hot spot as much as for the coffee, which took WiFi viral. Once WiFi was driving customer choice about where to get their coffee, every coffee shop and then other retailers had to get on board.

It is often claimed that Intel was a failure in mobile. But those that make this claim limit the term 'mobile' to smart phones, ignoring the role of WiFi. WiFi has always been the neglected sibling of cellular. But before you consider it a failure, consider that Intel's profits of $11B in Otellini's last full year was over 60% higher than the total of Broadcom's and Qualcomm's that year. It's true that Intel never credibly made it across the bridge to cellular in the public's eye. But one should not neglect the fact that no one had to create a wireless infrastructure in cellular for the smartphone. It was already there to be taken advantage of. No such infrastructure existed for WiFi, for which the creation of by Intel was a far more monumental task. Imagine what your life would be like if it had not been done. The buildout of the WiFi infrastructure didn't involve following the simple cadence of technology. Making WiFi real had to be approached by creating new emergent behavior in the world outside technology to make it successful.

Bringing a sunny side to the Paranoid Company: In 2003, when Paul was President and COO, John Heilmann wrote in Business 2.0 Magazine: "*When it comes to optimism, Paul Otellini is well equipped; he has the sunny self-confidence of a natural salesman. But when it comes to*

paranoia, Otellini could use an upgrade."[3] Ironically, Andy Grove's aggressive paranoid approach that had made Intel so successful up to the nineties, had become a stumbling block by the two-thousands. The world soon turns against the underdog it loved once it becomes the over-dog. And that's what had happened to Intel. It was dogged by a number of legal issues with competitors and governments, most notably anti-trust and anti-competitive claims. Worse, what could once be dealt with by legal Dobermans had bloomed into firestorms that were major distractions for management. Paul would resolve these during his tenure, making it far easier for Brain Krzanich to focus on another transformation. But that was not all…

Many adopters of the paranoid model in the 2000s cut back on technology investments. Former industry leaders, like TI and Motorola, backed out of developing new process nodes completely. This was a decade when the investment community was seeing a future dominated by the Internet and software. Chips and Moore's Law were seen as passé. You had to be an optimist to bet on Moore's Law continuing to be relevant.

Only a smart optimist could invest like Paul did, matching 2012's profits with capital investments in its factories.

Only a dedicated optimist would continue to pursue Apple, when Andy Grove had bluntly told him he would never make the sale. Apple wasn't the only one. Paul had brought in other new age accounts like Cisco, EMC, Facebook, Google, Motorola Mobility, Sun (now Oracle), and more.

Only an intelligent optimist would have believed at his retirement that "*the PC would stay relevant*" when most of the world had caught tablet fever and thought the notebook would soon die.

Only a bold optimist would take on changing the world's infrastructure to make a play in mobility. As opposed to taking a single approach of follow-the-leader into cellular.

Paul transformed Intel from a great technology company to a marketing company with great technology. Few have done so much to change our world. While few have gotten so little credit.

Epilogue: Once finished, I realized that it could not be finished without mentioning the moving Memorial Mass for Paul Otellini. Held at the historic landmark [St. Ignatius Church in San Francisco](), on its large chancel were members of the San Francisco Symphony, Opera singers, and even a Cardinal to show their respect. Its expansive nave was packed with luminaries from Silicon Valley and around the world. Larry Page sat two pews from me near the back, neither of us having anticipated the traffic congestion that would arise. It was a true Silicon Valley state funeral for a widely respected leader. Impressive, but what made it so moving was the loving energy in the room. There were no typical eulogy descriptions of a person's traits endearing in death, yet once annoying in life. Nor were such comments heard in the audience. It was all positive love and even respect from competitors. It was sunny as I left to drive down to the Great Highway along the coast where a fog bank was rolling in. Simon and Garfunkel's '[Bridge

over Troubled Water' came to mind as my mood darkened. But then it hit me that Paul would want us all to sing the first stanza of Paul Simon's 'Was a Sunny Day.'

For more on Paul's thoughts on the eve of his retirement, here are links for two videos from an interview I did with him: Going Mobile and Innovation and American Competitiveness
1: Tick Tock had been used before to less effect. So it had been tabled. Paul brought it back, aligning it to true predictability. Market-to-Operations alignment move like this is why a competitor summarizing why he was such a tough competitor remarked, "Paul Otellini *taught* Intel marketing."
2: When Intel introduced its first family with a slower clock, detractors promoted it as signaling the end of Moore's Law. Especially those who mistakenly believed Moore's Law was about improvements in clock speed.
3: John Heilmann, "The Man Who Will Be King: HERE'S SOME ADVICE FOR PAUL OTELLINI, WHO STANDS POISED TO BECOME INTEL'S NEXT CEO: BE AFRAID. BE VERY AFRAID." Business 2.0 Magazine, May 1, 2003

Chip History — Time Line: Intel tackles Mobile with Centrino in 2003

The launch of Intel's Centrino in 2003 marks the move that took laptop PCs into the mobile world. It is often claimed that Intel was a failure in mobile. But consider that Intel's profits of $11B in Otellini's last full year was over 60% higher than the total of Broadcom's and Qualcomm's that year. It's true that Intel never credibly made it across the bridge to cellular in the public's eye. But one should not neglect the fact that no one had to create a wireless infrastructure in cellular for the smartphone. No such infrastructure existed for WiFi, for which the creation of by Intel was a far more monumental task. Imagine what your life would be like if it had not been done. The buildout of the WiFi infrastructure didn't involve following the simple cadence of technology. Making WiFi real had to be approached by creating new emergent behavior in the world outside technology to make it successful.

> *"History never repeats itself but it often rhymes."*
> *—as Mark Twain is reputed to have said*

WildPhotons: light life lessons

If there ever comes a
day where we can't
be together …
Keep me
in your heart…
I'll stay there forever

Winnie the Pooh — A.A. Milne

Black Bear, Ursus amercanus. Waterton-Glacier
International Peace Park World Heritage Site,
Montana. Why it Works: Eyes and the smile symbolize
a heart. Reference number: MT_0709b_244

WildPhotons: light life lessons

follow Dan Hutcheson's photos at flickr.com/photos/wildphotons/

Archive of this Year's Previous Issues:

October 17, 2017 – Strategy and Tactics: A tribute to Paul Otellini. WildPhotons: If there ever comes a day …

October 6, 2017 – Strategy and Tactics: Silicon Cycle Killing – Overlay – Captives – EUV – IBM's Watson. WildPhotons: The hours when the mind is …

September 29, 2017 – Strategy and Tactics: China's 100 Year Semiconductor Strategy. WildPhotons: Living out loud …

September 22, 2017 – Strategy and Tactics: A new way to forecast. GTC…   WildPhotons: For fast acting relief …

September 15, 2017 – Strategy and Tactics: TSMC, Data-Center on Wheels, tidal zone for silicon, Anti-trust, and more. WildPhotons: Nature's secret …

September 8, 2017 – Strategy and Tactics: TSMC in Samsung's web? WildPhotons: To be thrown upon one's own resources …

September 1, 2017 – Strategy and Tactics: Inspection and Metrology, Apple's Silicon Moves.   WildPhotons: To be thrown upon …

August 25, 2017 – Strategy and Tactics: If Moore's Law is dead, then … AI and IoT are dead too. Value Creation in Semiconductors. WildPhotons: Leadership …

August 11, 2017 – Strategy and Tactics: This Year's Bubble. Foundry IC Supply & Demand. China versus Japan. WildPhotons: Curiosity keeps leading us …

August 4, 2017 – Strategy and Tactics: Intel's Strategy: Just One Word … "Data"   WildPhotons: Leadership …

July 28, 2017 – Strategy and Tactics: This Time it's Different? Shortages galore. WildPhotons: Truth and beauty …

July 21, 2017 – Strategy and Tactics: 2018 Demand Drivers, 450mm: Why it failed, North Korea threat assessment. WildPhotons: If you torture numbers …

July 7, 2017 – Strategy and Tactics: Yield Management shifting time zones   WildPhotons: It's always further than it looks …

June 30, 2017 – Strategy and Tactics: Value creation and Semiconductors' 3 Bears, 3D NAND, Intel IoT strategy, Leti, Zeiss …   WildPhotons: Perseverance-It overcomes almost everything-Even nature …

June 16, 2017 – Strategy and Tactics: Why Stocks are performing so well, Tweetplomacy, China Strategy, taking Moore's Law beyond 5nm, or is it dead again?
June 9, 2017 – The Cook's Tour: GLOBALFOUNDRIES' Fab 8 in Malta, NY   WildPhotons: Perseverance …
May 26, 2017 – Strategy and Tactics: Samsung's Foundry Forum WildPhotons: Grabel's Law …
May 12, 2017 – Strategy and Tactics: IoT: It's not a market. It's a …
May 5, 2017 – Strategy and Tactics: Photonics and Apple's Fab Plans
April 28, 2017 – Strategy and Tactics: The 5 Virtuous Cycles of Demand
April 21, 2017 – Strategy and Tactics: Bringing AI and IoT into your company's product portfolio and the fab
April 14, 2017 – Strategy and Tactics: Shortages, SPIE Lithography Week, & Is Moore's Law outmoded?
April 7, 2017 – Strategy and Tactics: Moore's Wall, Nodal Fiction, Hyperscaling
March 31, 2017 – Strategy and Tactics: Peter Rose, Gary Dickerson, 3D Xpoint™, 5G, Semiconductor Value in GDP
March 17, 2017 – Strategy and Tactics: The Cook's Tour: IBM's Watson and How AI will drive silicon
March 10, 2017 – Strategy and Tactics: Nikon LithoVision and KLA-Tencor's SPIE Dinner.
February 24, 2017 – Strategy and Tactics: The case for moderated cycles. Maxims: Abusive relationships
February 17, 2017 – Strategy and Tactics: Inflection Points – The industry's new era of transformational growth
February 10, 2017 – Strategy and Tactics: Trump-onomics of Tariffs and Fab expansions
February 3, 2017 – Strategy and Tactics: 2017 Tactical Forecast
January 20, 2017 – Strategy and Tactics: 2017 Strategic Forecast
January 13, 2017 – Strategy and Tactics: Siemens to buy Mentor Graphics and Nikon's Restructuring
January 6, 2017 – Strategy and Tactics: 2016 in Review