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Presents

The Global Semiconductor Monthly Report

June 2008

Let The Market Beware …
This Is NOT Business As Usual

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The Global Semiconductor Monthly Report

June 2008

A **CEO favourite**, the **Global Semiconductor Monthly Report** provides **analysis** and **commentary** on the **global semiconductor industry** and its **impact** on Future Horizons' **semiconductor market forecast**, as published in the **Annual Semiconductor / Semiconductor Application Markets** (previously called Key Market Drivers) **Reports**. These three reports provide a comprehensive in-depth analysis of the worldwide semiconductor, electronics equipment and economic environment. Together they provide the latest information on developments in the semiconductor industry, the companies involved, the changes in the markets, and the impact of the global economic and political situation.

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The Global Semiconductor Industry Analysts

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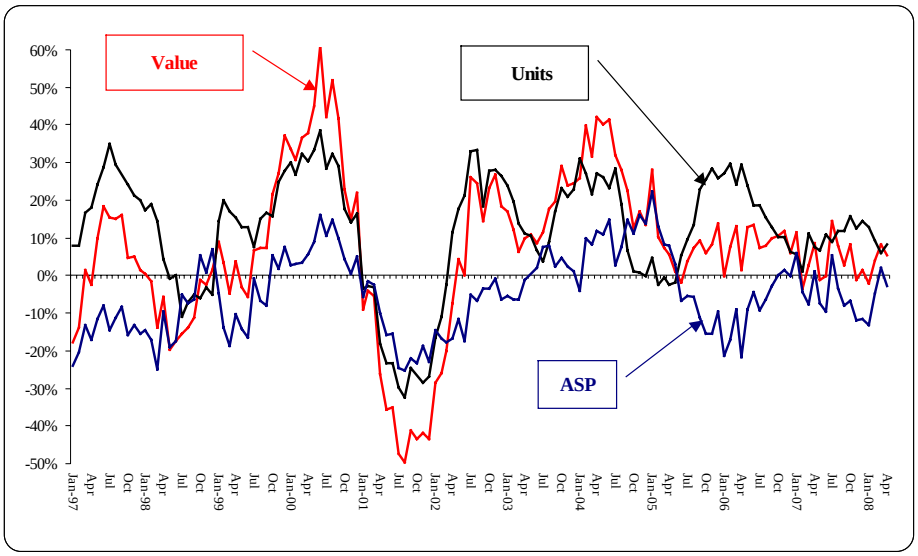
Executive Overview

Figure E1 shows the 12/12 worldwide monthly growth rates for IC sales in dollars, units and ASP for January 1997 to April 2008 inclusive. They need to be looked at in conjunction with the other 12/12 and rolling 12-month charts provided in the **Market Summary** section of this report.

Compared with March, IC units were up and ASPs were down in April, even after adjusting for March being a 5-week month. The net result was a 7.7 percent revenue decline. Did this spell more bad news for the beleaguered chip market? Certainly this seems to be the industry consensus view. Always the contrarian, our views are different. April's results came in exactly as expected … the unit rise and fall was simply the result of the engrained 'making the quarterly number' mentality. Digging beneath the layers reveals a set of market fundamentals that are in remarkably strong form. The penny may not yet have dropped to the table, but – even for the chip industry ever full of surprises – let the market beware; it is no longer business as usual.

Figure E1 - 12/12 Worldwide IC Monthly Growth Rates



Total IC	Units	ASP	Value
Apr 2008 vs Apr 2007	8.3%	-2.8%	5.3%
Apr 2008 vs Mar 2008	10.8%	-16.7%	-7.7%

Source: WSTS/Future Horizons (Growth rates adjusted for 5-week months)

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To paraphrase the late Sir Winston Churchill's comments on Russia, "The chip industry too is a riddle wrapped up in an enigma". It marches to its own complex interwoven pattern of rules, each relatively simple when viewed in isolation, but contriving to interact in a volatile and unique way.

Right now the industry is at its most confused for a decade, battered by a barrage of uncertainties and contradictions. Shell-shocked and confused, confidence is off the agenda … just when what is needed most is cool heads and determination.

Listed below are just some of the issues:

- The global economy is unsettled … but the semi market is holding its own
- 2008 Cap ex has been decimated … despite negligible excess capacity
- Q1 utilisation rates are running on empty … yet net new capacity is low
- Revenues per wafer start are appalling… focus is now on profits, not capacity
- Prices have stopped falling … no more "doing more for less" thank you
- Cheap debt is now expensive … bang goes that (PE-driven) business model
- Breaking up is easy to do … but what about the bits left over
- One plus one equals two … except when two chip divisions join forces
- Let the foundries take the strain … but is there a price to pay

Be it falling cap ex, tight capacity, focus on profits, continuing strong market demand, second half seasonal effects … the forecast tea leaves all seem to be pointing in the same positive direction. Has the worm finally turned for the industry? We think so. We also think that the penny has yet to drop and that the impact on the market will be seismic and dramatic.

We will be discussing all of these issues in great detail at our forthcoming mid-term industry forecast seminar (IFS2008-MT – July 22, London, England); here is just a preview of some of the concerns, and industry myths we will be covering.

Taming the cycles. As is currently being 'rediscovered', the free economic world is fundamentally cyclical. Put simple what goes up, must come down, and what comes down will eventually come up. Eloquently described by the infamous hog cycle, bankers are all too happy to lend cash for an umbrella when the sun is shining, only to ask for it back the minute it starts to rain. The cyclical ups and downs of business are something to be deal with – building buffers when times are good as a strategic defence for when times inevitably turn bad.

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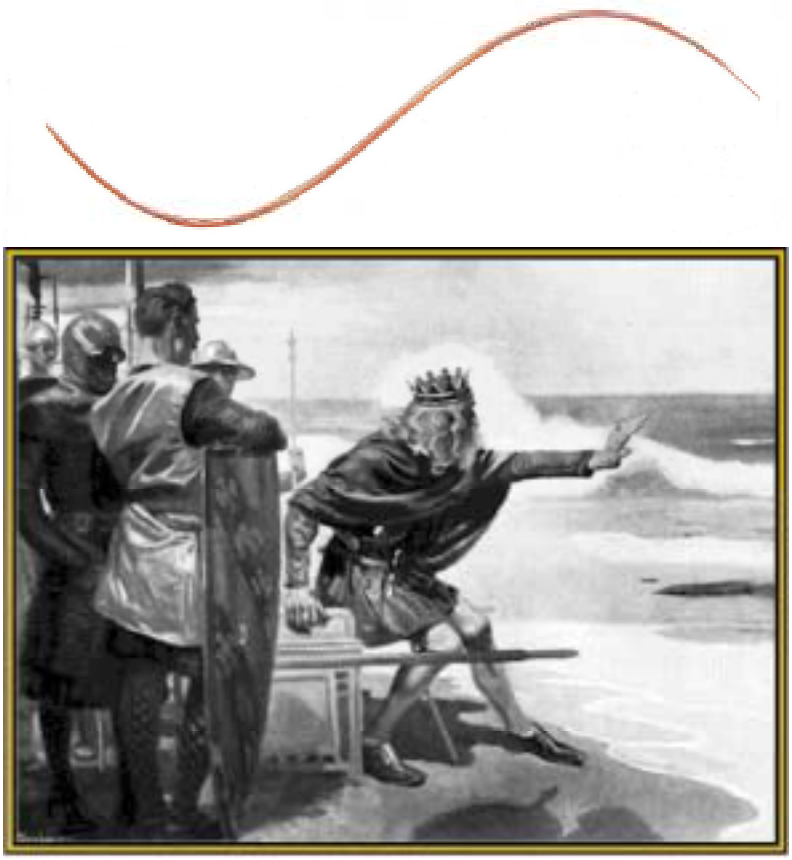
Ironically, the cycle seems safest just before it bursts; risk models should thus be backward, not forward looking. Pretending the cycles have been tamed is self-delusion. As the 11th century English King Canute discovered, taming these cycles is as futile as trying to command the tide to turn back, Figure E2.

Figure E2 - Life Is A Curve … The Cycles Are Dead … Long Live The Cycles



Acknowledging – and dealing with – the cyclical nature of the industry is the first step to driving a successful chip industry, which itself is a complex web of many overlapping and interwoven cycles.

Manufacturing Matters. Or rather does manufacturing matter? I have nothing but praise for fabless business model; it is the fab-lite business model I have a real problem reconciling. Little more than a bean-counter's fantasie, seemingly the logic goes "We can generate a better return for our shareholders by having

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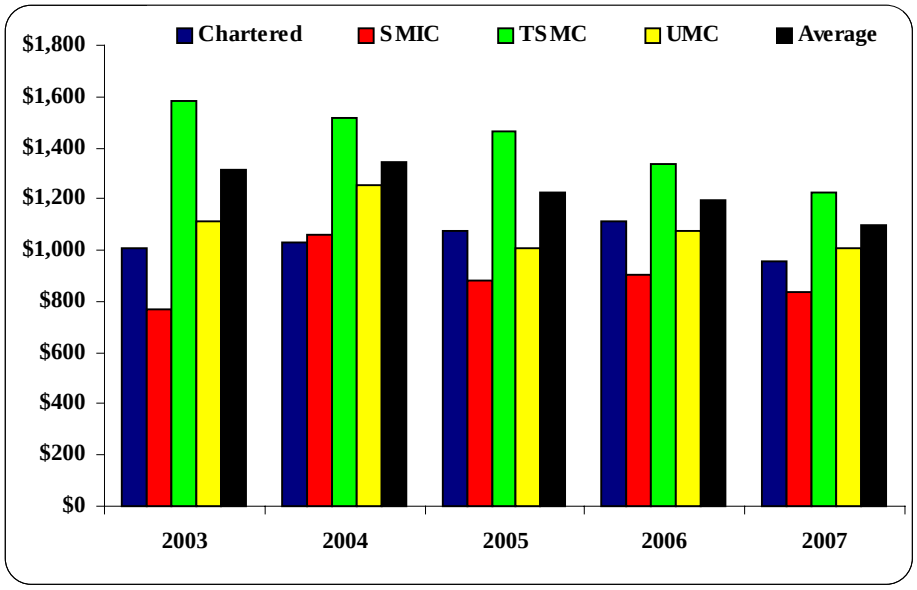
someone else carry the burden of a fab". Adding further justification to the logic, "In any event, the foundries are better at running fabs than we are". At a given point in time, this may certainly be true, the question I ask myself is, "Will it always be that way?" I very much doubt it.

I remember once when Japanese motorbikes, cameras, TVs and then cars were all significantly better and cheaper then their incumbent domestic competitors, until they established their market supremacy and could then charge a premium for the accepted value of their brand. They then remained better but now more expensive. Likewise with Samsung and increasingly Goldstar and Hyundai in Korea. China will eventually follow.

Right now the foundries are all on a hiding to nowhere, Figure E3, hounded by the fact they were willing to build fabs (a) to establish market position and (b) in response to markets needs. The question now is "How long will this last?".

Figure E3 – Top 4 Foundry Revenue Per Wafer Start



Source: Company Reports/Future Horizons

Now that the first issue has been clearly established – with TSMC now so far ahead of its nearest competitors it is completely untouchable – the second issue is destine to come to an end. Just as oil – seemingly stuck in a US$35 rut – was once cheap and plentiful, for essentially the same reason (insatiable demand),

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cheap foundry wafers will soon be a distant memory. Doing more for less is simply not a viable long-term business model; it is the alchemist's equivalent of turning base metal into gold. Eventually the industry will run out of money, or a competitor will exit, which in turn reduces competition and eventually allows prices to rise.

The foundries have already precipitated this change by cutting back on capacity. This is insidious as it takes 12 months to impact, but impact it will and the impact has started. Poignantly, these cutbacks, by way of reduced cap ex spend, started not on the back of excess capacity (there is none) but against a background of falling ASPs. Collectively the foundries have said: "Enough is enough". Just as the IDMs are seeking to increase their shareholder value … surprise, surprise, so too are the foundries. The foundry tide is turning; big changes are coming. The bean counters will soon be reaching for their abacus.

Industry Consolidation. Classical consolidation of the big getting bigger simply does not apply to the chip industry; one plus one is always significantly less than two, both from a sales and operational perspective. Two (or more) small wafer fabs in totally different locations still equals two (or more) small fabs in totally different locations. You simply end up with a fragmented and inefficient infrastructure, one that can never have the same efficiency a bigger fab of the same combined capacity.

Buying a competitor, other than for strategic R&D reasons to gain access to their technology, rarely nets a commercial or business benefit. Similarly spinning out 'star' (or dog) operations is no guarantee for success, either for them or the (reduced-size) entity left behind. For the stars, there are all sorts of cultural and operational issues to deal with – very few individuals downsize their organisational expectations when leaving the corporate comfort of a large firm as part of a spin out. This makes it hard to compete with a classic start up mentality.

And if you are a dog being dumped by your parent, I have never quite understood the logic that goes "Here is a great spin out for you to buy … we think it is dreadful but we just know you are going to love it".

The fact of the matter is the industry is overcrowded and it is better for some firm to simply exit the market. No one willing will, of course, so for many it will continue to be a game of death by slow strangulation.

People matters. Unfortunately for a technology driven industry, the bottom line is the technology is 'irrelevant', what matters is being first, good enough and competitive. Like it or not, semiconductors is still a make lunch or be lunch industry, and people and execution that are the real differentiating factors.

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Unfortunately too many people these days seem to be looking for the short cut/easy options, and think they can get away with it. This is all part of a much larger set of problems, namely: a decadence of values in the rush to become rich and entitlement syndrome, expecting everything for nothing and condemning reality when expectations are not realised. For companies, this often manifests itself via sporadic measures rather than cohesive policies, i.e. a resounding lack of corporate will.

Obituary. On May 25, Jack Simplot – the potato and memory chip tycoon – died, age 99. Simplot's life was a classic 'Made in America' story, starting with a log cabin built by his father after the family moved to Idaho from Iowa. A born entrepreneur in the oldest tradition, Jack firmly believed in the ethos of business, namely the fact that revenues and profits are diagnostic; they come from doing the job right, not an accountant's creative slight of hand.

Eager to cut costs, Jack was a great believer in vertical integration, owning much of the land on which he grew his potatoes; fertilising it with phosphate he produced from his own mines; owning the forests that provided the wood for the boxes in which his potatoes were packed and feeding any food not sold to his cattle.

Always the innovator, and with ever restless energy, failure never fazed him as he only ever sought for a 51 percent success rate, something he far exceeded. In contrast to much of today's get rich quick/greed driven culture, Simplot's success was based on traditional ingredients, namely hard work, thrift, enterprise, a readiness to take risk and a shrewd eye for opportunity.

His 1980 US$1 million investment in Micron Technology netted him 40 percent of the then fledgling start up.

An unlikely background for a chip-industry veteran, but to our mind his ethics are much missed and still the foundation for real success today. Such ethics and vision may not now be fashionable or even commendable, certainly viewed as quaintly old-fashioned but when we look at the way firms like Samsung and TSMC, or Tata and Mittal, are slowly but surely building their way to global market dominance, one cannot help wondering if these values are so outdated?

Hamlet - Act I, Scene iii - William Shakespeare. Polonius to his son Laertes before Laertes headed back to school. "Neither a borrower, nor a lender be; for loan oft loses both itself and friend, and borrowing dulls the edge of husbandry."

I suspect many in the chip industry, both borrowers and lenders, are now retrospectively wishing they had heeded Polonius' words!

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Market Summary

Figures M1 and M2 show the worldwide and European 12/12 industry growth rates for ICs, Opto, and Discrete Devices from January 1998 to date. These show the current month as compared with the same period 12 months ago, and are a useful industry momentum indicator. Figures M3a-M3h show 15-month rolling worldwide and European sales by major product category. Figure M4a-M4h show the comparable worldwide unit and ASP trends.

Figure M1 - World Sales By Product Category 12/12 Growth Rate

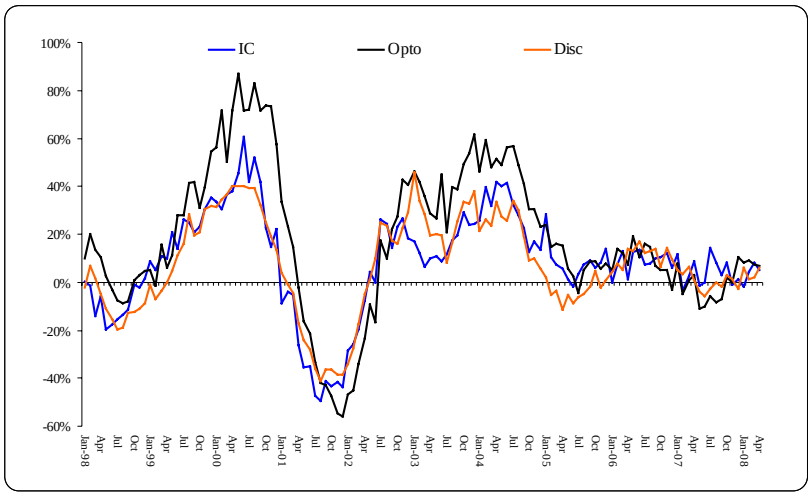
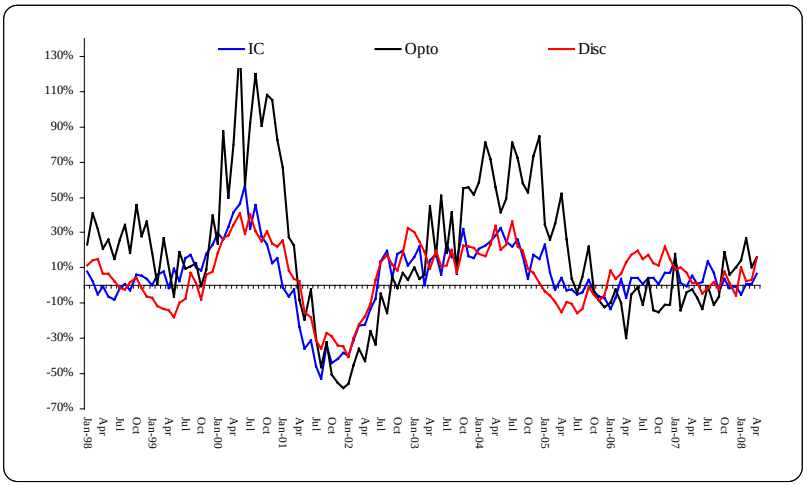


Figure M2 - Europe Sales By Product Category 12/12 Growth Rate



Source: WSTS/Future Horizons

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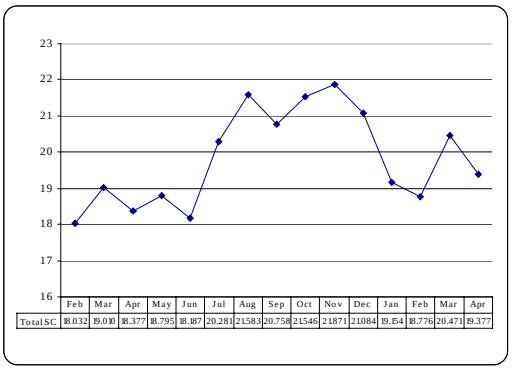
Figure M3 - 12 Month Rolling Worldwide & Europe Sales By Product

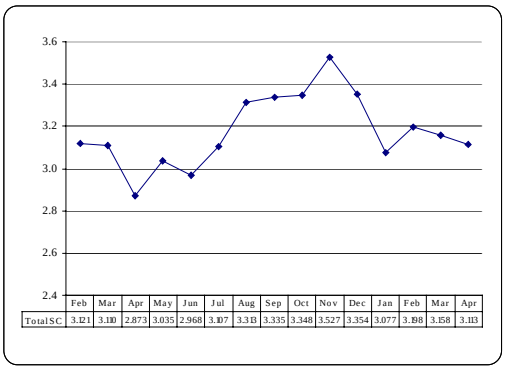
(Billions Of US$)

M3a - Total WW Semiconductor



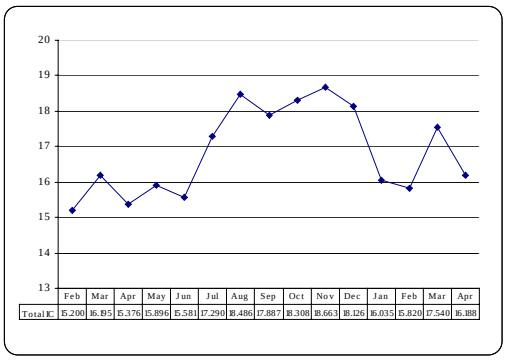
Apr 2008 vs Apr 2007	**5.4%**
Apr 2008 vs Mar 2008	**-5.3%**

M3b - Total Europe Semiconductor



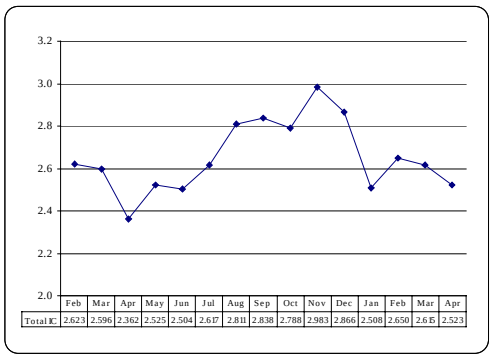
Apr 2008 vs Apr 2007	**8.4%**
Apr 2008 vs Mar 2008	**-1.4%**

M3c - Total WW IC



Apr 2008 vs Apr 2007	**5.3%**
Apr 2008 vs Mar 2008	**-7.7%**

M3d - Total Europe IC



Apr 2008 vs Apr 2007	**6.8%**
Apr 2008 vs Mar 2008	**-3.5%**

Source: WSTS/Future Horizons (Growth rates adjusted for 5-week months)

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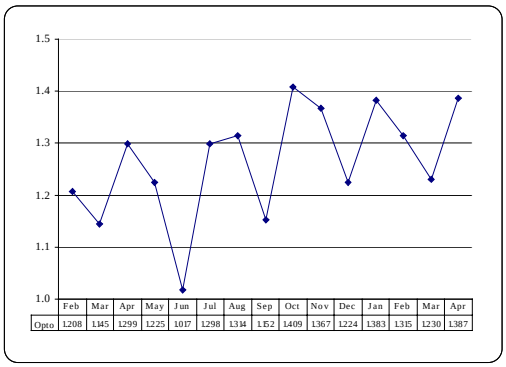
Figure M3 - 12 Month Rolling Worldwide & Europe Sales By Product (Cont)

(Billions Of US$)

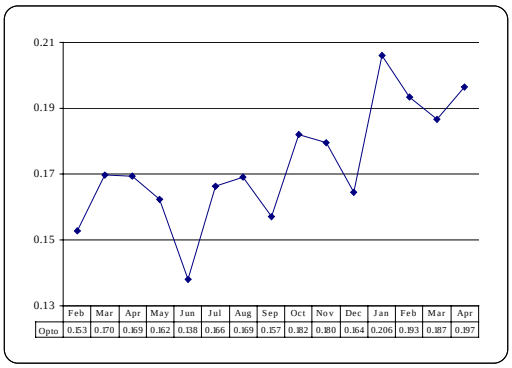
M3e – Total WW Optoelectronics



	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Opto	1208	1145	1299	1225	1017	1298	1314	1152	1409	1367	1224	1383	1315	1230	1387

Apr 2008 vs Apr 2007 6.8%
Apr 2008 vs Mar 2008 12.7%

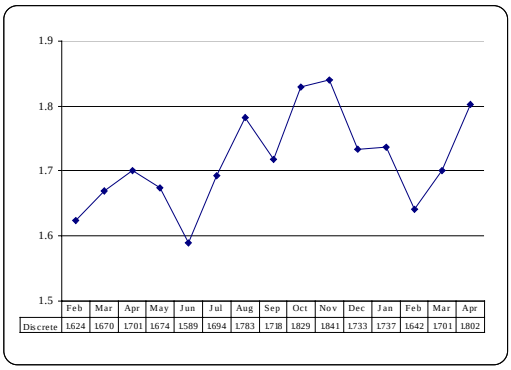
M3f – Total Europe Optoelectronics



	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Opto	0.153	0.170	0.169	0.162	0.138	0.166	0.169	0.157	0.182	0.180	0.164	0.206	0.193	0.187	0.197

Apr 2008 vs Apr 2007 16.1%
Apr 2008 vs Mar 2008 5.3%

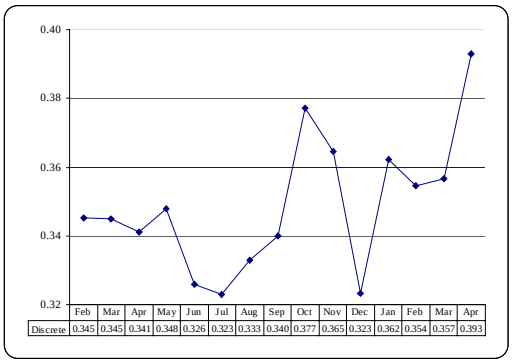
M3g – Total WW Discretes



	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Discrete	1624	1670	1701	1674	1589	1694	1783	1718	1829	1841	1733	1737	1642	1701	1802

Apr 2008 vs Apr 2007 5.9%
Apr 2008 vs Mar 2008 5.9%

M3h – Total Europe Discretes



	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Discrete	0.345	0.345	0.341	0.348	0.326	0.323	0.333	0.340	0.377	0.365	0.323	0.362	0.354	0.357	0.393

Apr 2008 vs Apr 2007 15.3%
Apr 2008 vs Mar 2008 10.2%

Source: WSTS/Future Horizons (Growth rates adjusted for 5-week months)

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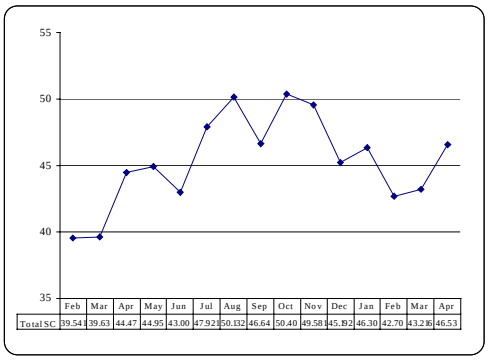
Figure M4 - 12 Month Rolling Worldwide Unit Sales & ASPs By Product

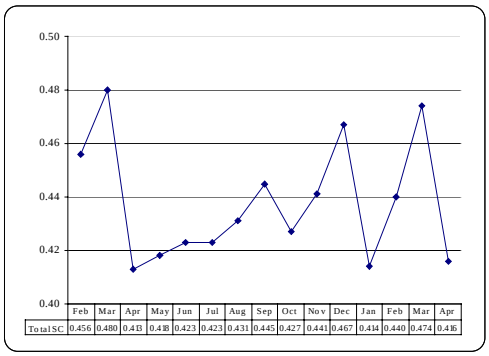
(Units In Billions & ASP In US$ Dollars)

M4a – Total Semiconductor Units



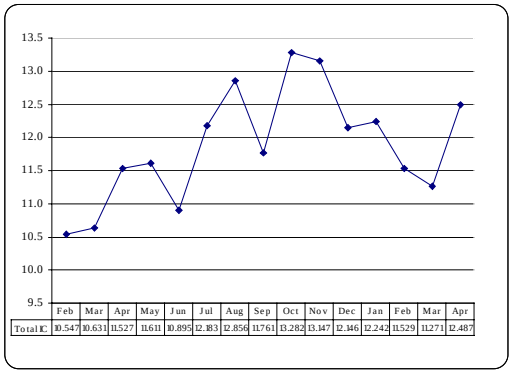
Apr 2008 vs Apr 2007	**4.6%**
Apr 2008 vs Mar 2008	**7.7%**

M4b – Total Semiconductor ASP



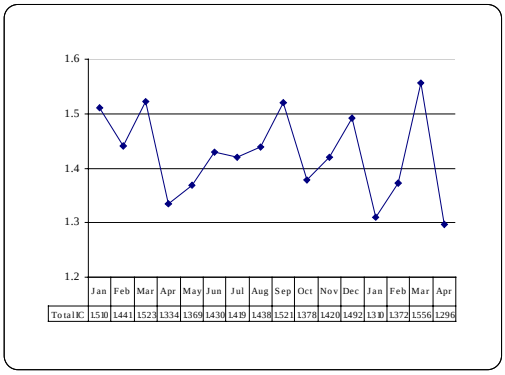
Apr 2008 vs Apr 2007	**0.7%**
Apr 2008 vs Mar 2008	**-12.2%**

M4c – Total IC Units



Apr 2008 vs Apr 2007	**8.3%**
Apr 2008 vs Mar 2008	**10.8%**

M4d – Total IC ASP



Apr 2008 vs Apr 2007	**-2.8%**
Apr 2008 vs Mar 2008	**-16.7%**

Source: WSTS/Future Horizons (Growth rates adjusted for 5-week months)

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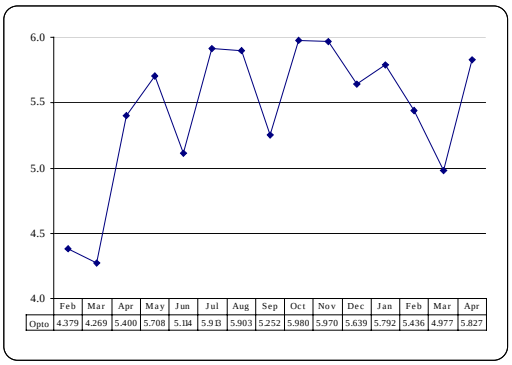
Figure M4 - 12 Month Rolling Worldwide Unit Sales & ASPs By Product (Cont)

(Units In Billions & ASP In US$ Dollars)

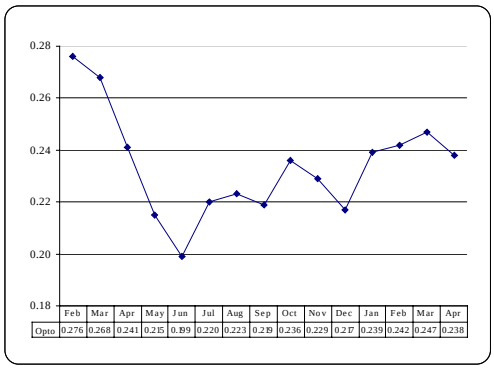
M4e - Total Optoelectronics Units



	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Opto	4.379	4.269	5.400	5.708	5.114	5.913	5.903	5.252	5.980	5.970	5.639	5.792	5.436	4.977	5.827

Apr 2008 vs Apr 2007 7.9%
Apr 2008 vs Mar 2008 17.1%

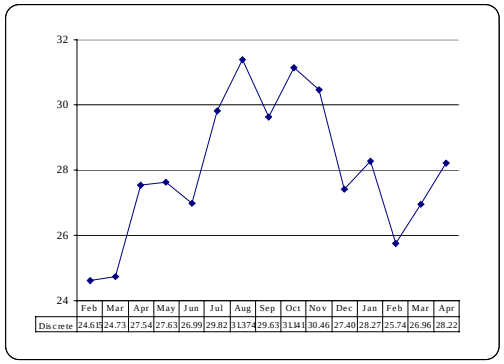
M4f - Total Optoelectronics ASP



	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Opto	0.276	0.268	0.241	0.215	0.199	0.220	0.223	0.219	0.236	0.229	0.217	0.239	0.242	0.247	0.238

Apr 2008 vs Apr 2007 -1.2%
Apr 2008 vs Mar 2008 -3.6%

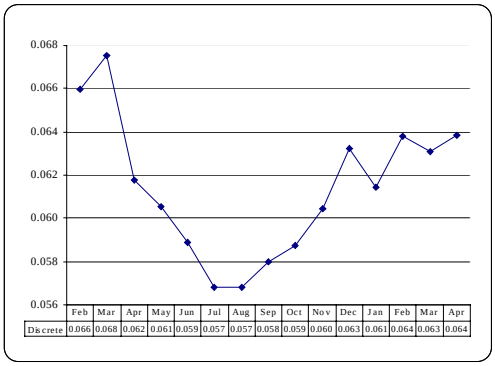
M4g - Total Discretes Units



	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Discrete	24.615	24.73	27.54	27.63	26.99	29.82	31.374	29.63	31.141	30.46	27.40	28.27	25.74	26.96	28.22

Apr 2008 vs Apr 2007 2.4%
Apr 2008 vs Mar 2008 4.6%

M4h - Total Discretes ASP



	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Discrete	0.066	0.068	0.062	0.061	0.059	0.057	0.057	0.058	0.059	0.060	0.063	0.061	0.064	0.063	0.064

Apr 2008 vs Apr 2007 3.4%
Apr 2008 vs Mar 2008 1.2%

Source: WSTS/Future Horizons (Growth rates adjusted for 5-week months)

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June 2008

Cowan LRA Report

Created by Mike Cowan, the Cowan Linear Regression Analysis (LRA) model naturally compliments Future Horizons' more interpretive methodology, and the two forecast approaches provide readers with a unique and balanced perspective. The latest run, based on April's 2008 WSTS global semiconductor sales of $19.377 billion, has produced global sales forecast estimates for 2Q08 through 2Q09 plus a forecast for May 2008, Table L1. Newly calculated growth forecasts for 2Q-4Q08 (and 2008), plus 1Q-2Q09 are shown in Table L2. Also included in this table is an actual and 3-month moving average (3MMA).

Table L1 – Global Semiconductor Sales Forecast Estimates

Time Period	Prev Month's Estimate ($b)	This Month's Estimate ($b)	% Change
Apr08 Est.	19.027	19.377	1.8%
Apr08 3MMA Est.	21.103	21.248	0.7%
May08 Est.	NA	20.113	NA
May08 3MMA Est.	NA	21.693	NA
2Q08 Est.	63.663	64.155	0.8%
1H08 Est.	**127.098**	**127.674**	**0.5%**
3Q08 Est.	69.336	69.513	0.3%
4Q08 Est.	70.883	71.061	0.3%
2H08 Est.	**140.219**	**140.576**	**0.3%**
2008 Est.	**267.318**	**268.249**	**0.3%**
1Q09 Est.	68.614	67.932	-1.0%
2Q09 Est.	67.858	68.858	1.5%
1H09 Est	136.473	136.79	0.2%

Table L2 - Sequential & Annual Revenue Growth Rates

Qtr - To - Qtr Period	Apr Est SRG (%)	Mar Est SRG (%)
1Q08 Act => 2Q08 Est	1.0%	0.4%
2Q08 Est => 3Q08 Est	8.4%	8.9%
3Q08 Est => 4Q08 Est	2.2%	2.2%
4Q08 Est => 1Q09 Est	-4.4%	-3.2%
1Q09 Est => 2Q09 Est	1.4%	-1.1%

Yr - To - Yr Period	Apr Est YoY (%)	Mar Est YoY (%)
2Q07 Act => 2Q08 Est	7.1%	6.3%
1H07 Act => 1H08 Est	5.5%	5.0%
3Q07 Act => 3Q08 Est	2.5%	2.2%
1Q-3Q07 Act => 1Q-3Q08 Est	4.4%	4.0%
4Q07 Act => 4Q08 Est	6.3%	6.0%
2H07 Act => 2H08 Est	4.4%	4.1%
2007 Act => 2008 Est	**4.9%**	**4.6%**
1Q08 Act => 1Q09 Est	6.9%	8.2%
2Q08 Est => 2Q09 Est	7.3%	6.6%
1H08 Est => 1H09 Est	7.1%	7.4%

Source: WSTS/Cowan LRA/Future Horizons

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The Global Semiconductor Monthly Report

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Figure L1 – Market Momentum Indicator

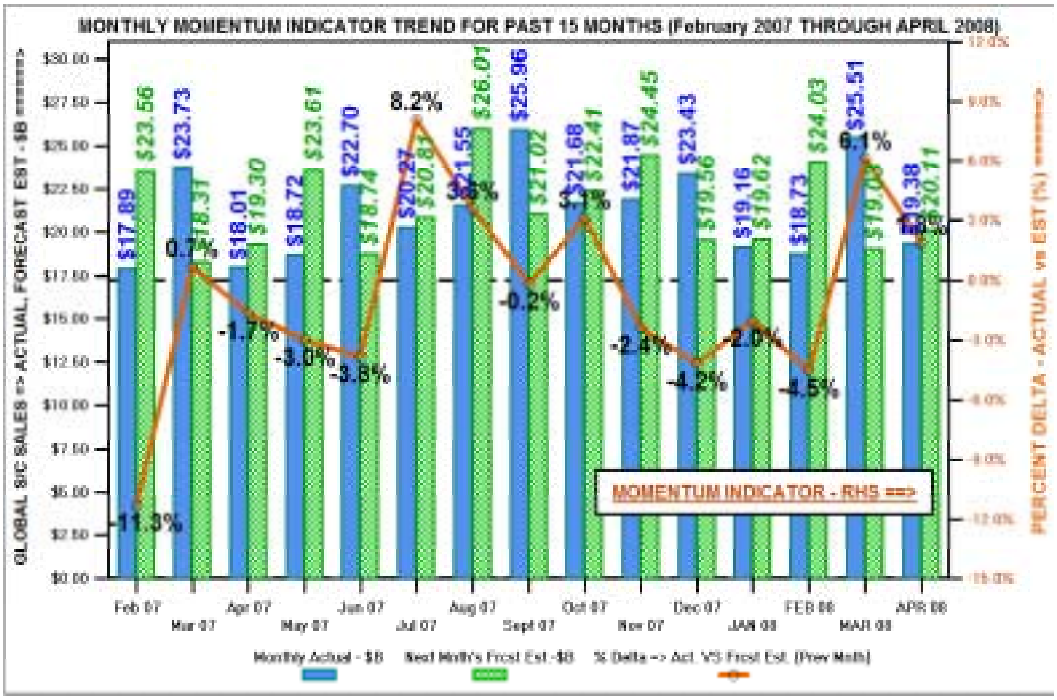
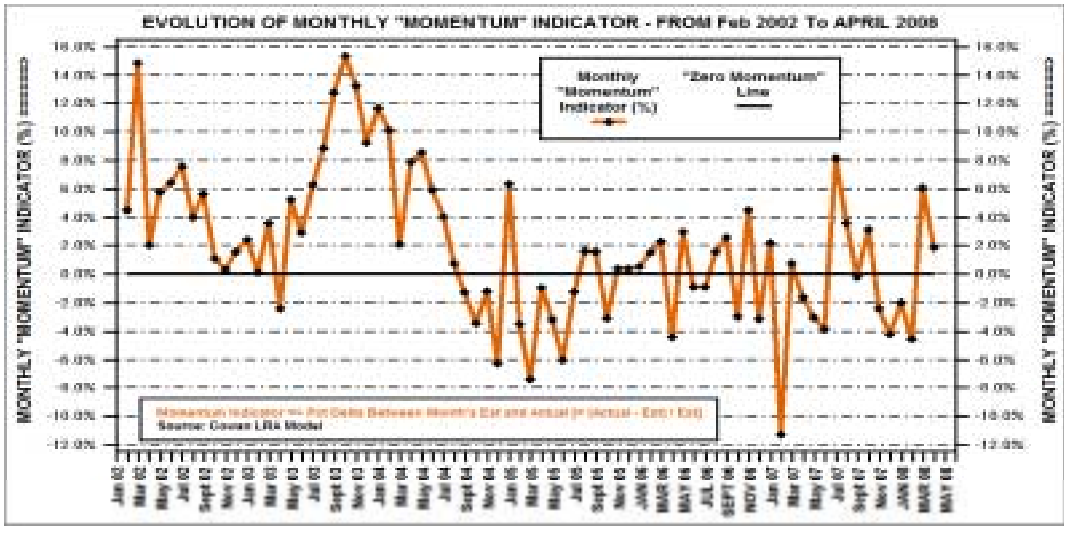


Figure L2 - Monthly Momentum Indicator, 2002-2008 YTD



Source: WSTS/Cowan LRA/Future Horizons

June 2008

Despite April's results coming in little stronger than the model calculated for last month, as can be seen from Figure L1 above, the momentum indicator decreased quite strongly from the previous month's momentum of plus 6.1 percent to plus 1.8 percent, but is still considerably stronger than January's minus 2.0 percent and February's minus 4.5 percent.

Due to this month's reduced positive momentum, all six of the updated global semiconductor sales forecast estimates change slightly compared to last month's calculated forecast estimates, namely 2Q08 (up 0.6 points to plus 1.0 percent), 3Q08 (down 0.5 points to plus 8.4 percent), 4Q08 (no change at plus 2.2 percent), 2008 (up 2.4 points to plus 4.6 percent), Q109 (down 1.2 points to minus 4.4 percent) and 2Q09 (up 2.5 points to plus 1.5 percent) - as shown in Table L2 above.

Next month's global semiconductor sales forecast estimate, namely for May 2008, is projected to be $20.113 billion. This yields a May 2008 3MMA (three Month Moving Average) sales forecast estimate of $21.693 billion, which is normally reported by the SIA in its monthly press release.

This month's updated year-over-year sales growth forecast estimate for 2008 - compared to 2007's final global semiconductor sales of $255.645 billion – comes in stronger at plus 4.9 percent, compared with last month's estimate of 4.6 percent.

Figure L1 shows the rolling 15-month momentum indicator trend, whereas Figure L2 shows the year-to-date monthly indicator trend since January 2002. The momentum indicator is defined as the percent difference between the actual sales number for a given month and the forecasted sales estimate calculated the previous month.

This indicator can be either positive or negative and is a measure of the deviation of the actual monthly sales number from the model's prediction based upon 23 years of past historical results. When the momentum indicator is positive, it indicates that the growth vector is increasing.

Finally, Figure L3 below shows the evolution of the past sales forecast estimates for 2008 over the previous seven months starting from the model's first prediction for 2008, namely with the August 2007 sales number which was released back in the beginning of October 2007.

Typically, July through September's forecast results are reasonably good proxies for the entire year's sales number, with the predictions improving with each subsequent month's forecast.

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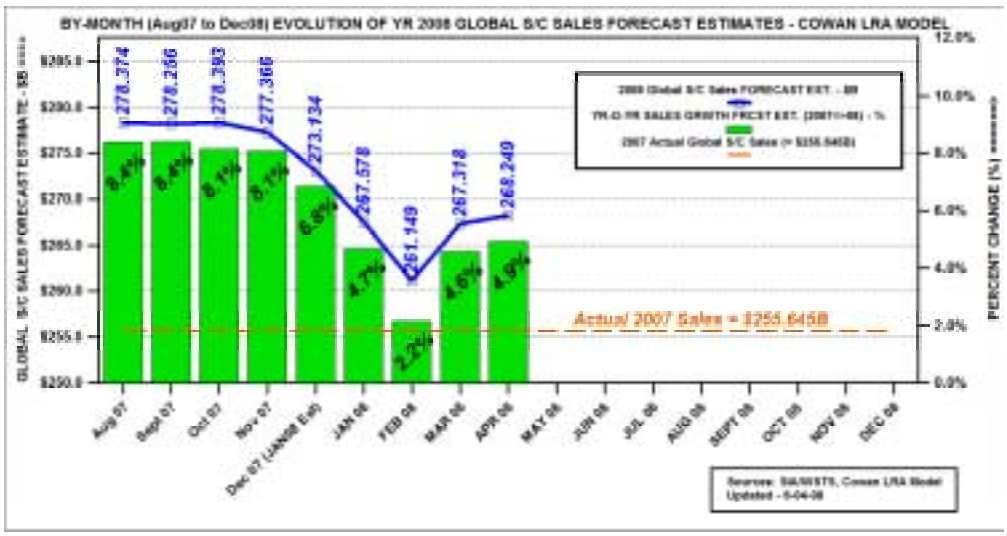
Figure L3 - 2008 Forecast Evolution



Source: WSTS/Cowan LRA/Future Horizons

Whilst the monthly global sales number published by the WSTS is a "lagging indicator", since it is published a full month after the fact, each month the Cowan LRA Model "turns" this lagging sales number into a "leading indicator" since its forecast horizon covers the next five quarters. It is this unique feature that makes the model dynamic, since it is updated each month with the latest sales data, allowing forecast revisions over the course of the year, Table L3.

*The Cowan LRA Model for forecasting global semiconductor sales is a statistically based model exploiting linear regression analysis of the past 23 years of historical monthly revenue results as published by the SIA. It is a mathematically-pure view of forecasted worldwide semiconductor sales looking out over the next five quarters. Linear regression techniques are utilized on the "appropriately transformed" monthly sales numbers thereby rendering the sales data highly linear and, therefore, very amenable to linear regression analysis. The numerical transformation (of the 23 years of monthly sales data -- from 1984 to 2006) that is invoked is not a complicated numerical manipulation but is quite straight forward and "makes sense physically" thereby yielding extremely high correlation coefficients approaching 0.98 and higher. In exercising the model each month a total of 6 distinct sets of linear regression parameters (y = **m**x + b) are employed in order to determine the sales forecast predictions for each of the next five quarters as well as a sales forecast estimate for the following month. Mike Cowan, the LRA inventor, is a 40-year semiconductor industry veteran, most recently retired (Jan 2002) from IBM Microelectronics where he was engaged in both technical and management assignments including strategy development and competitor/competitive analysis. For more details, please contact Mike at:* mikedcowan@verizon.com.

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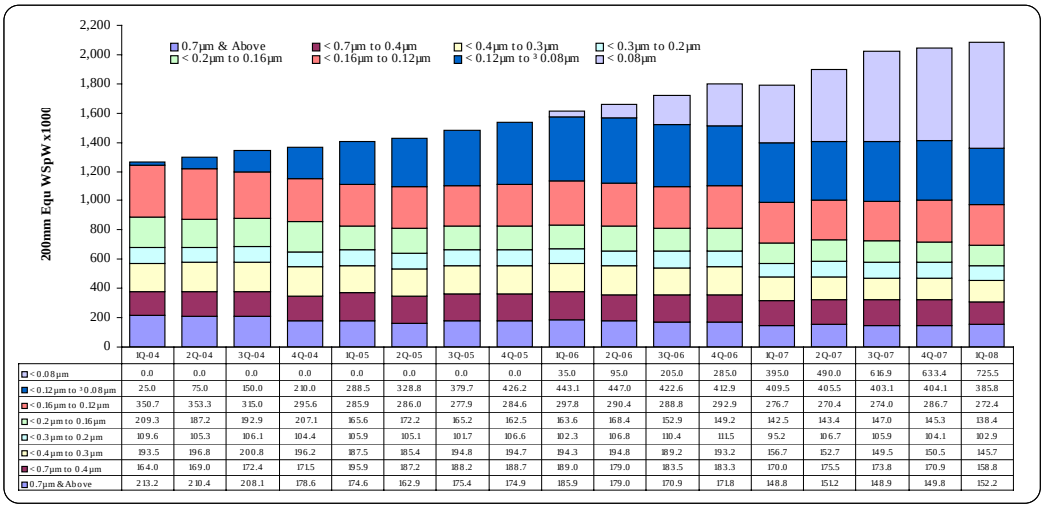
June 2008

Industry Capacity

Overall MOS wafer fab capacity increased 1.8 percent in Q1-08 versus Q4-07, from 2,019k 200mm equivalent wafer starts per week to 2,082k, Figure C1. The net increase by wafer size, Table C1, was in line with expectations, with growth centred on 300mm and sub-0.12 micron technology, Figures C2 and C3. Hot on the heels of the Q4-07 slowdown, Q1-08's capacity growth was well below that experienced this time last year, reflecting the slowdown in capital expenditure that began mid-2007. Given the continuing – and increasing level of – slowdown in 2008 cap ex, low levels of capacity expansion will continue well into 2009.

Figure C1 - MOS Wafer Fab Capacity By Feature Size
(200mm Equ Wafer Starts/Week x000)



	1Q-04	2Q-04	3Q-04	4Q-04	1Q-05	2Q-05	3Q-05	4Q-05	1Q-06	2Q-06	3Q-06	4Q-06	1Q-07	2Q-07	3Q-07	4Q-07	1Q-08
< 0.08µm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	35.0	95.0	205.0	285.0	395.0	490.0	616.9	633.4	725.5
< 0.12µm to ³ 0.08µm	25.0	75.0	150.0	210.0	288.5	328.8	379.7	426.2	443.1	447.0	422.6	412.9	409.5	405.5	403.1	404.1	385.8
< 0.16µm to 0.12µm	350.7	353.3	315.0	295.6	285.9	286.0	277.9	284.6	297.8	290.4	288.8	292.9	276.7	270.4	274.0	286.7	272.4
< 0.2µm to 0.16µm	209.3	187.2	192.9	207.1	165.6	172.2	165.2	162.5	163.6	168.4	152.9	149.2	142.5	143.4	147.0	145.3	138.4
< 0.3µm to 0.2µm	109.6	105.3	106.1	104.4	105.9	105.1	101.7	106.6	102.3	106.8	110.4	111.5	95.2	106.7	105.9	104.1	102.9
< 0.4µm to 0.3µm	193.5	196.8	200.8	196.2	187.5	185.4	194.8	194.7	194.3	194.8	189.2	193.2	156.7	152.7	149.5	150.5	145.7
< 0.7µm to 0.4µm	164.0	169.0	172.4	171.5	195.9	187.2	188.2	188.7	189.0	179.0	183.5	183.3	170.0	175.5	173.8	170.9	158.8
0.7µm & Above	213.2	210.4	208.1	178.6	174.6	162.9	175.4	174.9	185.9	179.0	170.9	171.8	148.8	151.2	148.9	149.8	152.2

Source: SICAS/Future Horizons

Table C1 – Q1-08 vs Q4-07 Wafer Fab Capacity Increase By Wafer Size

Wafer Technology	wsw (k)	Q1 vs Q4
Total MOS	**36.9**	**1.8%**
200mm Wafers in MOS Total	-17.1	-1.8%
300mm Wafers In MOS Total	67.0	8.6%
150mm & Below Wafers in MOS Total	-13.0	-4.4%
BIPOLAR (5 inch equivalents)	0.1	0.1%
TOTAL IC's (8 inch equivalents)	**36.9**	**1.7%**

Source: SICAS/Future Horizons

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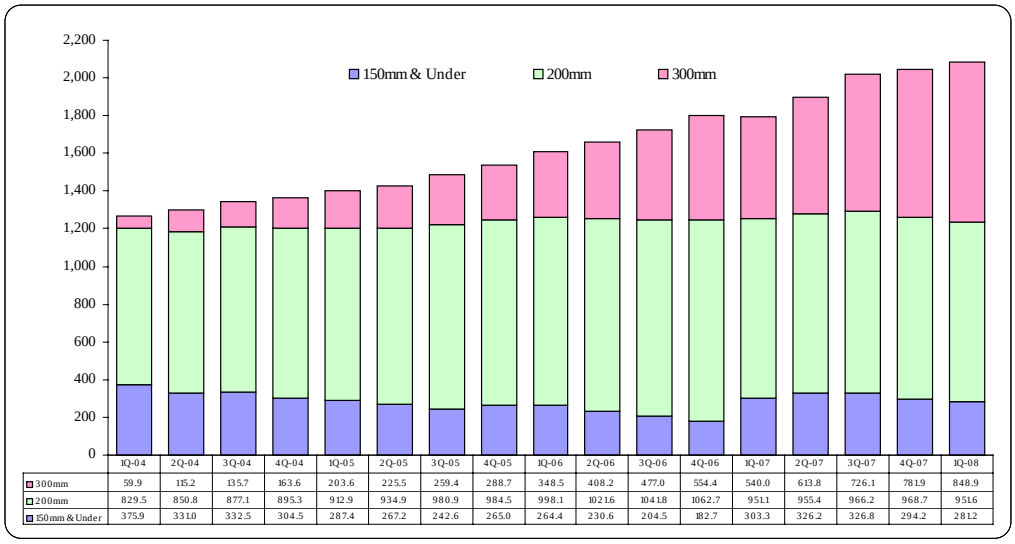
Figure C2 - MOS Wafer Fab Capacity By Wafer Size

(200mm Equ Wafer Starts/Week x000)

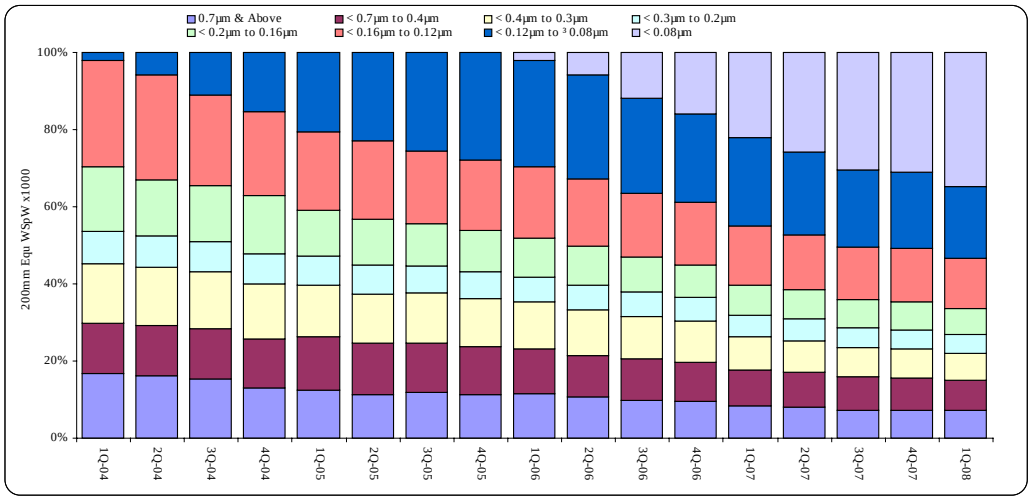


	1Q-04	2Q-04	3Q-04	4Q-04	1Q-05	2Q-05	3Q-05	4Q-05	1Q-06	2Q-06	3Q-06	4Q-06	1Q-07	2Q-07	3Q-07	4Q-07	1Q-08
300mm	59.9	115.2	135.7	163.6	203.6	225.5	259.4	288.7	348.5	408.2	477.0	554.4	540.0	613.8	726.1	781.9	848.9
200mm	829.5	850.8	877.1	895.3	912.9	934.9	980.9	984.5	998.1	1021.6	1041.8	1062.7	951.1	955.4	966.2	968.7	951.6
150mm & Under	375.9	331.0	332.5	304.5	287.4	267.2	242.6	265.0	264.4	230.6	204.5	182.7	303.3	326.2	326.8	294.2	281.2

Source: SICAS/Future Horizons

Figure C3 - MOS Wafer Fab Mix By Feature Size

(200mm Equ Wafer Starts/Week x000)



Source: SICAS/Future Horizons

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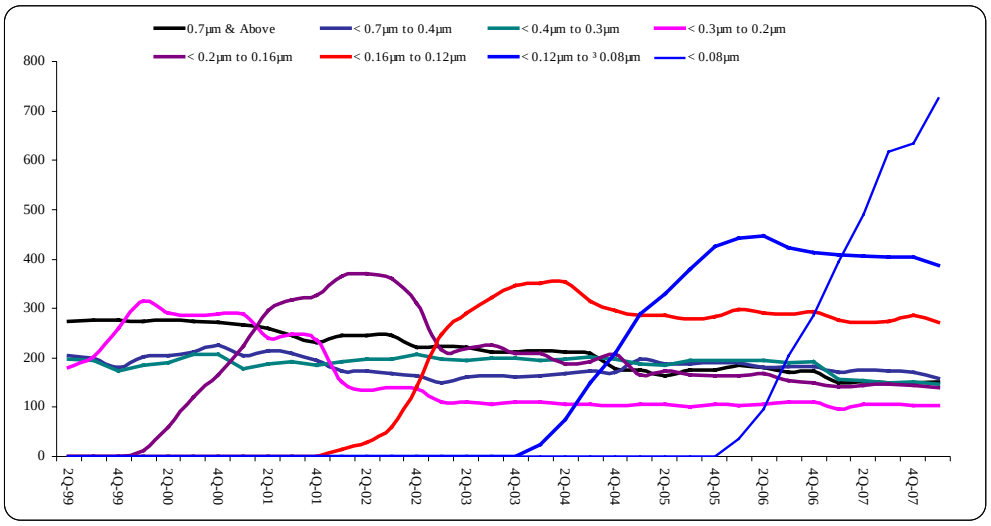
300mm wafers now account for 40.8 percent of the total MOS capacity, up from 38.2 percent in Q4-08 and 30.1 percent from the same period last year. 200mm wafers still make up the bulk of capacity at 45.7 percent, down from 47.4 percent in Q4-07 and 53.0 percent in Q1-07. Q1-08 also saw the actual size of the 200mm capacity decline by 1.8 percent. We expected this sector to now exhibit a steady decline in overall market share and absolute size over the coming decade. The vast majority of new fab additions are now in 300mm wafers, following the well-trodden path of the prior 200mm and 150mm wafer transitions. Again, hardly surprisingly, capacity at 0.08 micron and below is still in its market build out phase, Figure C4.

Figure C4 - MOS Wafer Fab Life Cycle By Feature Size
(200mm Equ Wafer Starts/Week x000)



Source: SICAS/Future Horizons

Given the very low level of Q1 capacity increase, utilisation rates increased slightly to 90.8 percent in Q1-08 from 90.7 percent in Q4-07, Figure C5. The comparable utilisation figure for Q1-07 was 87.4 percent.

Advanced IC capacity, i.e. 0.08 micron and below, increased to 96.7 percent (versus 95.4 percent in Q4), Figure C6, whilst 300mm and 200mm wafers checked in at 95.7 percent (Q4 = 98.0 percent) and 88.8 percent (Q4 = 89.2 percent) respectively, Figure C7.

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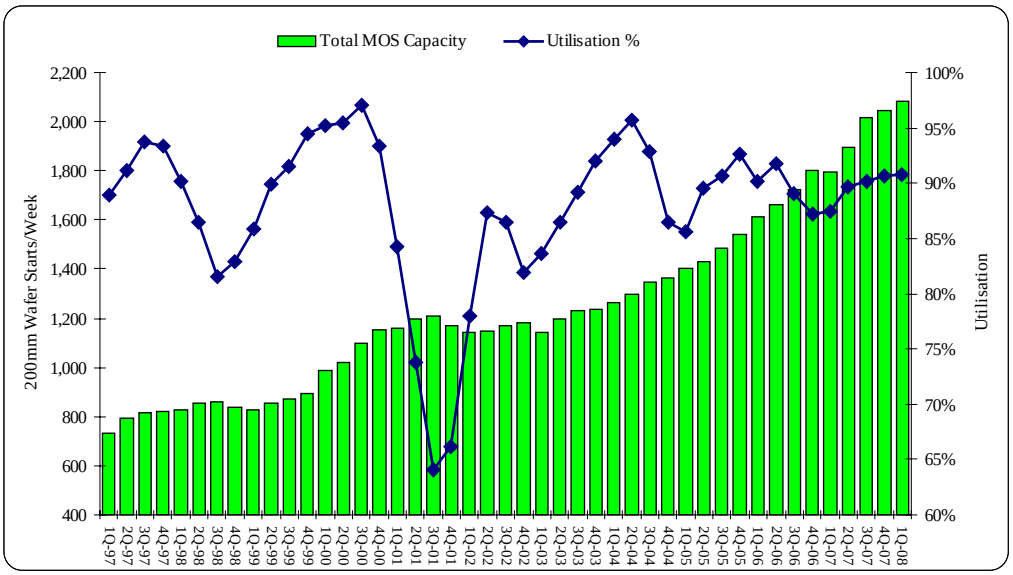
Figure C5 - MOS Wafer Fab Capacity Utilisation

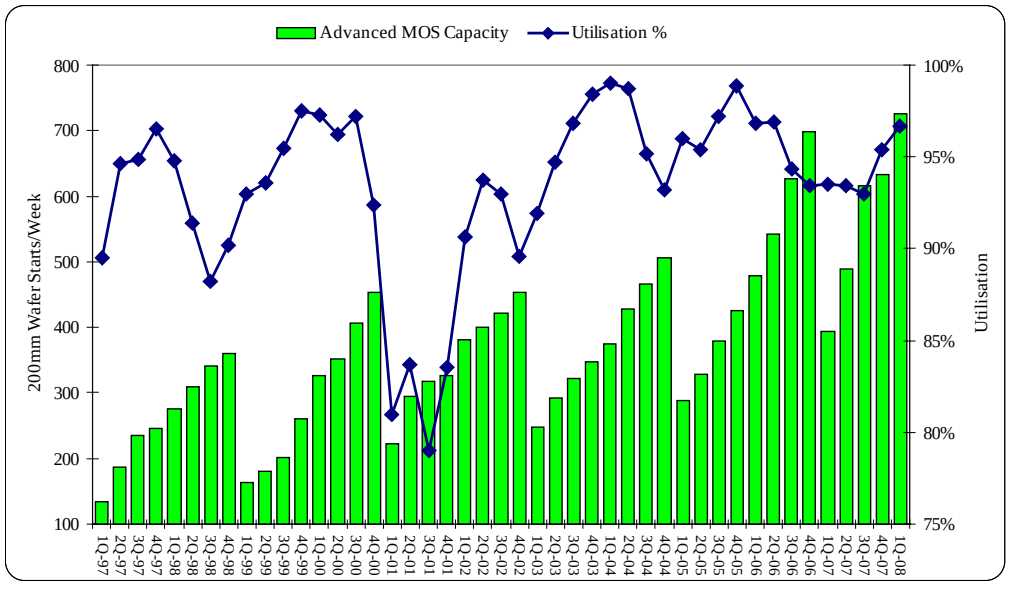
(Percent Of Total)



Source: SICAS/Future Horizons

Figure C6 - Advanced MOS Wafer Fab Capacity Utilisation

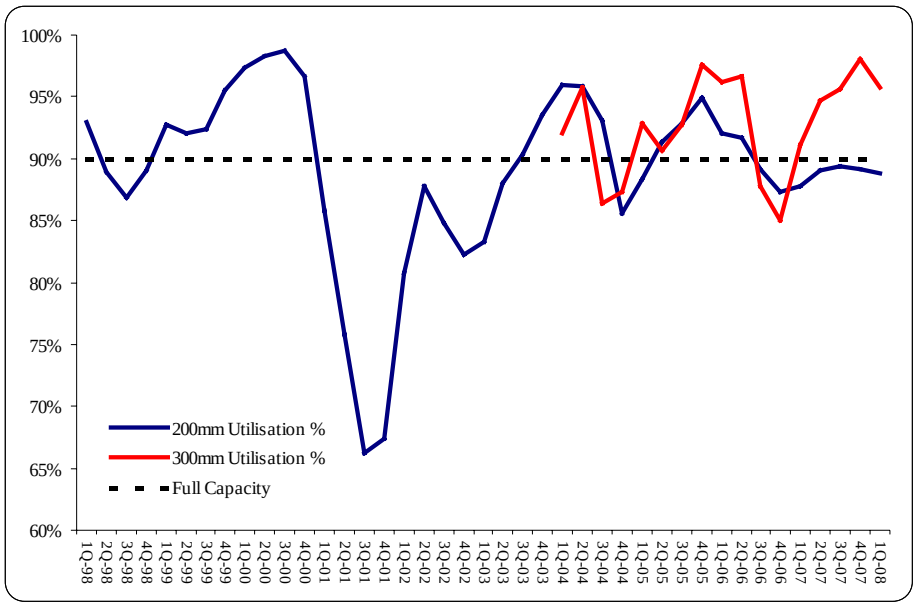
(Percent Of Total)



Source: SICAS/Future Horizons

June 2008

Figure C7 - MOS 200mm & 300mmWafer Fab Capacity Utilisation
(Percent Of Total)



Source: SICAS/Future Horizons

It takes a while, but the ex cut backs in cap ex that started mid-2007 are now clearly impacting net new capacity additions. Interestingly these cut backs are happening against a backdrop of high levels of capacity utilisation, not excess capacity, which clearly differentiates the capacity situation now from previous situations. In short, the industry is running on empty … with no sign of a tanker in sight. The penny has not dropped yet but the writing is on the wall.

Capacity will get even tighter in the second half of 2008; price increases – even wafer rationing – is inevitable. This may not be too worrisome for the 'A'-list fabless celebrities, but for the 'B' list and wannabes …. it is going to get tougher than tough.

Granted there is still reasonable excess at the plain vanilla 200mm trough for now, but this is the least profitable – and most competitive – end of the market, and for the firms doomed to play here, red ink will keep flowing. Nasty.

For the rest … with their now strong lock on the market, the foundry focus is all about improving their bottom line. The era of declining revenue per wafer start is over; prices will rise and wafer start rationing/management will follow.

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June 2008

World Economic Round Up

World Economy

Major world economies continue to experience difficulties with slowing economic growth and higher inflation due to high commodity and food prices.

With oil prices nearly doubling over the past 12 months to almost US$140 per barrel, many emerging economies have been forced to take the unpopular step of reducing subsidies that they consider essential to political stability *(see India and Asia Pacific).* In 2008, Asia is expected to account for 70 percent of the world's oil demand growth, with the rest coming from the Middle East and Latin America. Oil prices dipped for a short time during May amid concerns that reduced subsidies could lead to slower demand from some Asian countries but is now approaching US$140 per barrel. Experts believe that oil prices could reach US$150 by July because of rising demand and political tension.

Experts believe emerging economies such as China, Indonesia, Brazil and Argentina will benefit most from rising prices as their farmers seek to increase production. Although these Asian and Latin American farmers typically only get half the yields of the US and European counterparts, they are catching up by investing in modern seed, equipment and fertiliser. World trade in agricultural commodities is expected to rise by 20 percent, driven by exports from the developing world.

North America

During May fears of a recession subsided on the news that GDP for the first quarter was revised up from 0.6 percent to 0.9 percent. To date there has not been a single quarter of decline. Government data for April also showed that consumer prices rose less than expected. The weakening dollar rallied briefly at the beginning of June when the Chairman of the Federal Reserve (Fed)) broke the Fed's traditional silence on currency matters. He made it clear that the US does not want any further dollar weakness because of the risk this poses to inflation. He also hinted that dollar weakness could play a part in future interest-rate decisions.

However, data released at the beginning of June increased fears of a recession. The jobless rate surged to 5.5 percent in May from 5.0 percent in April, the biggest increase in more than two decades. Although job losses are spreading, they are concentrated in construction and manufacturing, which have been dropping steadily for over a year. By contrast, service sector employment rose

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slightly. Inflation continues to rise on the back of higher commodity and oil prices.

The Fed kept interest rates steady and this is expected to continue as they juggle a slowing economy with the ever-increasing risk of higher inflation.

Europe

Although the International Monetary Fund (IMF) raised its growth forecast for the Eurozone, some countries within the zone are continuing to see a fall in economic growth and confidence. The Baltic States are set for a hard landing in their economies whereas central Europe is proving to be particularly resistant to the effects of the credit crunch. Along Europe's southern fringe, economic sentiment in France, Spain and Greece deteriorated with Italy remaining weak, whereas, strong rebounds in industrial sentiment in Germany and Belgium offset that weakness. However, the latest news from Germany is that manufacturing orders declined by 1.8 percent on the month in April as export demand fell sharply.

Inflation in the zone surged to its highest level in 16 years during May to hit 3.6 percent. Evidence also emerged that higher prices were affecting consumer confidence, with Germany reporting a 1.7 percent drop in retail sales in April following a 2.2 percent fall in March. Although unemployment data has remained low at 7.1 percent in April, industry experts are expecting a downturn in the coming months.

The European Central Bank (ECB) kept its key interest rates on hold at 4 percent, the level it has held for a year. Indications are that in an effort to keep inflation under control, rates could be raised in July.

UK

Britain's largest mortgage lender stated that UK house prices dropped by 2.5 percent in May with the number of new mortgage approvals in April being 40 percent less than a year earlier. Retail sales also fell in May for the second consecutive month, while retailers raised prices at the fastest rate since 1992.

The Bank of England (BoE) left interest rates unchanged at 5 percent, despite calls from estate agents and constructions firms for a cut. Inflation, at 3 percent in April, is forecast to remain high and bank rates are unlikely for some time. A government plan to produce £2.7 billion in tax cuts for lower incomes will only account for 0.3 percent of household incomes. The BoE governor has warned of a protracted slowdown with high inflation but is not forecasting a recession.

A recent survey has shown that the service sector shrank in May for the first time in five years, as costs rose and confidence in business prospects fell. The survey

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confirmed other data such as the slowing housing market, where prices continue to slip, while the slowdown of new mortgages continues. Sterling fell against other major currencies and UK government bonds edged up following the service sector survey.

Japan

Japan's financial services agency has reported that losses stemming from US sub-prime lending increased by 41 percent to US$8.5 billion at the end of March. This brings total losses on investments linked to risky mortgages to US$23 billion, although this figure is not as severe as in Europe and the US.

The Bank of Japan (BoJ) recognises that even if exporters earn high profits, they will not pass these through to labour. Wages have failed to rise despite a fairly tight labour market. The forecast for exports and housing are lower, suggesting that economic risks are on the rise. Japan's trade surplus shrank by nearly half in April from a year earlier to US$4.7 billion. Imports rose 11.9 percent, due to rising oil prices, compared with a meagre 4 percent rise in exports. High oil prices are affecting the tuna fishing industry with a possible 20 percent of Japan's fishing fleet suspending operations. It is feared that this will have a knock on effect on the sushi industry.

After a gap of more than nine months, Japan and North Korea will resume talks on the current situation between the two countries and about how to deal with the future of the bilateral relations. Tokyo wants a dispute over abducted Japanese nationals to be resolved before establishing a formal diplomatic relationship with Pyongyang.

China

The death toll from the devastating earthquake in China has exceeded 12,000 and highlighted the growing gap between rich and poor. The greatest destruction was in rural areas and the small but fast growing towns, due to less stringent building-safety practices than the big cities. As a result, public buildings such as schools and hospitals will be constructed to higher earthquake-resistance standards in the future. Industry experts, however, say that standards are one thing, and implementation is another. Authorities are focussing on producing 1 million prefabricated temporary housing units within three months to meet the huge demand for housing. The Chinese quality control authority will be keeping a close eye on all products being shipped to the earthquake area and prosecute those sending substandard goods.

The impact of the earthquake is expected to be small and temporary, being less than that of the snowstorm in January, which affected two-thirds of the country.

June 2008

The biggest economic risk will be on inflation, 8.5 percent in April, which has emerged as the principal threat to the economy. The main cities are experiencing fuel shortages as oil companies cut supplies in the subsidised local market. The gap between the local market and international prices is 20 percent for petrol and 40 percent for diesel.

India

The rise in price of crude oil to above US$135 has forced Asia to rethink fuel subsidies that have been part of fiscal policy and thus risk even higher inflation than they have now. Threats of street protests and a backlash from rival parties were prompted by the Indian government raising retail prices of fuel by between 8 and 17 percent to reduce the burden of fuel subsidies that are expected to cost US$57.8 billion this year, or more than 3 percent of GDP. India imports more than 70 percent of its oil needs but with inflation already above 8 percent recently, the government has delayed the move.

The projection for growth this year by the Indian government will slow to around 8.5 percent. Hampered by a failing infrastructure manufacturing growth in the first quarter slowed by 3.6 percent from the previous quarter. On the other hand, construction activity jumped 13 percent from a year earlier and double-digit growth in the services industry. The government is planning a number of state-backed initiatives including a plan to build a Mumbai to New Delhi 'manufacturing corridor' that would involve high-tech factories in a series of industrial parks between the cities, linked by new rail and road routes.

Asia Pacific

As in India, several countries have reduced subsidies on fuel. Malaysia announced a 40 percent increase to reduce a subsidy burden estimated at US$17 billion this year, while Indonesia raised prices 29 percent in May and Sri Lanka increased prices by between 14 and 47 percent. Taiwan abolished its subsidies completely from the beginning of June and will raise electricity prices in July.

Soaring food and energy prices are raising inflation in many Asian countries and central banks in Indonesia and the Philippines raised interest rates by 25 basis points in early June to counter inflation. Indonesia's rate rise to 8.5 percent followed a similar increase in May, when inflation stood at 10.38 percent. In the Philippines, inflation has hit a nine-year high of 9.6 percent and benchmark interest rates rose to 5.25 percent, the first rise in three years. April's inflation rate in Singapore rose to a 26 year high of 7.5 percent as housing, transportation, food and communication costs soared. Food prices alone rose 8.5 percent.

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June 2008

Relations between China and Taiwan look promising as the two countries resume a semi-official dialogue suspended for almost a decade with talks in June on bilateral flights and tourism.

Russia/CIS – New Leader/Era For Russia?

On 7th May Vladimir Putin stepped down as President of Russia and Dmitri Medvedev took his place. This was an historic even for Russia as Mr Putin is alive, well and will remain on the political scene as Prime Minister. The question now being debated worldwide is just how much power the new President will be able to wield and to what extent Mr Putin will still make key decisions.

Many observers regard Mr Medvedev as a convenient stopgap for Mr Putin until he can return to power at the next presidential elections. Critics of Mr Putin feel that he intends to be the real leader of Russia, reducing Mr Medvedev to a largely ceremonial role. However, Mr Medvedev reiterates that they each know their responsibilities and will work in tandem at those responsibilities. Others point out that it is unlikely that Mr Putin will undermine the position of the President, as he may want to return to that position himself in the future.

Some industry experts believe that Mr Putin may initially be the 'senior partner' in 'tandem' but will gradually allow Mr Medvedev to become the more influential of the two. In the final few months of his presidential position Mr Putin kept his pledge not to change the constitution to give him more powers. However, he has strengthened his future position by ensuring governors of Russia's 85 regions will report to him and not to the Kremlin.

Dmitri Medvedev has been a close ally and supporter of Mr Putin since working with him in St Petersburg's mayoral office, a city that is native to both men and where they studied at the same university. He has been Mr Putin's deputy chief of staff, ran Mr Putin's election campaign and later became a deputy prime minister.

Unlike Mr Putin, he does not come from a background with the KGB and trained as a lawyer, although some feel that he may be harsher than Mr Putin to compensate. He is regarded as being more liberal than Mr Putin, giving hope to the more liberal members of government and the West.

In his inaugural speech he made it clear that he values personal and economic freedom, including freedom of speech. Alongside this, a key component of his idea of freedom is the rule of law, which he feels has been absent from Russia for a long time.

Freedom of speech is a particular area that many inside and outside Russia would like to see improved. For most Russians, television, especially via the national

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networks, is the main source of domestic and international news. However, channels that are either run directly by the state or owned by companies with close links to the Kremlin dominate TV broadcasting. Additionally, companies with close links to the Kremlin have been bought several influential daily newspapers.

In Moscow and elsewhere journalists investigating the affairs of the political and corporate elite are said to be particularly at risk of harassment or physical abuse. Kremlin control of the media was apparent in the presidential elections, which were considered unfair and undemocratic (see our January report – What next for Russia?).

As yet Mr Medvedev has no clear plans on improving media freedom. One area in which Mr Medvedev and Mr Putin are agreed is foreign policy and although political relations with countries such as the US and UK are thawing steadily, other more controversial attitudes in foreign policy look set to remain.

Mr Medvedev is first and foremost a lawyer and this is reflected into his desire to embed the rule of law in Russian society. He has a three-point plan to achieve this with the first step being to assert the law's supremacy over executive power and individual actions. The second step will 'create a new attitude to the law', where every citizen understands that without observing the law there cannot be normal development of the state or society. The third step will create an effective court system by assuring independence of the judiciary with judges being paid more and their prestige enhanced.

Proper law enforcement is also fundamental to tackling bribery and corruption. Mr Medvedev accepts that he is setting a mammoth task, which includes expectations of higher political partner's respect of the independence of courts and judges. He must also show that by upholding the rule of law he means to strengthen the rights of citizens and not simply to reinforce the rights of an over-mighty state.

Mr Medvedev still needs to tread with care as he faces a dysfunctional system of government with considerable infighting amongst the Kremlin clans that could spill over into political instability if he tries to change too much too soon. Their power should not be underestimated, as they are capable of ignoring the President's wishes as Vladimir Putin found out in his term as President. Mr Medvedev has inherited a flawed economy with massive reforms still necessary.

Even Mr Putin recently criticised many of Russia's shortcomings, including corruption, inefficiency of the state's management and dependence on natural resources. The average economic growth of seven percent for the past ten years is admirable but too reliant on energy and commodities. Oil production is showing

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signs of weakening with production figures stagnating for the third month in a row in April amid fears of a decline.

A continuation of this state will undoubtedly put pressure on economic growth and the amassed US$500 billion in gold and foreign exchange reserves Russia currently holds. The banking system has been largely unaffected by the global credit squeeze due to more conservative banking practices but US$100 billion of corporate borrowing is due to be repaid in 2008 that could put a strain on the financial system. Inflation was running at 12 percent in 2007 and reached and this is one area Mr Putin, as prime minister, has pledged to remedy along with cuts in tax and increased social spending.

Our March report on Russia highlighted the plight of the Russian infrastructure and plans to address the immense task of bringing Russia into the 21st century. Critics of the Putin administration say that infrastructure problems should have been tackled sooner instead of focussing on taking control of energy assets and building often inefficient or monopolised state controlled companies.

Likewise, bribery and convergence of the civil service with business becoming the norm at all levels of government have restricted Russia's development. Whichever of the two is in power, it would seem that the duo of President Medvedev and Prime Minister Putin will be undertaking a dual juggling act to keep the country moving forwards.

Economic Case Study – Austria

In terms of GDP per capita, Austria is one of the ten richest countries in the world with a well-developed social market economy and a high standard of living. This landlocked, mainly mountainous country is in a strategic location in the heart of central Europe, with many easily traversable Alpine passes and valleys.

Austria borders Germany and Czech Republic to the north with Slovenia and Italy to the south. To the west are Switzerland and Liechtenstein with Slovakia and Hungary to the east. The majority of its eight million inhabitants are German speaking and live on the eastern lowlands of the country and its major river, the Danube, is a strategic trade route.

Having rejected the use of nuclear power in 1972, Austria currently produces more than half of its electricity by hydropower. Together with other renewable energy sources such as wind, solar and biomass power plants, the electricity supply from renewable energy amounts to nearly 80 percent of total use in Austria, with the rest being produced by gas and oil power plants.

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Austria was once the centre of power for the large Austro-Hungarian Empire but was reduced to a small republic after its defeat in World War I. Following integration into the Third Reich by Nazi Germany in 1938 and subsequent occupation by the Allies in 1945, Austria's status remained unclear for a further decade. A State Treaty signed in 1955 ended the occupation and recognized Austria's independence. Later that year a constitutional law was passed making Austria 'permanently neutral'.

Federal legislation of Austria is exercised by two chambers of Parliament chaired by the Chancellor, who is appointed by the President, currently Heinz Fischer of the centre-left Social Democratic Party (SPO). The country is split into nine independent federal states with their own provincial governments. The general elections held in October 2006 saw the Social Democrats emerge as the largest party but without a majority.

In January 2007, a coalition was formed between the SPO and the conservative People's Party (OVP) with the Social Democrat, Alfred Gusenbauer as Chancellor. He has admitted that it is not easy to have two parties roughly the same size in a coalition and he has been criticized as being more of a mediator between the two parties than a leader. Mr. Gusenbauer argues that pragmatism is the only way forward and that he is leading through moderation and not by accentuating different standpoints, which may result in confrontation.

The major parties have contrary opinions about the future status of Austria's military neutrality with the OVP arguing for a stronger integration into the EU's security policy, and some seeing Austria taking a role in NATO. However, major changes in policy like this would require a two-thirds majority in parliament.

The Austrian economy is sound with a steady 3.3 percent growth rate in both 2006 and 2007, although this is expected to slow to around 2.5 percent in 2008 due to global conditions. Unemployment is among the lowest in the EU at around 4 percent; there is no current account problem; inflation appears to be under control and state finances are comfortably within EU rules.

Austria is closely tied to other EU economies, especially Germany and enjoys strong commercial relations, especially in banking and insurance sectors, with central, eastern and south eastern Europe. Austrian companies are emerging as regional players in banking and energy as well as industry and trading. The country also boasts a large service sector and a small, but highly developed, agricultural sector.

Membership of the European Union since 1995 has attracted plenty of foreign investment, due to Austria's access to the single European market and proximity

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to the new EU economies. A comprehensive economic reform programme, aimed at streamlining government and creating a more competitive business environment has further strengthened Austria's attractiveness as an investment location.

Austria's success over the past few years has been in taking advantage of the markets opening up around it. Austrian banks have successfully expanded into central Europe, which now accounts for around 40 percent of their profits. The two main domestic banking groups, the cooperative banks and the savings banks, benefit by a mutual support mechanism, known as the 'Haftungsverbund', which enables them to bail each other out when there are any signs of trouble. The European Commission has used this 'Verbund' as a model when drawing up Europe wide capital adequacy laws.

The OECD has praised Austria for introducing reforms that encouraged entrepreneurs and generated high incomes for a well-educated workforce. But it identified a number of challenges. These included opening up the service sector to more competition, bringing more people - such as older workers, and women with small children - into employment, and improving regional infrastructure to allow growth prospects to be exploited fully. Other improvements identified have been to put the emphasis on 'Austria-specific' strengths in technology, energy and the environment.

As well as being a member of the European Union, Austria has been a member of the United Nations since 1955. The country enjoys a reputation around the world as a centre of dialogue, being a top venue for congresses and conferences. It is home to a number of international organisations such as the Organisation of the Petroleum Exporting Countries (OPEC) and the Organisation for Security and Co-operation in Europe, as well as being one of the four official seats of the UN.

In March 2008, Austria's borders were opened up to four new countries that joined the European Union's passport-free Schengen area - the Czech Republic, Hungary, Slovakia and Slovenia. When they were opened the Chancellor rejected fears that the open borders might create a crime wave in Austria. However, in June 2008, Austria will be re-imposing controls at most of its borders as part of a major security operation for the European Football (Soccer) Championship. Austria enjoys an intermittently fractious relationship with some of its neighbours but generally is a solid European country whilst maintaining its own identity.

Market Trends – Let's Pay By Mobile

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Near Field Communication (NFC), a short-range wireless communication technology will be utilised for two-way contactless transactions, on say mobile phones, at a single touch.

NFC operates at the 'no licence band' of 13.56 MHz at ultra-short distances of only a few centimetres and works alongside Bluetooth and Wi-Fi. 'Pay-Buy Mobile' is the target market for this technology that will be used to link mobile handsets with credit-card type payments. Other applications include opening secure doors, Smart advertising posters and contactless mass transit tickets/cards.

NFC In Mobile Use Is Getting Closer

NFC used as the technology that will bring payments by mobile phone has taken several years to come to fruition, but success is now within sight. Delays have not been all technological, as standardisation and field trials have now proved successful. Hold-ups have occurred, due to conflicts of interest with mobile phone operators, banking and payment-processing firms such as Europay, MasterCard, and Visa, Trusted Service Providers, the reader manufacturers, and the handset OEMs, and SIM card manufacturers. This chain of involved businesses is only just beginning to get its act together.

NFC Radio Technology

The term 'Near Field' refers to the near field of the radio wave. At a distance of 10 wavelengths and above the radio wave frequency, the radio wave behaves, according to Maxwell's equations, where the electric and magnetic field components reinforce each other in transit in what is called the 'Far Field' in radio terminology. The 'Near Field' is inside the ten wavelengths and it is where the electric and magnetic components work independently and do not reinforce each other. In fact the magnetic component is useful and can be used for ultra short-range communications as the magnetic coupling field falls off at 1/(d^6) compared to 1/(d^2) of a normal radio. Communications falling off so steeply is not necessarily a disadvantage - as this will limit interference and interception by other similar devices nearby.

Exchanging Data

NFC allows devices such as mobile (cellular) phones to exchange data in an 'active' or 'passive mode'. In the 'passive' mode the master initiator supplies the RF field throughout the communication session and sends data at 106, 212, or 424Kbpsec to the target slave receiver, Figure A1.

To save power, the target slave device does not have to generate its own field, but sends data back to the master initiator using a 'load-modulation technique'. In the

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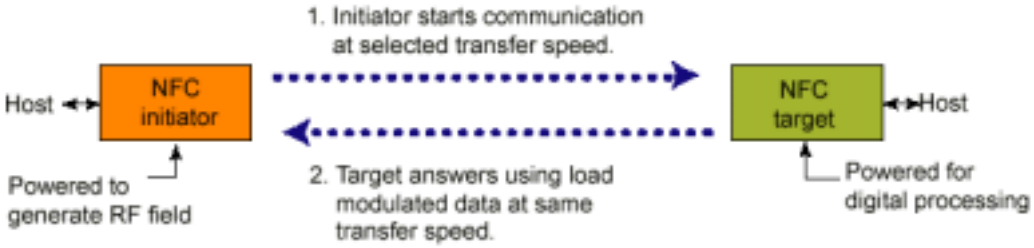
most common and 'active mode', each device generates its own RF field, operates faster and therefore uses more power. It is therefore possible that in the active mode, the master and slave can change rolls and either will be able to initiate the communication, Figure A2.

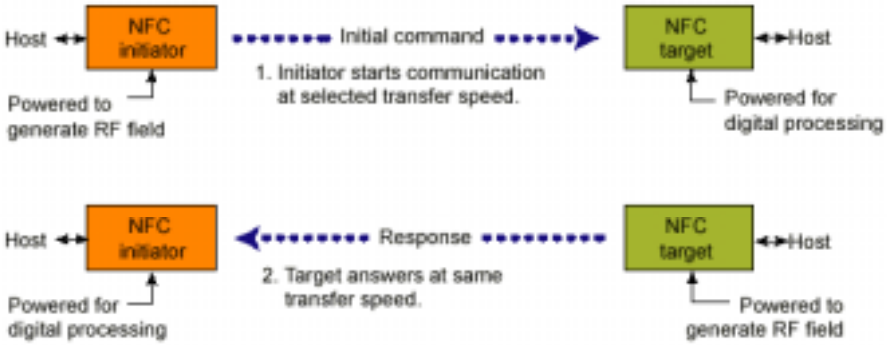
If a battery-powered device runs low on power it can change to act as a target rather than an initiator, thus saving power.

Figure A1 – NFC In Passive Mode



Source: NXP Semiconductors/Future Horizons

Figure A2 – NFC In Active Mode



Source: NXP Semiconductors/Future Horizons

Applications For NFC In Mobile Phones

1) Touch & Go

This is a 'mass consumer' application and will increase the productivity and throughput of the event-supplying company. Fast transactions will be dealt with when the NFC enabled mobile phone is brought close to the reader, Figure A3.

By taking advantage of the mobile phone handset and network functionality, existing credit card on-chip software and the NFC device-to-device connectivity,

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the NFC enabled mobile phone can be used as an e-ticket. Once the consumer's payment information is collected and verified, the e-ticket is automatically transferred to the handset for use.

This application is being tested at entertainment venues, on public transport (Touch and Travel), in car parks, for building access and in sports stadiums. The system is also exploring the use for opening home, office and garage doors.

Figure A3 - Contactless Mobile and Reader

Source: ViVopay/Future Horizons

2) Touch & Confirm

Here the user confirms the payment by using the PIN number in a similar way to use in a credit card. Faster transactions are being tested when a NFC mobile phone is being used for retail purchase. This is likely to be used on vending machines as well as cash tills.

3) Touch & Connect

Linking two NFC mobile phones or other devices such as a laptop PC together will enable peer-to-peer data transfer such as synchronising address books or setting up the download of images to a printer. Another medium, such as Bluetooth, may be used for the bulk transfer. The NFC's connection process is used only to reduce the number of steps needed for set-up and accelerates security checking. In fact NFC will be used to turn on and start the process to link

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Bluetooth headphones and other hands-free equipment to mobile phones by just touching the headphones with the mobile phone. NFC will also be used for gaming by establishing the link to another games equipment or to the network as this is done several times a day by a games enthusiast and becomes a hassle.

4) Touch & Explore

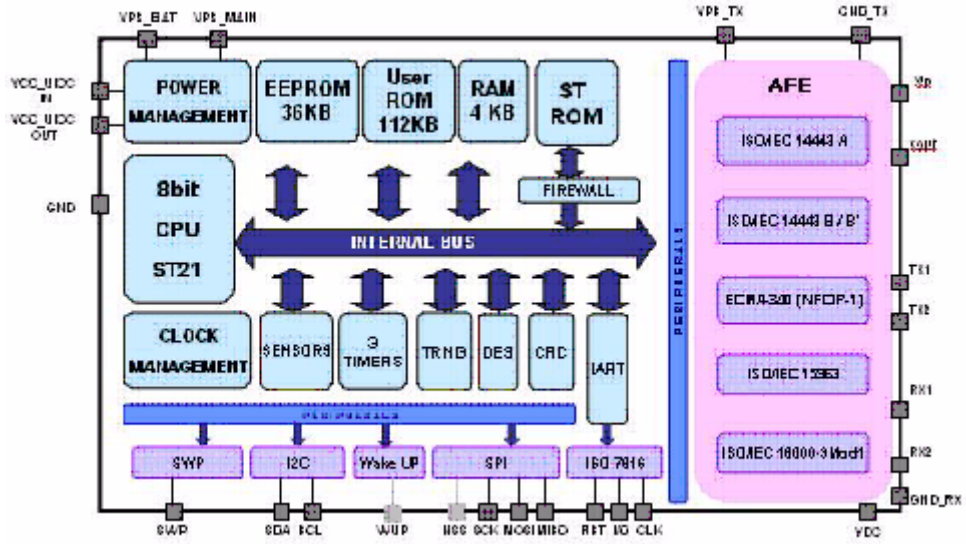
Finding out 'rich information' on companies services and products without committing to purchase. As an information gatherer, the NFC mobile phone is brought close to an advertising poster or product label and extra information. For example, product ingredients will appear on the mobile phone's screen.

ChipsetsAlready On The Market

Originally, there were only two leading suppliers of mobile phone NFC transceivers and these are fabless company INSIDE Contactless of France and NXP Semiconductors of The Netherlands. However, there is now or will soon be solutions from Infineon, Innovision, NEC, Renesas, Sony, STMicroelectronics and Texas Instruments.

A typical example of a single chip a NFC transceiver is the ST21NFCA from STMicroelectronics, Figure A4.

Figure A4 - Typical Single-Chip NFC Transceiver Block Diagram



Source: STMicroelectronics/Future Horizons

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STMicroelectronics along with NXP Semiconductors and Infineon Technologies should be able to harness their existing smartcard and RFID skills to reach a good position in this market. In addition to their extensive hardware security capabilities, the suppliers will add an NFC-enabled SIM card microcontroller combining a Single Wire Protocol (SWP) interface with contactless MIFARE technology. Many of the NFC patents are owned by NXP Semiconductors.

NFC-Enhanced Mobile Market

Contactless transactions are not new. Low-security contactless transactions are made everyday using dedicated contactless smartcards on mass-transit operations throughout the world. Some of these use different frequencies of operation and some use techniques at 13.56 MHz. However these use mostly different standards, as do electronic Passports and electronic ID cards, which are already counted in Future Horizons' estimate of the smartcard market.

While Near-Field Communication in mobile phones is new, in some parts of the world the contactless smartcard experience can only assist in the acceptance of contactless payments by mobile phone. The 100+ strong members of the NFC Forum have also been operating technical working groups on specifications, semiconductors and software, reference applications, security, and interoperability and compliance testing.

Trials and early adoption of techniques using the 'Mobile Phone Wallet' by DoCoMo in Japan and strong field support by the original backers Nokia, NXP Semiconductors, Sony and Visa International plus more recent support from Infineon Technologies, Samsung, Siemens, France Telecom, MasterCard, Matsushita, Motorola, Sony Ericsson and Vodafone, only bodes well for the system.

As part of the trials, mobile phone handset manufacturers Nokia have embedded an NFC chipset to the 6131 NFC handset and has made this available to all those keen to test NFC capability. The O2 mobile operator has a trial of a model 6131 handset mobile wallet that involves a virtual Oyster card for travel on London's public transport system and a Barclaycard with £200 worth of credit.

End-to-end trials have already succeeded in South Korea with LG Electronics providing the handsets. Mobile phone based transactions are already becoming commonplace in South Korea, where there are already more than 20 million mobile payment enabled handsets in circulation, with 100,000 terminal payment machines in shops, restaurants and cafes.

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The NFC phone stores critical and secure information on the phone's SIM card, which is the only secure memory on the phone. It has been in the technical area of communication with the SIM card where there were some extra discussion and extra standardisation. The use of the SIM card, has incidentally, increased the value of the SIM card and is helping to guarantee its place in the phone in the future.

Financial institutions and ticket authorities may have to replace or upgrade software for readers once they have been assured that NFC-enabled handsets comply and are on the market. With some recent delays now overcome and mostly positive outcomes of trials, it is expected that 'production' NFC phones became globally available during 2008 with the real momentum of sales expected to start in 2009. The NFC-enabled phone will then start activity in other 'NFC-enabled' consumer goods such as printers, MP3 players, cameras and PCs.

NFC-enabled mobile phones are initially likely to be the mid and high-end 3G and 2.5 G handsets with Bluetooth, and not necessarily in the ultra low-cost handsets sold to undeveloped countries. This does not mean that sales will be low as it is expected that the NFC ' mobile phone wallet' function will gain rapid acceptance from mobile consumers with sales rising to 25 percent of handsets per annum in 2012 as the function gets added as standard in many models.

The World Needs Mobile Wallets

Without necessarily knowing it today consumers and industry need mobile wallets. Leading mobile phone operators and handset manufacturers are hoping that 'Near Field Communication' short-range electromagnetic technology will bring another positive phase in the mobile phone business. With financial e-shopping transactions, ticketing and the automation of the set-up of Bluetooth and Wi-Fi communications, operators are expecting to offer more imaginative services and thus increase revenue.

By embedding credit card details in the mobile phone SIM card, the mobile phone industry will be improving the user experience. There will be difficulties, as there always are in designing the business models of cooperating companies so that all can extract value.

The GSM Association is working with operators, credit card companies and point of sale terminal manufacturers to provide transaction solutions, and accelerate the programmes of the operators now completing trials to turn these into commercial success.

Consumers, mobile operating companies, handset manufactures, IC manufacturers, shops and restaurants and credit card companies are ready and see

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2008/9 as the launch period of Pay-By-Mobile services. The European Telecommunications Standards Institute (ETSI) is working with the NFC Forum and the financial industry Mobey Forum to secure cross industry standards. ETSI has already agreed a 'Single Wire Protocol' standard to connect the NFC chip to the handset.

The major credit card companies are supporting the trials and are testing the security of these NFC contactless payment transactions so that an infrastructure of Point of Sale (PoS) terminals can be installed. The forming of Moversa, a joint venture between Sony and NXP Semiconductors is also helping the momentum. Despite the start of the use of NFC in the Far East things could move slower in Europe and the USA. Unfortunately, just having the technology is only part of the solution. Creating a new complex ecosystem of providers, new revenue flows and the inclusion of the banks can take time. Look at the example of trying to get IC security into credit cards ... this took a decade from a working technology.

Rapid infrastructure implementation will be critical, so who pays for PoS upgrades will have to be decided immediately. It is therefore possible that the non- payment uses of NFC may well be the first to arrive in Europe and the USA, with applications such as Bluetooth and Wi-Fi pairing possibly the first on the market.

NFC is expected to increase consumer usage of mobile phones creating greater revenues for operators, handset and semiconductor manufacturers and to improve the user's lifestyle by changing the way information on the move is gathered, access is gained and goods are paid for and distributed. NFC-enabled mobile phones are planned to be intuitive for consumers to use, secure and part of mobile life.

'Everyone' is expected to have a mobile phone in the future; 'everyone' is busy and on the move and 'everyone' has to pay for goods and services. NFC will overcome difficult to embrace technology and simplify and facilitate data exchange transfer between a number of devices, without having to navigate through complicated menus and set-up procedures.

Semiconductor Spotlight – The New Wonder Material?

Is Graphene the new wonder material? Graphene is a basic structural element of graphite material, including the much talked about nanotechnology favourite the carbon nanotube. Graphene is a one atom thick planar sheet of carbon atoms held

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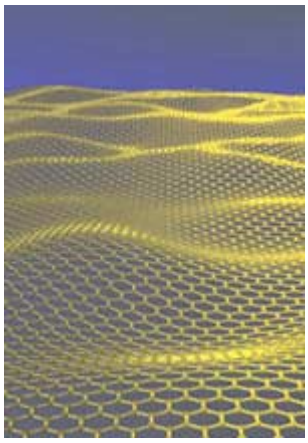
by atomic forces into a 'chicken wire' or 'honeycomb' hexagonal cell lattice, Figure T1. If these cell lattices are stacked up then it forms bulk graphite.

Graphine was discovered in the University Of Manchester, England, in 2004 and the university, and local spin-off company, Graphene Industries, are continuing this work.

Other research work is being carried out at the University Of Cambridge (England), Institute Of Chernogolovka (Russia), Max Planck Institute (Germany), University Of Nijmegen (Netherlands) and Universities of Maryland, Columbia (New York) Harvard, Northwestern, and companies such as Hewlett-Packard, IBM Research, MIT, and Nantero ... all in the USA.

Figure T1 - Chicken Wire Type Of Hexagonal Cell Array



Source: University Of Manchester/Future Horizons

Graphene Applications

These are too early to forecast but some examples could be:

Transistors

In the IC industry graphene can be put to many uses including the manufacture of transistors that work up to 500 times faster than today's silicon transistors. The problem is ... and there is always a problem in a new marvellous material ... the transistors are electrically noisy.

IBM is investigating an idea of stacking two layers of graphene together. These experiments have shown that this stacking has reduced i/f noise by a factor of ten.

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The improved noise behaviour in graphene bi-layers is associated with its unique band structure that varies with the charge distribution amongst the two layers, resulting in an effective screening of voltage fluctuations thus suppressing the noise.

Gas Sensors & Gas Sieves

Gas molecules that land on graphene affect its electronic properties in a measurable and predictable way. Accuracy and sensitivity is down to the single molecule level. If a molecule cannot pass the honeycomb structure then the material can act as a molecule sieve.

Solar Cells

Graphene is also being evaluated as the transparent conductive window in photovoltaic solar cells.

Scientific Use

As graphene is one of the thinnest materials known (one atom thick) and relatively strong it is being looked at as a support material for delicate objects, such as DNA, so that they can be viewed more easily by electron microscopes.

Graphene is also resistant to attack by powerful acids and alkalis and is being developed as a protective coating against these agents.

LCDs

Other applications being looked at are its use in LCDs and touch screens to replace Indium Tin Oxide (ITO) in conductive transparent coatings. The graphene will be sprayed onto glass substrates and its need may be accelerated because Indium is a expensive and rare metal and may be in short supply soon.

Some of these applications such as high-speed transistors in ICs may still be 10-20 years away, but others, such as LCDs, solar cells and the inert coating use may be already within some companies planning horizons.

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Forthcoming Events

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Annual Mid-Term Semiconductor Industry Forecast
July 22, 2008 – London, England

Future Horizons is pleased to announce that its Annual Mid-Term Industry Forecast Seminar (IFS2008-MT) will take place on Tuesday July 22, 2008 at the Hilton, Kensington, London, England. For delegate travelling convenience, the seminar starts at 10:30 am (with registration from 10:00) and finishes at 4:00 pm. Lunch is included in the seminar fee. For full details visit our website at: http://www.futurehorizons.com/new_web/seminars/ifs/ifs.htm

Sign Up Now … Get The Latest Market Outlook …Can You Really Afford Not To Be There?"

IFF2008 Pre-Announcement

6th Annual International System & SoC Forum
Oct 8-10, 2008 - Trend Hotel Savoyen, Vienna, Austria

Future Horizons is pleased to announce that its 6th Annual International System & SoC Forum (IFF2008) will take place from Oct 8-10, 2008 at the Trend Hotel Savoyen, Austria - http://www.austria-trend.at/en/?id=sav - under the auspices of the Dubai Silicon Oasis Authority. Mark your calendar NOW and visit our website at http://www.futurehorizons.com/new_web/forums/ieforum/ieforum.htm for details.

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Exchange Rates

Figure R1 shows the weekly Euro exchange rate vs the US$ and UK£ for 2008. Figure R2 shows the historical trend since its 1st Jan 1999 launch.

Figure R1 - 2008 Exchange Rate Trend
(Euro vs. US$/UK£)

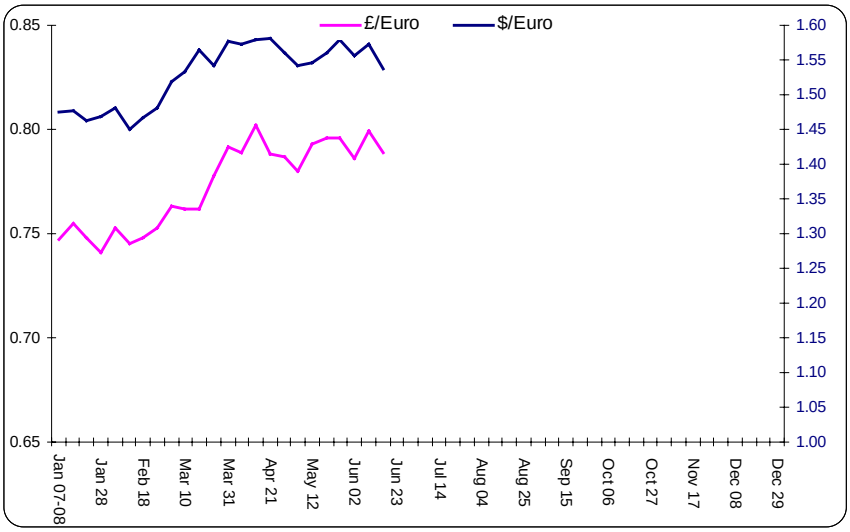
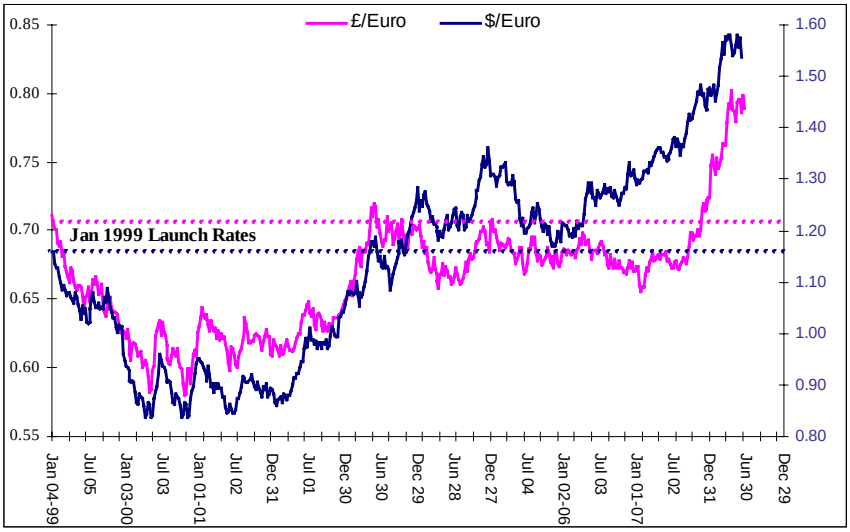


Figure R2 - Exchange Rate History, 1999-To Date
(Euro vs. US$/UK£)



Source: Financial Times/Future Horizons

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- Annual Semiconductor Report
- Semiconductor Application Markets Report
- European Fabless Semiconductor Report (Optional Database)
- European Semiconductor Wafer Fabrication Capacity (Optional Database)
- Russian Electronics Industry Report
- Russia & The Other Countries Of The Former USSR IC Manual
- East European Semiconductor Report

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Summary Of Key Reports

Brochure downloads are available from our website. Reports can be purchased online, by fax, or email and are supplied in A4-ring binder and CD-ROM format. Respect copyright laws, multi-user/site licenses are required for additional users and/or posting on company Intranets.

Global Semiconductor Update Report

http://www.futurehorizons.com/new_web/westmkt/mureport/mureport.htm

A CEO favourite, this report is all a busy executive needs to keep in touch with industry trends. E-mailed monthly, the report provides a useful industry momentum indicator by compiling 12-monthly rolling charts for Units, Average Selling Prices (ASP) and Revenues broken down by total SC, IC, Optoelectronics and Discretes. Also included is a review of the world economy, broken out by region, plus a monthly feature on a key semiconductor market driver. The link between the economy and the semiconductor industry is not perfect but by measuring and understanding the impact of wafer fab capacity on lead-times and prices, and by monitoring the level of system OEM, distribution and semiconductor company inventory, more sense can be made of this fundamentally unstable industry. The report focus is on in-depth analysis and the underlying industry trends.

Annual Semiconductor Report

http://www.futurehorizons.com/new_web/westmkt/esreport/esreport.htm

This two-volume report provides market analyses and forecasts of the worldwide and European semiconductor market (Volume 1), as well as a detailed analysis of the 27 key semiconductor end-user applications and industry market drivers, collectively accounting for three quarters of the total IC market (Volume 2). This value-added bundle is a must-have for anyone interested in the global semiconductor market and European detail.

Semiconductor Application Markets Report

(Previously called the Key Market Drivers Report)

http://www.futurehorizons.com/new_web/westmkt/kmreport/kmreport.htm

Volume 2 of the Annual Semiconductor report is available separately as the Semiconductor Application Markets Report. Individual chapters describe how each application works, the technology used, the unit sales history and forecast, the semiconductor content and the associated semiconductor market size. This vital research resource volume is a proven industry favourite. Individual applications are also available as separate reports; please call for details.

European Fabless Semiconductor Report

(Previously called the European Chipless & Fabless IC Design House Report)

http://www.futurehorizons.com/new_web/westmkt/dhreport/dhreport.htm

This 300-page report covers the European and Israeli, chipless, fabless and independent IC design house community, and is essential for those planning the resources of subcontracting new product design, both in the semiconductor industry and the final system end product. It will also prove invaluable for authorities and government departments, planning and directing economic growth, as well as companies seeking investments, potential partners or acquisitions. As an added user benefit, the 280 strong chipless and fabless IC design house company database is available in Excel format as an optional CD extra (not available separately), with both pre-organised sorts (by country, design skill and application) and in raw data format allowing customised searches and analyses. This best-selling report has a proven track record as an invaluable research resource.

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Updated Annually - 820 Pages - Despatched As Two Volumes:

Annual Analysis & Forecast Of The Worldwide & European SC Industry

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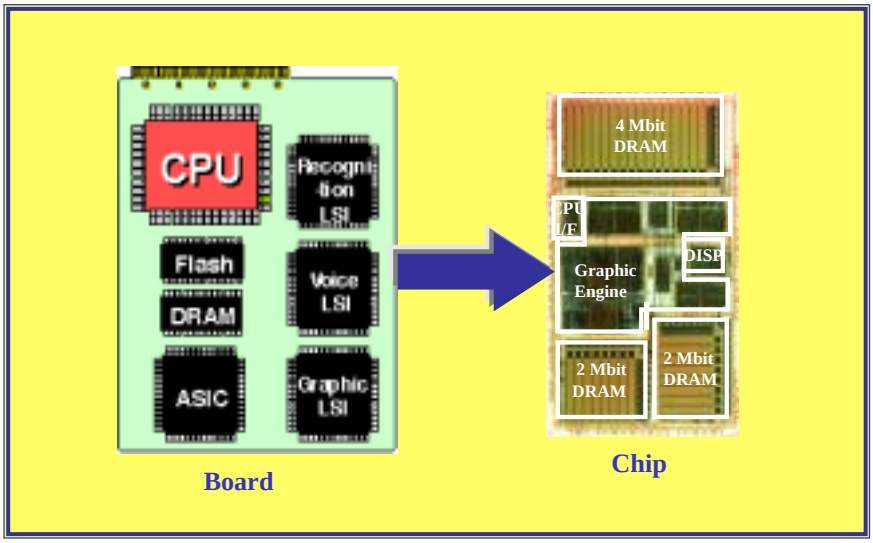
Updated Annually - Over 320 Companies Analysed



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Jan	**29th - IFS2008, Semiconductor Industry Briefing, London** Annual analysis & forecast of the European & WW semiconductor market
Mar	**10th - Silicon Chip Industry Training Seminar, London** Presented in layman's terms, this seminar provides a complete overview of the integrated circuit industry, its background, technology, manufacture & markets
May	**7th-9th - International Electronics 2008 Forum, Dubai, UAE** IEF2008 - 17th Annual International Electronics Industry Forum. An international forum to update market forecasts, develop new business opportunities, meet new contacts, share experiences, explore ideas, and refine strategic thinking
Jun	**19h - Silicon Chip Industry Training Seminar, London** Presented in layman's terms, this seminar provides a complete overview of the integrated circuit industry, its background, technology, manufacture & markets
Jul	**22nd – IFS - MT2008-Mid-Term Semiconductor Industry Briefing, London** Mid-year analysis & forecast of the European & WW semiconductor market
Sep	**8th - Silicon Chip Industry Training Seminar, London** Presented in layman's term, this seminar provides a complete overview of the integrated circuit industry, its background, technology, manufacture & markets
Oct	**8th-10h - International System & SoC Forum 2008, Venue TBA** IFF2008 - 6th Annual International System & SoC Forum. An international forum to discuss business issues within the international design & IP market, meet new contacts, share experiences, explore ideas and refine strategic thinking
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The Global Semiconductor Industry Analysts

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