

# FUTURE HORIZONS

Presents

## The Global Semiconductor Monthly Report May 2008

**Stop Agonising The Numbers ...  
Time For Bold Actions & Basics**

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# The Global Semiconductor Monthly Report

May 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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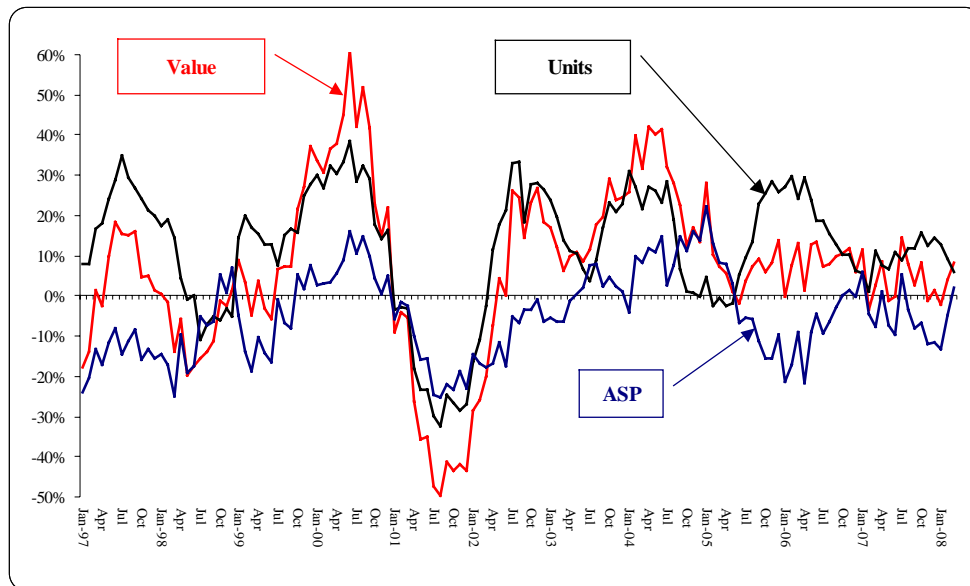
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**Executive Overview**

Figure E1 shows the 12/12 worldwide monthly growth rates for IC sales in dollars, units and ASP for January 1997 to March 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.

March’s sale figures romped home with a vengeance – reversing February’s lacklustre performance – with IC sales up 10.8 percent on February and 8.2 percent on the same time last year. More importantly, ASPs were up 13.3 percent on February and 2.1 percent on March 2007. Whilst the increase on February is merely part of the normal month 3 versus month 2 quarterly patterns, the increase over the same period last year is much more statistically – and structurally – significant. Finally the chip market is starting to hum. Now is NOT the time to cut back on the 2008 forecast.

**Figure E1 - 12/12 Worldwide IC Monthly Growth Rates**



	Total IC	Units	ASP	Value
Mar 2008 vs Mar 2007		6.0%	2.1%	8.2%
Mar 2008 vs Feb 2008		-2.2%	13.3%	10.8%

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

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Contrary to conventional wisdom, the sky is not yet falling in on the chip industry, despite the current rush to mark down the 2008 forecasts. We do not share the current industry pessimism and are convinced that the underlying industry trends are strong.

Granted February's IC unit growth was down 5.9 percent versus January, offset by a 4.2 percent growth in ASPs, with the net result a 1.9 percent value decline. This performance dramatically slowed the industry growth momentum and, were this to translate into an underlying trend, the net result would be to decimate 2008's growth.

Seasoned industry veterans however appreciate just how notoriously poor individual monthly numbers are at predicting underlying trends – especially in the notoriously poor seasonally weak first quarter. True to form, March's results saw monthly IC sales soar by 10.8 percent on a 5-week month adjusted basis, significantly reversing February's doom and gloom, driven by a 2.2 percent decline in units but a 13.3 percent increase in ASP. It also dramatically reversed the Cowan LRA momentum indicator, from February's minus 4.5 percent to March's plus 6.1 percent.

The net result was an overall quarterly value decline of 5.9 percent versus Q4-2007, driven by a 5.2 decline in units and a 0.7 percent decline in ASPs. The corresponding numbers for Q1-2007 were a quarterly decline of 6.9 percent in value driven by 0.8 percent decline in units and a 6.2 percent decline in ASPs. The key point here is, not the apparent slowing in IC unit demand but the significant slowing in ASP decline. The fact that ASPs were essentially flat on Q4 is a clear vindication of our belief that the IC ASP trend has finally stopped falling.

The first quarter sales decline was also much lower than our January IFS2008 estimate, industry consensus forecasts and the same period this time last year; three strong signals that things are perhaps not quite so bad after all. Back therefore to the industry basics: the economy, IC demand, capacity and IC ASP.

The global economy has clearly slowed dramatically from the past heady trends, but the current world outlook is still well in positive territory. Indeed, no economic forecaster is yet predicting a global world recession. The slowdown in the developed world economies is being offset by the continuing growth in the newly emerging regions, themselves now significant consumers of electronic products, as witnessed by where firms like Nokia and Intel are growing their revenues fastest. Unless the world really does slip into recession, the current economic trends are more than enough to support a strong semiconductor market.

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This in turn means a steady underlying semiconductor unit demand, with the actual number dictated by any near-term inventory and mix adjustment effects. Our current forecast for 2008 is a 10 percent annual growth in units, in line with the industry long-term industry average. This still looks to be reasonable and well within any forecast margin of error.

Over-capacity has been the industry Achilles' heel but here too the current trends are good, at least from a supply side perspective. Cap Ex is forecast to be down at least 10-20 percent in 2008 versus 2007, a trend that started mid-way last year. It takes a year for these cutbacks to filter through the supply chain but, given the continued steady demand for units, capacity utilisation rates are irreversibly condemned to increase in 2008 and 2009.

This is good news for the foundries and IDMs; it means prices will fall more slowly than the learning curve, which in turn will improve revenues per wafer start, help lift ASPs and drop straight to the bottom line. It will also be an 'interesting' shock to the demand side, where customers have become far too cosily complacent, accustomed to low processed wafer costs and inexhaustible supply. The overall impact on the chip industry will be a dramatically needed – and long overdue – boost to profitability, growth and morale.

Supply is already starting to become tight, with 300mm and sub-80nm utilisation rates over 95 percent in both Q4-2007 and Q1-2008, and foundry utilisation rates over 94 percent since Q3-2007. Given Q4 is the weakest quarter for capacity – it represents Q1's sales, the weakest quarter for unit demand – the fact these results were (a) high in absolute terms and (b) an increase over Q3's results (the strongest quarter for capacity, these being Q4's sales) capacity is already a problem waiting to happen. The (cheap and abundant) parallel with oil is uncannily similar.

It is the mainstream 200mm (160nm and above) market that reflects any remaining weakness, where utilisation rates are still in the mid-80 percent range. Given no one is investing here, natural demand growth will eventually resolve this issue too. In the meanwhile, given that these fabs are all virtually fully depreciated, they remain a good source of cash generation, with any margin improvement a significant upside potential. IDM's and foundries with a good balance of both will be dripping in profits once the capacity squeeze starts biting.

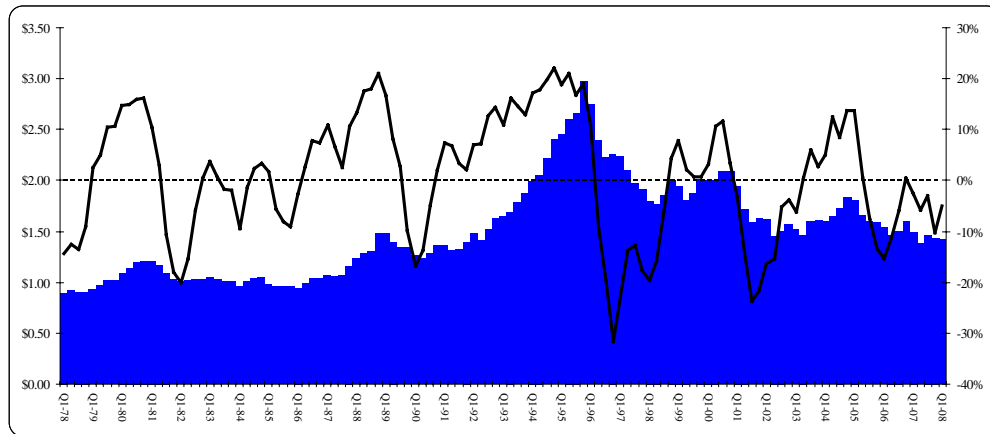
This leaves the final jigsaw piece – IC ASPs. These have been stubbornly refusing to recover since the 2005 crash, but even here the underlying trends are good, Figure E2. ASPs are a complex mix of issues, driven by price declines at an individual device level (the classic industry learning curve trend), new device introductions (selling at a higher device cost than the parts they supersede), supply

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and demand issues (as with any economic business model) interspersed with price wars, as with memories and MPUs in 2006 and 2007.

**Figure E2 - Quarterly Year-on-Year IC ASP Trends, 1987-2007**



Source: WSTS/Future Horizons

You cannot however keep on doing more for less (you eventually go bankrupt) and even the strongest competitor cannot sustain a price war forever, which means that an underlying (structural) ASP recovery is inevitable. The only uncertainty is not 'if' but 'when'. It is our belief that the 'when' has now started which, from a yearly growth rate perspective, will be very good news indeed.

With all of the four industry fundamentals in good shape, in a fair and rational world, the second half year will be breathtakingly strong, yet no-one – except us – seems willing to entertain the idea. Which means our Jan 2008 12 percent forecast scenario is still a strong possibility, Figure E3.

Interestingly, Q2 is now almost over from a production point of view (if the wafers are not already in well progress or the units in stock, they will not now be shippable in this quarter), yet no one is crying 'foul' or issuing sales shortfall guidance warnings and our recent straw poll of key industry vendors to a man indicates an already now strong second-half year backlog.

We said it in January, and we say it again now ... 2008 could easily be a re-run of 1999 and 2003 when world GDP growth was a remarkably similar 3.8 and 3.6 percent respectively. Interestingly no one (except us) believed it would happen then either ... plus ca change?

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**Figure E3 – Making the 12 Percent 2008 Growth Number**

F'Cast	Scenario A	Scenario B	Scenario C
Q1-08	-5.9%	-5.9%	-5.9%
Q2	2.0%	3.0%	3.5%
Q3	12.0%	14.0%	16.9%
Q4	4.0%	6.0%	6.7%
2007	217.810	217.810	217.810
2008	233.887	239.175	243.854
<b>YoY%</b>	<b>7.4%</b>	<b>9.8%</b>	<b>12.0%</b>

Scenario C						
Qtr	WW \$	WW Units	ASP	WW \$	WW Units	ASP
Q1-07	51.815	34.678	1.494	-6.9%	-0.8%	-6.2%
Q2	50.748	36.757	1.381	-2.1%	6.0%	-7.6%
Q3	58.135	39.740	1.463	14.6%	8.1%	6.0%
Q4	57.111	39.925	1.430	-1.8%	0.5%	-2.2%
<b>2007</b>	<b>217.810</b>	<b>151.100</b>	<b>1.441</b>	<b>4.0%</b>	<b>10.0%</b>	<b>-5.5%</b>
Q1-08	53.761	37.864	1.420	-5.9%	-5.2%	-0.7%
Q2	55.643	38.995	1.427	3.5%	3.0%	0.5%
Q3	65.046	44.257	1.470	16.9%	13.5%	3.0%
Q4	69.404	44.549	1.558	6.7%	0.7%	6.0%
<b>2008</b>	<b>243.854</b>	<b>165.666</b>	<b>1.472</b>	<b>12.0%</b>	<b>9.6%</b>	<b>2.1%</b>

Source: WSTS/Future Horizons

Bottom line though is that the world is neither fair nor semiconductors rational so the real question is: what could go wrong to derail the recovery? Clearly the most significant risk is that of a real global recession. Yet the economic resilience – even in hard-pressed regions like the US and UK – is remarkable and the steps being taken at the government and bank level to avoid recession unprecedented.

Without an economic collapse, it is now virtually impossible for inventory to kill the second-half year market, meaning unit demand should hold which in turn means nothing can now be done to trigger an excess capacity-driven collapse. Price wars can rear their ugly head any time, any place, but this too is unlikely given the red-ink splattered memory balance sheets. If the world were thus to crash into a global economic recession, whilst the chip market would collapse, it would do so from a position of relative structural strength not weakness.

Time therefore to get back to basics and stop agonising over the month-on-month or even year-on-year numbers. The chip industry has nowhere near run out of steam with the real challenge – as always – being how to deliver new world-class products to market. The lead-time here to deliver on this strategy is measured in years not weeks or months ... wavering CEOs and financial analysts please take note! Gordon Moore's remarks (see February's Report) are as true today as they were all those many years ago.

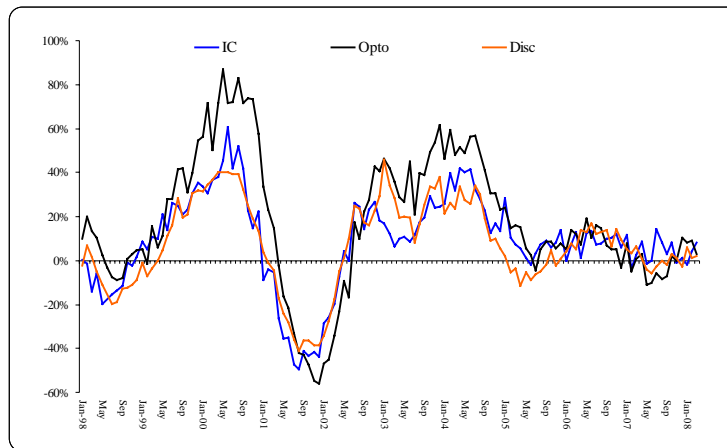
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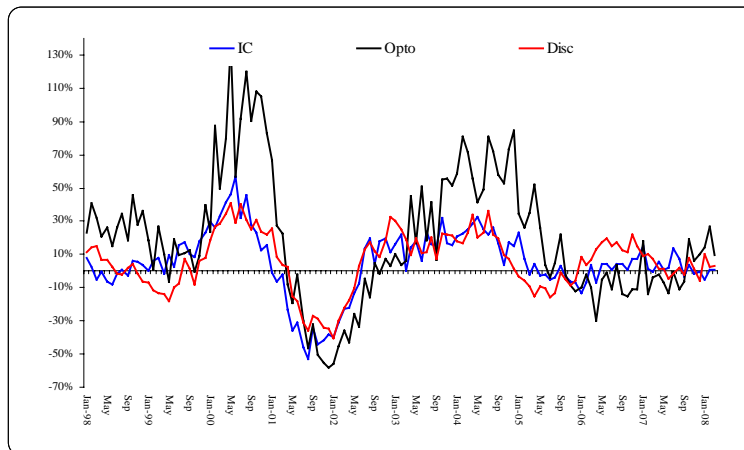
**Market Summary**

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**



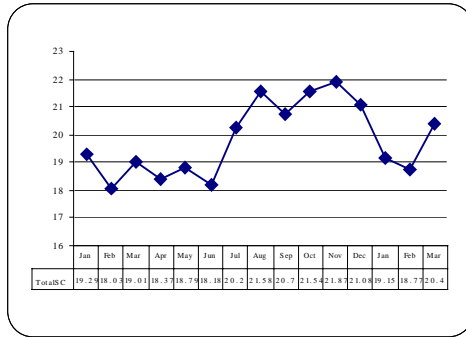
Source: WSTS/Future Horizons

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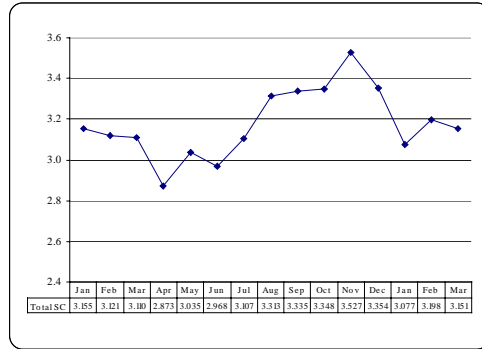
**Figure M3 - 12 Month Rolling Worldwide & Europe Sales By Product**  
(Billions Of US\$)

**M3a - Total WW Semiconductor**



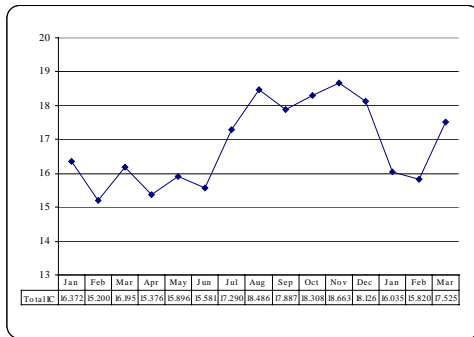
**Mar 2008 vs Mar 2007 7.3%**  
**Mar 2008 vs Feb 2008 8.7%**

**M3b - Total Europe Semiconductor**



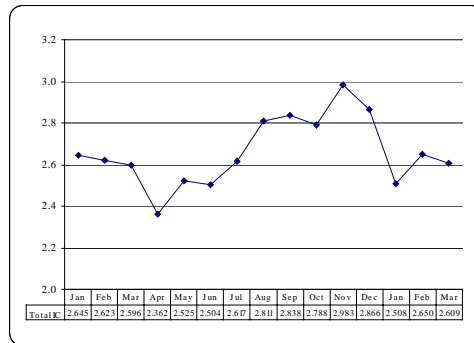
**Mar 2008 vs Mar 2007 1.3%**  
**Mar 2008 vs Feb 2008 -1.5%**

**M3c - Total WW IC**



**Mar 2008 vs Mar 2007 8.2%**  
**Mar 2008 vs Feb 2008 10.8%**

**M3d - Total Europe IC**



**Mar 2008 vs Mar 2007 0.5%**  
**Mar 2008 vs Feb 2008 -1.6%**

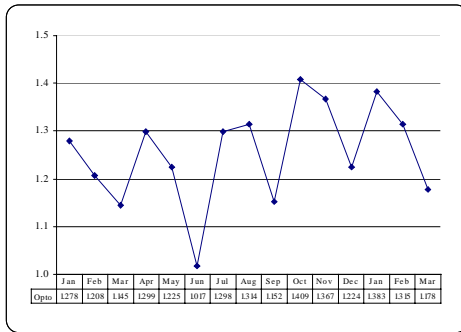
Source: WSTS/Future Horizons (Growth rates adjusted for 5-week months)

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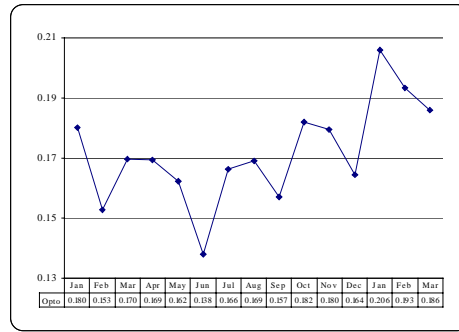
Figure M3 - 12 Month Rolling Worldwide & Europe Sales By Product (Cont)  
(Billions Of US\$)

M3e – Total WW Optoelectronics



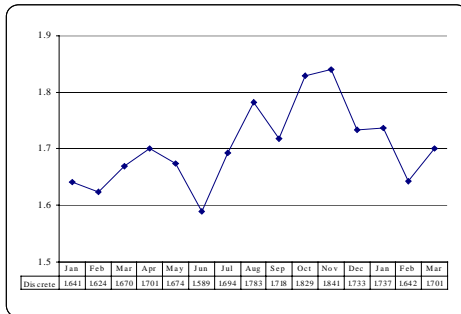
Mar 2008 vs Mar 2007      **2.9%**  
 Mar 2008 vs Feb 2008      **-10.4%**

M3f – Total Europe Optoelectronics



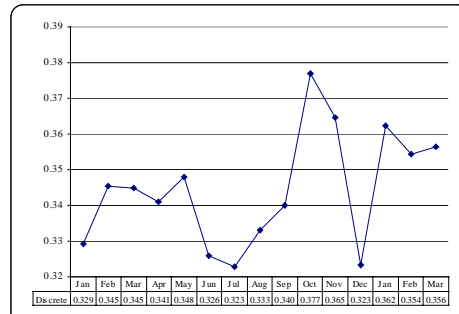
Mar 2008 vs Mar 2007      **9.6%**  
 Mar 2008 vs Feb 2008      **-3.8%**

M3g – Total WW Discretes



Mar 2008 vs Mar 2007      **1.9%**  
 Mar 2008 vs Feb 2008      **3.6%**

M3h – Total Europe Discretes



Mar 2008 vs Mar 2007      **3.3%**  
 Mar 2008 vs Feb 2008      **0.6%**

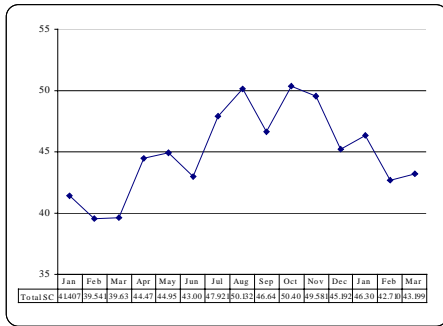
Source: WSTS/Future Horizons (Growth rates adjusted for 5-week months)

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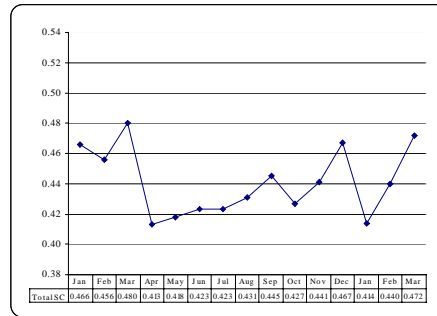
**Figure M4 - 12 Month Rolling Worldwide Unit Sales & ASPs By Product**  
(Units In Billions & ASP In US\$ Dollars)

**M4a – Total Semiconductor Units**



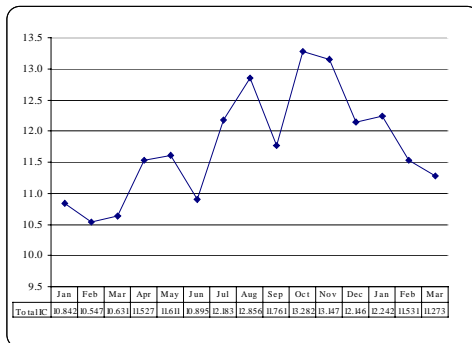
**Mar 2008 vs Mar 2007      9.0%**  
**Mar 2008 vs Feb 2008      1.1%**

**M4b – Total Semiconductor ASP**



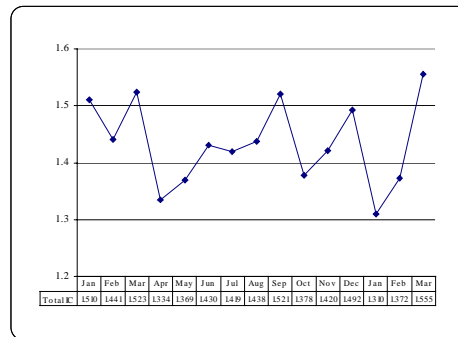
**Mar 2008 vs Mar 2007      -1.7%**  
**Mar 2008 vs Feb 2008      7.3%**

**M4c – Total IC Units**



**Mar 2008 vs Mar 2007      6.0%**  
**Mar 2008 vs Feb 2008      -2.2%**

**M4d – Total IC ASP**



**Mar 2008 vs Mar 2007      2.1%**  
**Mar 2008 vs Feb 2008      13.3%**

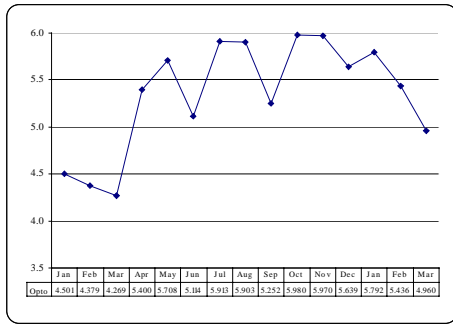
Source: WSTS/Future Horizons (Growth rates adjusted for 5-week months)

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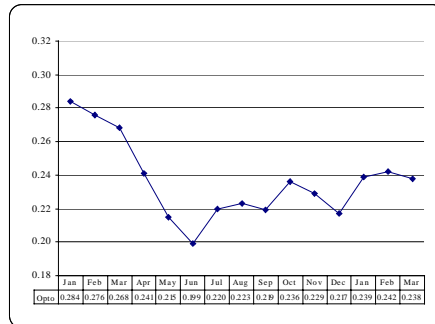
Figure M4 - 12 Month Rolling Worldwide Unit Sales & ASPs By Product (Cont)  
(Units In Billions & ASP In US\$ Dollars)

M4e - Total Optoelectronics Units



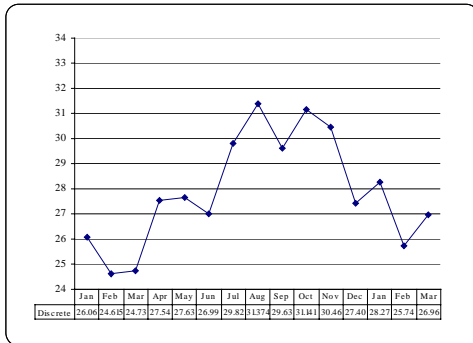
Mar 2008 vs Mar 2007 **16.2%**  
Mar 2008 vs Feb 2008 **-8.8%**

M4f - Total Optoelectronics ASP



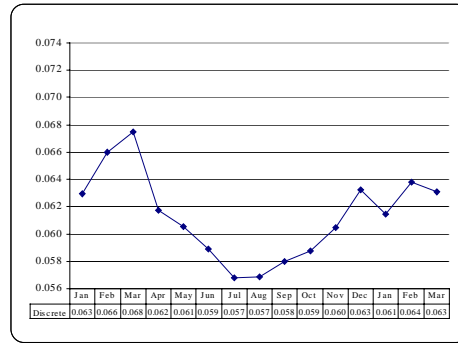
Mar 2008 vs Mar 2007 **-11.2%**  
Mar 2008 vs Feb 2008 **-1.7%**

M4g - Total Discretes Units



Mar 2008 vs Mar 2007 **9.0%**  
Mar 2008 vs Feb 2008 **4.8%**

M4h - Total Discretes ASP



Mar 2008 vs Mar 2007 **-6.6%**  
Mar 2008 vs Feb 2008 **-1.1%**

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

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#### 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 March's 2008 WSTS global semiconductor sales of \$25.505 billion, has produced global sales forecast estimates for 2Q08 through 2Q09 plus a forecast for April 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
Mar08 Est.	24.032	25.505	6.1%
Mar08 3MMA Est.	20.698	21.145	2.2%
Apr08 Est.	NA	19.027	NA
Apr08 3MMA Est.	NA	21.103	NA
1Q08 Act.	61.913	63.436	2.5%
2Q08 Est.	62.227	63.663	2.3%
<b>1H08 Est.</b>	<b>124.410</b>	<b>127.098</b>	<b>2.2%</b>
3Q08 Est.	67.756	69.336	2.3%
4Q08 Est.	69.253	70.883	2.4%
<b>2H08 Est.</b>	<b>137.009</b>	<b>140.219</b>	<b>2.3%</b>
<b>2008 Est.</b>	<b>261.149</b>	<b>267.318</b>	<b>2.4%</b>
1Q09 Est.	66.985	68.614	2.4%
2Q09 Est.	NA	67.858	NA

**Table L2 - Sequential & Annual Revenue Growth Rates**

Qtr - To - Qtr Period	Mar Est	Feb Est	Yr - To - Yr Period	Mar Est	Feb Est
	SRG (%)	SRG (%)		YoY (%)	YoY (%)
4Q07 Act => 1Q08 Act	-6.1%	-7.4%	1Q07 Act => 1Q08 Act	3.8%	1.4%
1Q08 Act => 2Q08 Est	0.4%	0.1%	2Q07 Act => 2Q08 Est	6.3%	3.9%
2Q08 Est => 3Q08 Est	8.9%	8.9%	1H07 Act => 1H08 Est	5.0%	2.6%
3Q08 Est => 4Q08 Est	2.2%	2.2%	3Q07 Act => 3Q08 Est	2.2%	-0.1%
4Q08 Est => 1Q09 Est	-3.2%	-3.3%	1Q-3Q07 Act => 1Q-3Q08 Est	4.0%	1.6%
1Q09 Est => 2Q09 Est	-1.1%	NA	4Q07 Act => 4Q08 Est	6.0%	3.6%
			2H07 Act => 2H08 Est	4.1%	1.7%
			<b>2007 Act =&gt; 2008 Est</b>	<b>4.6%</b>	<b>2.2%</b>
			1Q08 Act => 1Q09 Est	8.2%	8.2%
			2Q08 Est => 2Q09 Est	6.6%	NA

Source: WSTS/Cowan LRA/Future Horizons

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Figure L1 – Market Momentum Indicator

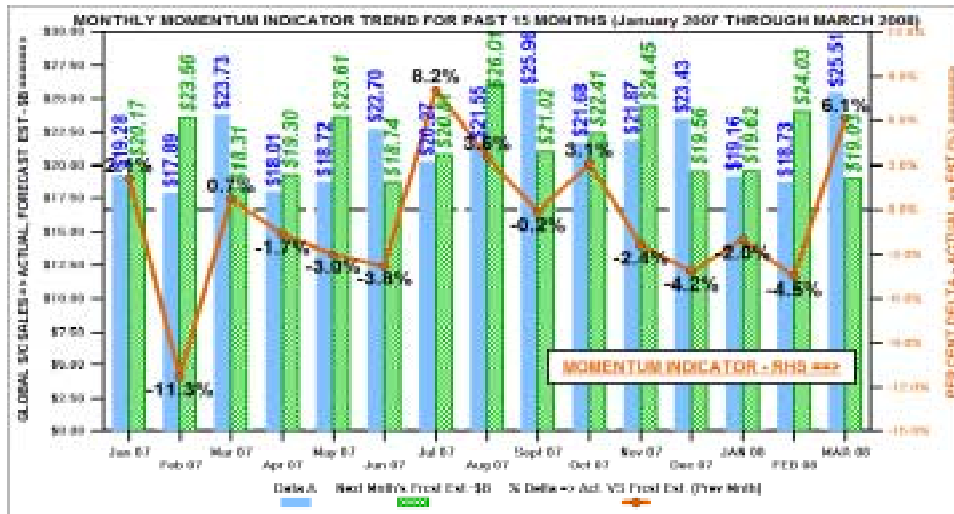
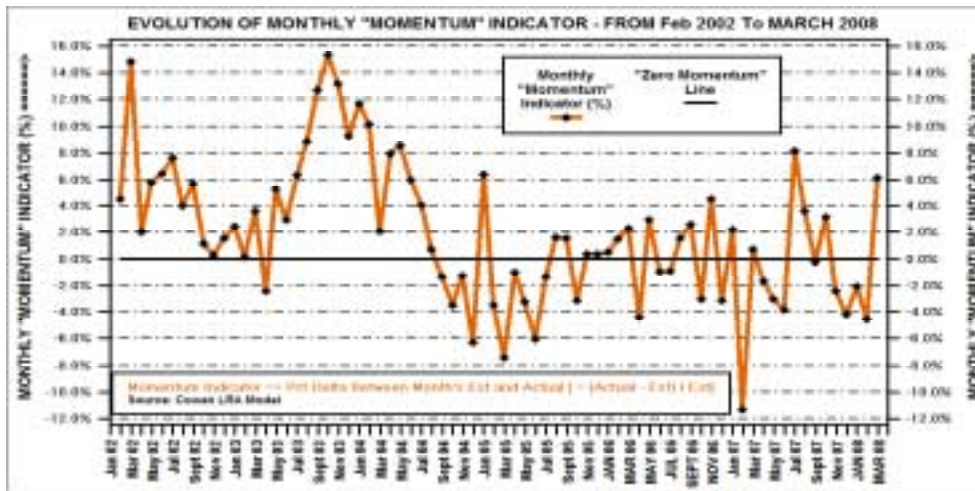


Figure L2 - Monthly Momentum Indicator, 2002-2008 YTD



Source: WSTS/Cowan LRA/Future Horizons

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As can be seen from Figure L1 above, the momentum indicator increased strongly from the previous month's momentum of minus 4.5 percent to plus 6.1 percent rocketing into positive territory and reversing a downward trend from July's peak of plus 8.2 percent.

Due to this month's positive momentum, all six of the updated global semiconductor sales forecast estimates were up or flat compared to last month's calculated forecast estimates, namely 1Q08 (up 1.3 points to minus 6.1 percent), 2Q08 (up 0.3 points to plus 0.4 percent), 3Q08 (no change at plus 8.9 percent), 4Q08 (no change at plus 2.2 percent), 2008 (up 2.4 points to plus 4.6 percent) and Q109 (up 0.1 points to minus 3.2 percent) - as shown in Table L2 above.

Next month's global semiconductor sales forecast estimate, namely for April 2008, is projected to be \$19.027 billion. This yields a April 2008 3MMA (three Month Moving Average) sales forecast estimate of \$21.103 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 4.6 percent, compared with last month's estimate of 2.2 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.

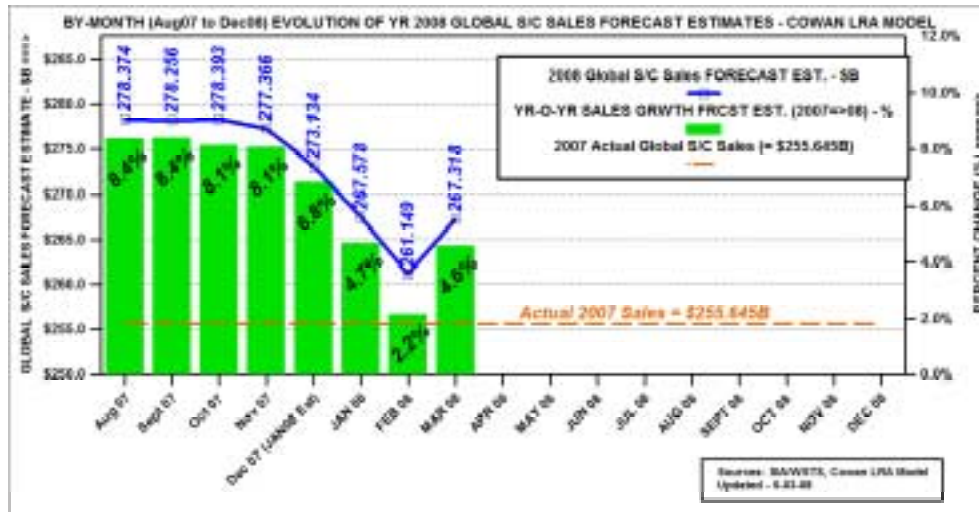
Finally, Figure L3 below shows the evolution of the past sales forecast estimates for 2008 over the previous seven months starting from the model's first prediction for 2008, namely with the August 2007 sales number which was released back in the beginning of October 2007.

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 - 2007 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 ( $y = mx + b$ ) 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: [mikedco@attglobal.net](mailto:mikedco@attglobal.net).*

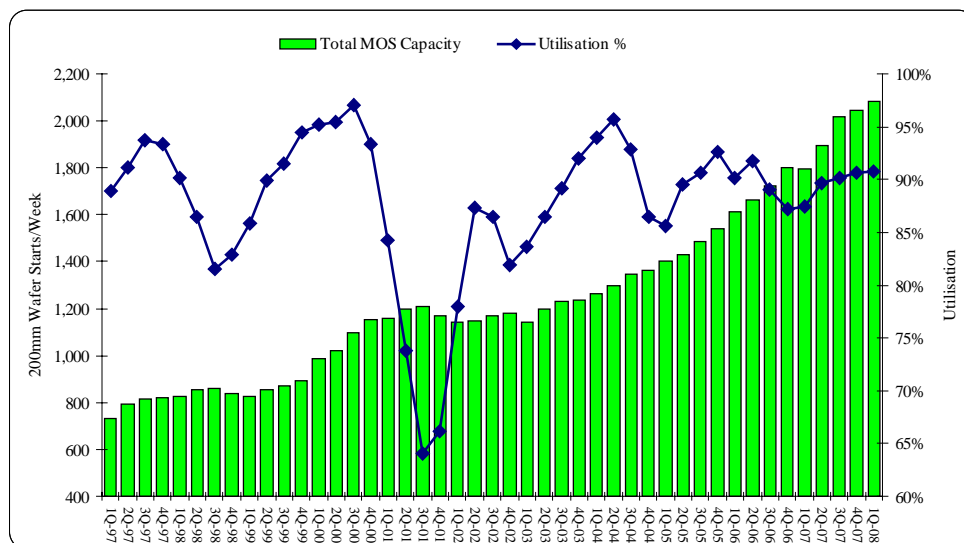
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#### Industry Capacity

Q1-08 total MOS IC capacity was up 16.0 percent versus Q1-07 and only 1.8 percent versus Q4-07. With all of the total year-on-year growth front-half loaded, the rate of capacity growth has all but ground to a halt. This is in direct response to the slowdown in Cap Ex that started in Q4-2006. It should be remembered that there is a 9 to 12-month delay between a cap ex spend and saleable units out, so Cap Ex in year 'n' drives capacity expansion in year 'n+1'. As such, Cap Ex is now growing much slower than the unit demand, and the impact is an eventual increase in the capacity utilisation rates, Figure C1.

**Figure C1 – MOS IC Capacity Utilisation Trends, 1997-To Date**  
(Percent Of Total)



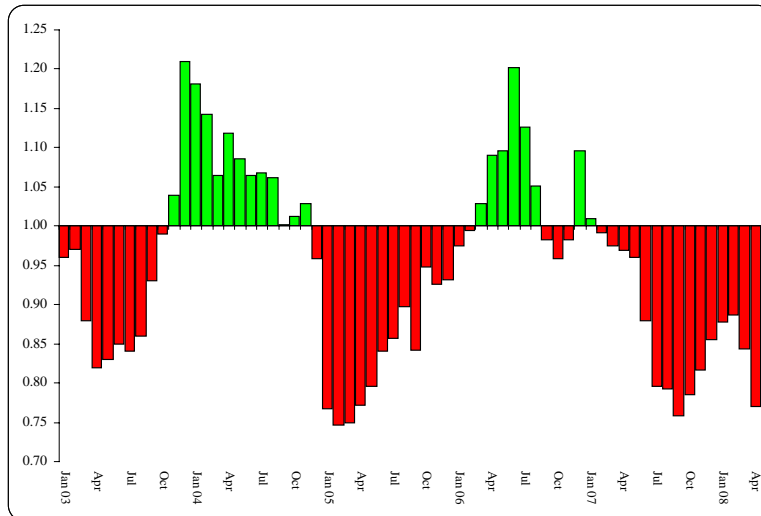
Source: SICAS/Future Horizons

The second half-year Cap Ex cutbacks meant 2007 investment was up only 5.7 percent versus 2006, despite a 10 percent growth in IC unit production, a trend that has continued into 2008, with 2008 forecast to be between 10 and 20 percent down on 2007. That would put 2006's spend on a par with 2004-05, despite an anticipated further 10 percent IC unit growth. The Front-End book-to-bill ratio, Figure C2, shows just how deep the cut back has been with the ratio recently worsening against an ever-lower sales number.

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**Figure C2 – Front-End Book-To-Bill Investment Trends, 2003-To Date**


Source: SEMI/Future Horizons

With the level of new orders now sizeably lower than sales for five successive quarters, net new capacity additions – which started to slow three quarters ago – will continue to grow at their current snail’s pace level, well beneath the growth rate for net IC production. Increased utilisation levels – already well over the all-important 90 percent threshold – will continue to rise.

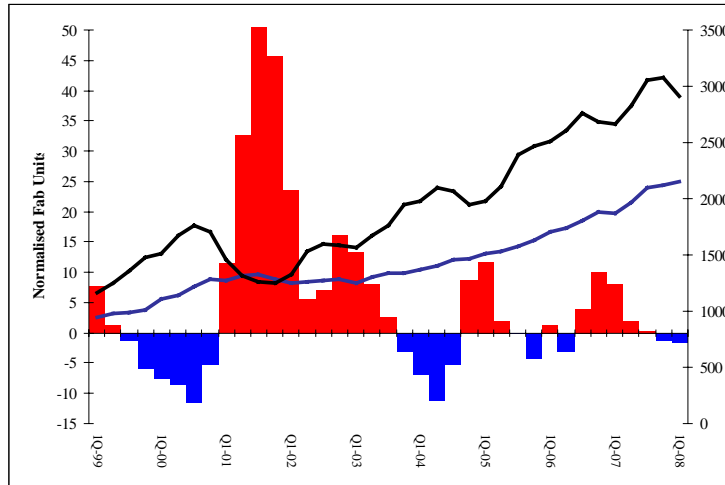
New capacity growth is bounded by the 10 percent long-term IC unit growth rate trend, which in turn limits the long-term Cap Ex growth rate trend to the same 10 percent per annum. Just as a 20 percent Cap Ex growth is dangerous, so too is a minus 10-20 percent level, especially following on from 2007’s ‘ideal’ 11 percent growth. Just when it looked like the fab Cap Ex swings were under control, the current underinvestment is going to trigger the next shortage. Never forget new fab capacity works to a minimum four-quarter lead time.

The current new capacity trends have already undershot the trend line, as shown by the negative excess fab indicator, based on 90 percent utilisation being normalised full capacity, Figure C3. Of course there are still options to squeeze out further production, claw back process time allocated to engineering, cut back the number of test wafers even further and minimise number of device variants in production and thereby reduce the down time caused by too frequent mask changes, but eventually these will all run out of steam with the A (for allocation) word then back in the industry lexicon.

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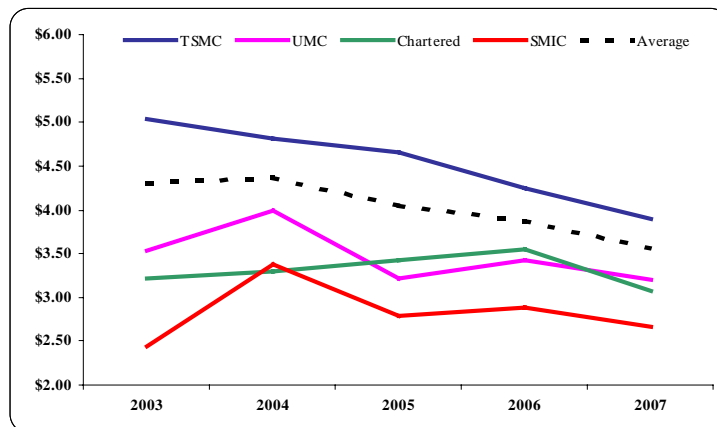
**Figure C3 – Supply-Demand Balance**  
(Equivalent 200mm Fabs)



Source: SEMI/WSTS/Future Horizons

With foundry revenues per wafer start still in decline, Figure C4, despite their being asked to take on more and more of the fab asset burden, how long before the foundries' attention also turns to what their IDM customers are doing – improve the shareholder's return on investment. Errr ... how long before foundry prices start to rise? Errr ... why are we the only ones asking this question?

**Figure C4 – Foundry Revenue Per Wafer Start**



Source: Company Reports/Future Horizons

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**World Economic Round Up****World Economy**

Dominating news this month has been rising food, oil and raw material prices. Surging commodity prices have pushed up global food prices 83 percent in the past three years putting huge stress on some of the world's poorest nations. A number of countries have seen rioting in response to rising food prices and others are dealing with food theft and corruption.

In contrast with an earlier report from the International Monetary Fund (IMF) that predicted subprime mortgage losses would reach US\$945 billion, the Organisation for Economic Co-operation and Development (OECD) have predicted a total of between US\$350 to US\$420 billion. The World Trade Organisation (WTO) reported that world trade growth declined sharply in 2007, rising by 5.5 percent in 2007 from 8.5 percent in 2006.

Industry experts point to the US response to their problems by cutting rates as complicating the issues of global inflation. The weakening US dollar is also pushing up prices of American imports and transmitting inflation to economies that link their currencies to the US dollar.

In early May, central banks in the US, Europe launched a fresh co-ordinated assault to ease strains in financial markets, and better news from the US on unemployment encouraged the risk appetite of investors.

**North America**

The US economy grew by 0.6 percent in the first three months of 2008, however, real final sales, excluding inventories, declined as investment fell and consumption slowed leading many experts to the opinion that the US is in a recession. News on unemployment is not as bad as feared with less severe layoffs than expected and lower compared with previous downturns, even though the labour force has grown.

There are significant job losses in the finance sector with 60,000 fewer people than a year ago. Further job losses are expected in a sector that had claimed a growing share of the US stock market, profits and the overall economy. Experts feel that finance has now peaked, at 27 percent of GDP in 2007, and will become a less important part of the economy.

At the end of April, the Federal Reserve (Fed) cut their main lending rate to 2 percent but indicated that there may be a pause in cuts next month. New proposals have been proposed to increase the powers of the Federal Reserve and it has been suggested that the Fed would be able to use the powers as a stability

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regulator by forcing institutions to change their investment strategy if it is judged that they threaten the wider economy.

**Europe**

The International Monetary Fund (IMF) broke ranks with other forecasters by taking a downbeat stance on Europe in its global forecasts, stating that although the region has relative strengths it is not immune to global economic threats. Their view is upheld by news that the strong euro and high oil prices are increasingly damaging manufacturing, which is slowing faster than expected.

At the same time, inflation remains high preventing the European Central Bank (ECB) cutting its main interest rates. Consumer prices rose by 3.6 percent in March from a year earlier but fell slightly in April to 3.3 percent. Generally, confidence in the region has fallen along with expectation of a deeper slowdown.

Divergence among the euro zones larger members is expected to widen sharply as the currency area's economy slows. Economic prospects in Italy and Spain have deteriorated sharply so far in 2008. The European Commission have expressed concern over France's rising budget deficit that they believe will reach the upper limit of the EU rules of 3 percent in 2009.

A concrete offer from Turkmenistan to increase supplies of gas to Europe will ease reliance on Russian Gas. Europe has received assurances that 10 billion cubic metres a year will be set aside for Europe in addition to possibilities in new fields to be tendered.

**UK**

Output price inflation from producers rose to a 17 year high in March with cost inflation reaching the highest levels on record. With the weaker pound and rising costs of imported materials the fear is that costs will be passed on to the consumer. However, consumer price inflation was lower than expected in March leaving the annual inflation figure unchanged at 2.5 percent.

The Bank of England's (BoE) minor cut in rates in April was regarded as insufficient to combat the economic slowdown but inflation fears appear to have been at the heart of the decision not to make any further cuts in May, keeping the bank rate at 5 percent. The BoE has predicted a recovery in confidence and risk appetite over the coming months.

House price growth remained relatively flat in March but fell in April amid fears that the downturn in the UK property market is gathering pace. At the same time,

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mortgage lenders have become even tougher by freezing out buyers with only small deposits. Lenders have removed 100 percent mortgages and above loan-to-value deals.

Gross domestic product growth was at its weakest in three years for the first quarter of 2008, as oil output dipped and the credit squeeze weighed on business services and construction.

**Japan**

The first task for the new governor of Japan's central bank, Masaaki Shirakawa, was to issue a report downgrading Japan's economy warning that the rise in energy and raw material prices is causing Japan's economy to lose momentum. Japanese steel and power companies are being forced to pay two to three times more for the coal they need to make their core products. The price hike means less profit and strengthens momentum for inflationary pressures on finished goods.

Japan's exports hit a record low in the year ended March 31<sup>st</sup>, highlighting the country's heavy reliance on external demand to maintain its growth. In March, exports to the US shrank for the seventh month in a row and over the fiscal year fell 3.1 percent, the first drop in four years.

Japanese banks are benefiting from the losses of US and European banks, expanding their lending business in the global market. Their conservative lending style adopted after their long struggle with bad loans in the 1990's has meant they have been able to post relatively narrow losses. Armed with huge assets from Japanese savers they are becoming powerful suppliers of loans to fund costly acquisitions and infrastructure projects around the world.

**China**

The value of the renminbi has continued to rise and hit an historic Rmb7 per dollar, underlining the currency's importance in curbing inflation. Coinciding with the landmark rise, the government announced revised GDP figures for 2007 to 11.9 percent although predictions for 2008 are lower. In the first three months of 2008, GDP growth was 10.6 percent partly due to weaker trade performance and the bad weather earlier in the year.

Inflation fell to 8.3 percent in March, down slightly from February, but producer prices accelerated to 8 percent increasing from 6.6 percent in February. The central bank raised the proportion of deposits that large commercial banks must keep with it by 0.5 percentage points to 16 percent - the 16<sup>th</sup> such increase since mid-2006.

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Rising costs for raw materials globally combined with government price controls are cutting into profit margins for many refiners and power producers. Growth in industrial companies last year was 37 percent but stocks have fallen sharply as this figure is expected to lessen.

The government has banned the construction of new soya bean crushing plants in a move designed to reduce overcapacity in the industry and check the growing market share of foreign companies in the food oil business.

**India**

As the global slump and rising inflation take their toll, it is becoming clear that India's rapid expansion over the past few years was due in part to benign conditions that boosted emerging markets everywhere. Industry experts feel that India needs to grow at 9 to 10 percent per year to wipe out the deficit of previous growth rates but predictions are that growth will be around 7 percent for this year.

The country's finance minister is considering banning exports in more industries to slow rising inflation. Higher food prices and rising consumption are fuelling inflation, which is running at over 7 percent per year. Twice during April, the central bank reduced liquidity in the banking system, raising the amount of capital banks must keep with the central bank aimed at reducing bank lending. Inflation is a major concern in India, where the poorest spend almost all their income on food and 46 percent of under-fives suffer from malnutrition. The central bank, as expected, left bank rates unchanged.

India's Tata group is moving to launch a full-service bank if restrictions are relaxed. Despite an 18 percent drop in the country's benchmark stock-market index this year, the finance minister still feels that India is a good place to invest in, with a return of 27 percent in the year to March 2008.

**Asia Pacific**

Widespread hoarding and corruption in many parts of Asia, affecting state subsidised rice for the poor, are exacerbating the problems from high prices of rice. Some economists believe that the wide margin between commercial prices and subsidised prices encourage corruption.

The sale of subsidised rice through public markets has been stopped in the Philippines and the president has organised distribution through the Roman Catholic Church instead. Causes for the recent higher prices include more demand in India and China, drought in Australia and pests in Vietnam.

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Thailand is the world's biggest rice exporter and has announced that it would like to form an OPEC-style rice cartel with four South East Asian neighbours - Laos, Vietnam, Cambodia and Burma.

Taiwan businesses are experiencing difficulties due to a rapid rise in the island's currency against the US dollar, with one company reporting a 68 per cent drop in net income partly due to foreign exchange losses.

Vietnam's economy is experiencing widespread financial distress with inflation hitting 21 percent year on year in April. It has been predicted that domestic credit will reach 95 percent of GDP by the end of 2008.

**Russia/CIS – Gazprom Gas Giant Grows**

Russia's energy sector has undergone a massive transformation since the days of Boris Yeltsin, from diverse and primarily private ownership by Russian 'oligarchs' to an increasingly state-controlled sector, fuelled by foreign investment. During his time as president, Vladimir Putin has overseen the steady strengthening of state control over industries deemed to be of strategic importance. One of these industries is the energy sector that brought in the sum of US\$600 billion in export earnings in the seven years to 2007. The concentration of Russia on this sector has the aim of gaining much needed finance but is also regarded as a geopolitical tool to wield power.

Gazprom is the largest producer of natural gas in the world and is actively seeking to expand its empire. The company is state-controlled with the government owning 51 percent of its shares. Six government ministers sit on its 11 member board which has been chaired since 2002 by future President, Dmitry Medvedev. The primary activity of Gazprom is selling natural gas in Europe at market rates to subsidise energy prices domestically although it is expanding into other energy areas.

Ex-communist countries such as Ukraine and Belarus have discovered that they are no longer part of the subsidised favouritism they used to enjoy for gas prices. This has resulted in several disputes with Gazprom. Ukraine, with its pro-western government has been hardest hit by the company's price hikes and in February yet another dispute threatened gas supplies to Europe. After two days of gas pressure reduced by 50 percent, Ukraine agreed to pay an outstanding debt of US\$600 million to Russia and, in return, could only slightly raise their transit charges.

Currently, Gazprom relies on Ukraine to ship about 80 percent of the gas it exports to Europe who need about 20 percent of its gas from Ukrainian pipelines.

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Two years ago, Gazprom halted shipments of natural gas to Ukraine in the middle of winter affecting many areas of Europe. At that time, critics called the shutoff politically motivated due to the Orange Revolution and a pro-western government being appointed in Ukraine. The February 2008 dispute came less than a month after Ukraine formally applied to be put on a path to NATO membership - something Russia is not happy about.

Belarus found that the price for their Russian gas doubled putting it in debt to the tune of US\$450 million for Russian natural gas. Following this, a Gazprom controlled bank offered to loan Belarus US\$500 million and many saw this as a first step to their aim of acquiring 50 percent of the Belarus pipeline network by 2010.

The company is seeking to acquire more energy businesses to add to its assets across Europe, while it is building or planning to build pipelines to the north in the Baltic Sea, running directly to Germany, and south in Turkey. Critics in the European Union feel that Gazprom is causing divisions in the Union by making deals with individual members such as Germany, Italy, Hungary and Bulgaria.

The cuts in gas supplies to Ukraine that affected the whole of Europe two years ago raised EU pressure to find alternative supplies of gas, prompting discussions on establishing a new route to Europe from Turkmenistan through Turkey. This set alarm bells ringing for Gazprom.

By consolidating its stake in companies such as E.On and BASF, Gazprom gains a voice in all the strategic investment issues and is better placed to thwart alternative routes. Whichever alternative countries the EU has approached in an effort to become more energy independent, Russia seems to be just one step ahead of the game and is either also having talks or making deals with the same countries.

Inside Russia, Gazprom is also expanding and is regarded by some as a real threat to competitive trade in energy by diversifying into other energy areas such as electricity production. For instance, when Russia's biggest wholesale electricity-generation company signed a big supply deal with Novatek, an independent gas producer, Gazprom refused to allow Novatek to pump the gas through its pipeline network until the power company agreed to buy gas from Gazprom at a much higher price.

In February 2008, Gazprom extended its business empire into electricity by acquiring control of a leading Russian coal company. The deal with Siberian Coal and Energy Company (SUEK), Russia's largest coal producer by volume will allow Gazprom to produce more coal and increase its use in electricity generating

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and home heating in Russia, freeing more gas for export. The abundance and low cost of natural gas in Russia have made Gazprom's export business profitable but have also encouraged wasteful domestic use.

Analysts are concerned about the structural risks associated with Gazprom's monopoly over supplies and increasing participation in electricity generation itself. The government has been promising liberalisation of electricity prices for some time – news which has attracted investors. However, some feel that the ease with which the Russian government is raising funds so far could delay the order to liberalise prices, as the order has not been made into a law yet.

One estimate is that Gazprom will soon control 45 percent of capacity in large fossil fuel companies and 33 percent of the entire fossil fuel generated market. By itself, that market share does not threaten competition but the recent deal with SUEK adds to those figures and with Gazprom's hold over gas supplies, it opens the possibility for the gas giant to knock out competitor generation companies just by cutting off supplies. The Federal Anti-Monopoly Service is pledged to ensure competition on the market but analysts wonder whether it will ever be powerful enough to rein in Gazprom.

The gas giant is growing but if it gains a controlling interest in European energy market and its own home market, the power it could wield will be far more worrisome than any missiles from the Cold War.

### Economic Case Study – Bursting The Credit Bubble

When financial turmoil hit financial centres around the world in August 2007, many were predicting it would be short lived and would primarily affect the US. That was before it was realised just how extensive the rot of risky investment had penetrated established and respected financial institutions. The run on a bank in the UK (not seen since Victorian times), the collapse of Bear Stearns and central banks cutting interest rates and pumping billions into financial markets are just a few remarkable outcomes of the collapse of the credit bubble.

All forecasts are for a global slowdown while financial markets readjust and lick their wounds from billions of dollars worth of write downs due to subprime mortgage based investments (*see 'Banking Blues', November 2007*). The International Monetary Fund has predicted a cost of US\$990 billion to the global economy.

One of the biggest problems has been the lack of transparency of the collateralised debt obligations at the heart of the subprime mortgage market, which has led

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banks to be wary of lending to one another. Also, many banks are trying to rebuild their own capital buffers as they discover the limits of their own exposure to risky investments. Interbank lending rates have soared and central banks have tried a number of measures to release the blockage.

One such measure, taken by the US Federal Reserve, was copied by the Bank of England in April. The largest ever cash injection, of £50 billion (US\$99 billion), from the BoE allowed banks to swap mortgage-backed securities for taxpayer-backed loans. The aim of the move will encourage banks to resume lending to each other, thus easing the mortgage market and stopping the housing market from slipping further.

American property prices are falling by about 10 percent annually and the slump is expected to accelerate throughout 2008. Recently experts have predicted that Britain is particularly vulnerable to a similar housing market decline with UK house prices around 30% higher than they should be. An estimated 2.5 million home owners are expected to come off cheap fixed-rate deals in the next 18 months and face rate increases of 1 to 2 percent. With the rising cost of living, rising tax bills and slower increases in income repossessions are expected to almost double in 2008 to around 60,000. Elsewhere in Europe individual countries, such as Spain, are also facing a slump in house prices.

Analysts state that the financial crisis is still largely contained in the US and some parts of Western Europe with little or no direct impact in countries such as China, India and other Asian economies. The financial troubles are most likely to hit countries with high borrowing and those with current account surpluses, well-capitalised banking systems and commodity exports should continue to perform well.

The continued strength of economies such as China and India are likely to generate a significant degree of 'reverse coupling' limiting the degree of the US slowdown. However, with house prices falling in the US - and slowing or stagnant in other leading economies - and a reduction in US-based assets due to the falling dollar, the chances are growing that weaker consumer spending and investment will exacerbate a global fall in wealth.

Until financial institutions have managed to identify and cleanse their systems of their risky investments a clearer picture of the global economical future will remain uncertain. When that is done it will be possible to see whether two interlinked downward spirals are happening.

The first is a negative feedback loop between the financial markets and the real economy. In this case, tighter liquidity conditions, lower asset values, impaired

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capital resources, reduced credit supply and slower overall demand feed back on each other. If banks transmit their problems onto borrowers with higher interest rates, that will increase delinquency rates and put further strain on the banks.

In an effort to prevent this happening the Royal Bank of Scotland unveiled emergency plans to repair the damage the credit crisis has wrought on its balance sheet by raising £12 billion (US\$23.7 billion) from shareholders and £4 billion (US\$7.9 billion) by selling assets. The move will allow RBS to rebuild its capital reserves that have been stretched by its bid for ABN Amro in 2007 and the financial turmoil. Some experts believe that this will be followed by other banks that will revert the cost of putting their books straight onto shareholders. The second downward spiral which could happen is that consumer spending drops and savings increase, leading to falling prices that raise the burden of debt and induce households to save more and spend less. There is scant evidence to date of either of these conditions taking hold.

Surveys of credit conditions in the Eurozone, the US and the UK all show banks are restricting credit to households and intend to tighten credit further, but bank lending is yet to fall significantly. Creditworthy companies' borrowing costs have not risen much, nor has the cost of mortgages. The cost of borrowing has risen but is not yet prohibitively expensive. A third force that can affect advanced economies is rising inflation, driven by high oil, food and commodity prices. Price pressures limit the scope for central bankers to keep on injecting money into the system for fear of creating an inflation problem, with consumers seeking higher wages.

Several analysts have predicted a further US\$200 billion in subprime losses over the next few months. This would cut bank capital by 12 percent and a possible reduction in lending, due to leverage, would total US\$2300 billion. However, banks may manage to rebuild capital with fresh equity injections from a variety of sources, including sovereign wealth funds. Alternatively, they may reduce exposure to financial borrowers first with lending constraints being applied in the financial world. At this stage it is impossible to predict how long and how deeply the global economy will be affected by the financial crisis and how much of it will spread into the 'real' economy.

### Market Trends –IEF2008 Keynote Presentations

The following extracts précis the IEF2008 keynote presentations, as presented at Future Horizons' 17<sup>th</sup> Annual International Electronics Forum in Dubai, UAE, in programme order.

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**“Present and Future Digital Technology” - JJ Yamaguchi, Executive VP, NEC Electronics Corporation**

**JJ Yamaguchi** kept to his long-term vision of further consolidation of consumer products towards the aim of ubiquitous computing ... the product that can be accessed at any time, in any place and gives access to everyone, in particular, the billions of customers in Asia.

Yamaguchi illustrated this by using the 3G and forthcoming 4G mobile phones that can be used for web browsing, online games, video and music, and for the electronic payment of goods. This brings the fusion of applications into one handheld unit and key to this is a continuous redesign of ICs to reduce size and power consumption. Other illustrations were some consolidation in the TV/STB/Games Console/DVD/Internet applications into one unit.

The PC is now seen as a commodity as prices fell over the past seven years leading soon towards the \$200 PC and then its expansion of use in emerging nations. The automotive market will be good for semiconductors with electric/hybrid/ clean diesel car development driven by emission standards and the growing trends towards low-priced products for the emerging world. NEC sees the car as a ‘cockpit of wireless and computing services’.

Growing wealth and population is also driving the medical and industrial sectors. In all sectors, Yamaguchi concluded our challenge is power and cost. Cost depends heavily on design and development and to reduce this we have to create common platforms, get better design tools and collaborate more.



**“Mobile Device Technical Challenges” - Petri Liuha, Laboratory Director, Nokia Research Centre**

**Petri Liuha** outlined that over the past twenty-five years the mobile phone industry has done very well in reducing the mobile phone size to the pocket versions today. To do this it has needed a continuous redesign of ICs to reduce power and size. Over this period the phone had changed function - originally it was a voice telephone, then a text platform and now a multi-media computer, with mobile Internet being the key driving force.

Over the same period mobile phones were originally ‘access dominated’, where the radio chipsets were the key items. Now the ‘applications processor’ dominates and in the near future the mobile will be driven by the need to process and display content. The mobile phone is entering a period of gaining intelligence

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and it will do this by the addition of sensors that will read the environment. It will move from just knowing its position, via GPS, to reading/using character recognition and then to image sensing. This will need a ten-fold increase in computing power using additional specialist microprocessors.

Petri then went on to look at the challenges ahead and his immediate thought was the use of multiple antennae. He was pleased to see 4G would have so many technologies and standards that it would be difficult for one firm to dominate the IP.



**“The Other Barrier In Electronics: Applications”  
- Kees van der Klauw, Senior VP Technology &  
Development, Philips Consumer Lifestyle**

**Kees van der Klauw** explained that Moore’s Law stretched over many generations of process, but now this part of the IC business is in the hands of the foundries. Foundries are in control of the assets and raise the asset value by huge investment. Large-scale production encourages high-volume throughput and further commoditisation. The remaining IC companies are now ‘asset light’ and operate in a consumer environment with shortening product life cycles.

The commoditisation of many products holds down the price that can be achieved for the IC. The new IC company needs to look for some form of differentiation and customer leverage. To look for enabling ‘value creation’ Kees used an LCD industry example. In 2005 LCD cell and module assembly was separate and were then both commodities. In 2009 LCD cell production will still be separate, but the drivers/backlighting and the TV set assembly will be co-located and this will allow differentiation and value creation.

Similarly with TV chips. These are at present separate commodity chips, which will then become a TV SoC plus a display processor - then eventually a single chip. Differentiation will come in chip architecture and software.

Kees accepted that software complexity also followed a Moore’s Law of its own. Software, in itself, is often limited by manpower and validation time. To overcome this companies use outsourcing and re-use IP however to pass this complexity barrier more open architectures are need by industry.



**“Electrification: A Chance For Automotive Electronics” - Valentin von Tils, VP Advanced Development ASICs, Robert Bosch**

**Valentin von Tils** presented some impressive predictions about the global automotive market. Firstly, vehicle sales will reach 70M units in 2008 and will

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rise to 80M units by 2020. Electronics will play a greater growth and automotive system growth will grow from US\$53B to US\$89B over the same period.

Semiconductors will be 44 percent of the system 2008, and will grow to 67 percent by 2020. This gives us automotive semiconductor sales of US\$23B in 2008 rising to US\$60B in 2020. In terms of semiconductors per car it is US\$332 in 2008 rising to US\$735 in 2020. Over the long term the automotive sector has been a driving force of semiconductor industry with a growth 10.1 percent during 1996-2006 versus 6.5 percent for total semiconductors. In comparison the growth for Europe is bigger because automotive plays a greater force in the market.

The greatest driving force for semiconductors in the sector is legislation, which impacts within five years of an announcement of a standard. Other influences such as safety, fashion and entertainment trends can take up to 15 years for decisions to work down to the average car. This is one of the many reasons that semiconductor product life cycles can be between 10-25 years and it is only via industry long-term stability that the payback is delivered.

Valentin stated that reducing Carbon Dioxide (CO<sub>2</sub>) emission has a major impact on future design. CO<sub>2</sub> reduction also reduces fuel consumption as well. Some of the incremental improvements to be introduced will have a payback period in less than one year. An example of a CO<sub>2</sub> reduction improvement is the 'stop-start' system that can save eight percent of fuel in the city.

Looking forward to the technical challenges for automotive Ics, the great gains will be made if silicon could be placed close to actuators. To do this junction temperatures have to be raised from 150°C to 210°C. Other electronics improvements will come if architecture moves to platforms and Valentin would like to see the industry 'zero defect' philosophy also to apply to software.



**“Open Communications Solutions” - Thomas Wiemers, VP Strategic Marketing, Siemens Enterprise Communications**

**Thomas Wiemers** opened by stating that telecommunications had been bringing people together on a global scale since before 1847 when at the time the UK was connected to Calcutta by telephone. The big explosion is that is occurring today is different in that it is driven by social and employee networks and video/IP - enhancing this by 'personalising' data and searches.

Companies that do not harness the power of communications dramatically fall back in company value. Company communications must include fixed wired networks, fixed wireless networks, and mobile networks. To optimise the

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efficiency of use of the multitude of communications, the employee must have contact on the move, at work, and in the office - all in one device.

Thomas believes that the immediate big challenge is one of security. Identity fraud is a big issue and this fraud sees no geographical or economic boundaries. Already today identities can be purchased on-line for a few dollars so a new way of securing data needs to be found and implemented. Looking further ahead to build future systems, more open standards are required and this will encourage partnerships and cooperation.



**“Mobile Innovation: Improving Customer Quality Of Life” - Luigi Licciardi, Executive VP Domestic Mobile Services, Telecom Italia**

**Luigi Licciardi** believes that in the mobile era the customer must be the focus of innovation. Today, a mobile device must recognise a user socialising need via the web, provide time management capability plus entertainment and driving assistance. It must also deliver health assistance, personal sport training, home monitoring and energy saving and be an e-ticket and an electronic credit card banking device. In addition it must still have style and be equally useable by the elderly and young.

To meet these needs it must seamlessly utilise 4G, WiMAX, ZigBee, DVB-H, LTE, connect to femtocells where needed and incorporate ADSL and Wireless LAN. To meet all these market sectors, the phone can possibly utilise a ‘jacket’ to modify a basic handset for specific use. The Apple iPhone is part of this industry learning curve and low-power semiconductors have a key roll in this development.



**“India: The Global Hub For Semiconductors & Electronics” - S Janakiraman, Chairman, India Semiconductor Association**

**S Janakiraman’s** India will be the most populous country in 2050 and will be the world’s third largest economy with a growing middle class. In the next few years there will be huge growth in mobile subscribers, IT services, automotive purchases, computer and printer hardware. To meet this growth in demand major end-system products are needed, such as mobile handsets, wired and microwave telecom systems, desktop and notebook PCs, low-cost automotives, and TVs and TV set-top boxes.

These products will not necessarily be imported as India has major EMS and OEM plants including Nokia. In the longer term many products will be developed within India, as India is good for SoC design and embedded software. Even with

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strong inward design investment over 30 percent of this work is being sub-contracted to Indian firms.

Western and Eastern companies will establish themselves in our country as India is democratic and already has good legal/IP protection laws. To fuel this growth the Indian government has set up Special Economic Zones (SEZ) to provide incentives and tax breaks.



**“Automotive Electronics & New Technology Trends In Automotive Industry” - V G Gujrathi, Senior GM Electronics, Tata Motors**

**VG Gujrathi** introduced the 130-year old Tata company which had now reached US\$50B in turnover. It is a wide conglomerate whose business covers automotive, chemicals, metals, energy, IT, publishing, consumer products and financial services. Tata has over 3,000 scientists and engineers.

Tata is India’s largest automotive company and the world’s fifth largest commercial vehicle company. The company is most recently famous for the Tata Nano - a car designed to be sold at US\$2,500 to emerging countries - 100 percent Indian designed. As well as controls for low-cost cars, Tata has to design electronics to meet standards in all global markets including those needing in-car networks and telematics/GPS for fleet vehicles.

Cars for emerging markets still need fuel efficiency and there is also a need to run cars on bio diesel and non-conventional energy resources. As well as standard automotive electronics development, Tata is also involved with the government plans to have bus scheduling and fare collection systems and is involved in electronic systems in this market.



**“Applying Nanomanufacturing Technologies Beyond The IC” - Mark Pinto, Senior VP & CTO, Applied Materials**

**Mark Pinto** believes that reducing cost per function drives IC market growth and that cost per function has two components; process cost per area and good die per area. Scaling has been primary cost reduction method between process generations where process costs have kept relatively flat.

Mark insisted that his first example was not chosen because of the doldrums the IC industry is in at present. He used an example from LCD industry illustrating that as the cost per area had decreased over the number of years the industry had sold a 20 percent bigger TV for the same price every year.

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Although at a different scale, similar cost reductions are expected with nanotechnology once it becomes repeatable, robust, reliable and controllable. An early application of nanotechnology is coated windows glass. It saves energy with a payback in three years. Applied Materials is selling equipment into the large-area solar cell market as well as LCDs.

Photovoltaic solar energy is a strong opportunity for rewards from innovation. Cost per watt from conventional carbon power stations and solar-power arrays are coming closer as we move down the learning curve. Parity will be hit before the end of 2010 and GigaWatt fabs will be built by then. Equipment is being delivered for photovoltaic panels of large size and production scale savings will occur through material improvement and better yields.

Other nanotechnology opportunities are in fuel cells, solid-state lighting and energy storage. In semiconductors, nanotubes will be seen in memories first.



**“Developments In Optoelectronics Driving Innovations In Electronics” - Waguih Ishak, Divisional VP & Director, Corning**

**Waguih Ishak** forecast that in the near future there would be major changes on our planet in terms of a great demand for health and elder care, growth of demand from emerging nations and, in these nations, a growth of middle class wealth. Other changes will be energy supply issues and a change in the way we work with an increase in working from home or local office/travelling.

He sees three market sectors driven by what people want, namely good health and education, good simple communications and good personalised entertainment, to be met by a convergence of nanotechnology, biotechnology, IT and cognitive sciences.

In solar energy field there are over 100 start-ups in Silicon Valley alone. On the medical horizon there are new product areas such as rapid healthcare and remote health diagnostics, low-cost over the counter diagnostic equipment and ‘on-a-chip’ smart diagnostics (Stanford University). On the communications horizon there are Video On Demand (Via IPTV) STBs, content on-demand (via YouTube), iTunes, Slingbox, mobile TV and improved content service providers (Google etc).

By 2010 we will use 1 terabit/sec optical links, infinite, bi-directional and free. For this era, terabyte storage is required. Nanotechnology will improve ‘bendable’ fibre and optical waveguides will connect chips. Equally importantly, there will be improvements in the machine-human interface, such as; solid-state backlighting, improved displays, improved software for customer satisfaction

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(iPhone), personal projectors, flexible displays and disposable products brought about by the ink printing of semiconductors.

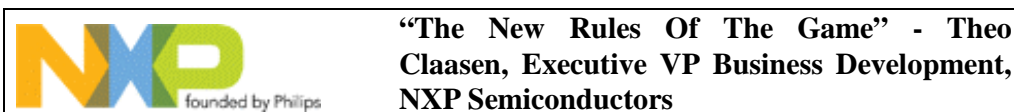


**Luc van den Hove** believes that the workhorse silicon process technology of the next few years will be 32nm, but some early entrants will move to 22nm. There are three lithography options for scaling to 22nm, namely ARF lens immersed, ARF lens immersed with 2x patterning (favoured by early entrants) and EUV light (an option in 2012).

NAND flash memory leads over DRAM and logic by pushing the feature size requirements to doubling the density every year. Logic needs a much more relaxed pitch and is not so demanding in comparison. Current process challenges are high-K Materials, further development of FINFETS, tunnel FETs, use of Ge and III-V materials, nanowires, graphene and the integration of sensors and batteries.

Chip assembly is also being looked enthusiastically with the use of 3-D stacking chips to increase performance, density. This methodology also resolves interconnect issues, allows the building of systems of multi-technologies and gives products a sleek form factor particularly if the assembly can include the battery.

IMEC is a university/independent R&D laboratory that is led by industrial partners. Partners include foundries, fabless, fab-lite, the IDM companies and equipment suppliers. IMEC aims to be the R&D laboratory for the industry.



**Theo Claasen** opened by characterising the semiconductor market. He saw it as an industry with a revenue of US\$256B, three companies with sales over US\$10B, more than ten with sales over US\$5B, more than 35 with sales of over US\$1B and 150 with sales below half a billion dollars. Therefore the semiconductor industry has too many suppliers (50 should be just right) in a market with a crazy volatility of +50 to -50 percent growth variations.

Looking at semiconductor costs. a wafer fab for 65nm and 800k wafers/year will cost US\$5B to build and equip. Therefore most suppliers now subcontract to a wafer foundry. Assembly now needs fine-pitch packaging, or multichip modules. Therefore most companies need to subcontract to back-end foundry. R&D for

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system library and IP Blocks need US\$1B per silicon process node. Therefore companies are beginning to cooperate in R&D partnerships. Theo pointed out other semiconductor trends - the sale of IC Divisions by OEM system companies. The spin out specialist divisions (e.g. memories, analogue) and the integration of large SoC companies with fabless (ST bought Genesis).

Looking forward for a strategy for profitable growth Theo sees a strong correlation between market leader and profit, and recommends that company scale matters with the need to be No.1 or No.2 in each market segment. CMOS process and standard IP no longer differentiates and system knowledge is now the main differentiator.

As an example of changes in NXP Semiconductor operations the company has a blend of businesses - mature, growing and emerging. It has divided R&D 35/55/10 percent as above and then pursued disposal and acquisitions tactics to create leadership positions, as with the recent mobile division merger with ST. The remaining NXP divisions are Home, Automotive, Identification and Multi-market.

Looking slightly further forward at industry needs Theo comes up that a more practical Wi-Fi is needed., which may come from UltraWideBand over a USB connection. Theo uses only 10 percent of a consumer systems technical capability so human interfaces still have to be improved further!

***The full Forum Proceedings are available for immediate delivery (binder plus CD-ROM), priced at £370 (€590 / US\$790) including postage. Please contact: [http://www.futurehorizons.com/new\\_web/proceeds/proc-ief/proc-ief.htm](http://www.futurehorizons.com/new_web/proceeds/proc-ief/proc-ief.htm).***

***Next year's IEF2009 Forum will take place from May 6-8, 2009. Mark your calendar NOW and visit our website for details at: [http://www.futurehorizons.com/new\\_web/forums/ieforum/ieforum.htm](http://www.futurehorizons.com/new_web/forums/ieforum/ieforum.htm).***

## **Semiconductor Spotlight – IP Reuse Takes Centre Stage**

When it comes to SoC design, nothing is more important in enabling productivity, reducing risk, and simplifying verification than the use of standardised, pre-engineered, proven IP blocks and subsystems. Unfortunately, with IP coming from a wide variety of sources – many of which are highly competitive and proprietary – the idea of standardisation has so far fallen on deaf ears.

The recent demise of the well-conceived VSI Alliance (VSIA), whilst it did make provisions for its existing standards to be taken over and consolidated by other

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industry organizations, has only served to demonstrate the underlying strength of the embedded resistance.

In order for IP to be realistically used and re-used, it needs to be compatible with a variety of design tools and design flows from all the major EDA vendors, thereby enabling complex IP from disparate sources to be easily incorporated into a wide variety of SoC designs and design tool flows. In the past, that meant either giving away far too much proprietary detail to competitors or giving up the ability to differentiate the IP. Maybe, just maybe, things are finally about to change with the first signs that some common standards are starting to gain traction, for example the SPIRIT Consortium IP-XACT.

The key to IP-XACT's success is its generator-centric architecture that enables tool vendors to optimise the information needed by their particular applications without re-architecting their tools to support a new standard natively. The Consortium's founding companies realized that they would never be likely to share the level of proprietary data needed to make their tools support common native data models, and they did not like the idea of giving up the flexibility to add differentiating capabilities that might affect their data model itself.

By adopting a meta-data/generator approach, they built a competitive firewall through which their IP could pass but their proprietary tool technologies could not. Recently, The SPIRIT Consortium released version 1.4 of their specification, which includes additional capability to support transaction-level modelling.

IP-XACT is centred on an XML meta-data description called a "component." It contains a structural description, the interfaces, and references to all of the IP views. To create a nested hierarchy, components are collected into a "design," the design is configured via a configuration object, and that design itself can then be instantiated or referenced as a component.

Interconnects are specified by bus definitions. Bus definitions contain wire-level and bundle-level specifications that determine what components can be interconnected. Bus definitions include classifications like master, slave, system-level, and monitor, and bus definitions can be derived from other bus definitions. Commonality in bus definitions determines whether and how two components are legal to interconnect.

In the 1.4 release abstraction definitions were added to facilitate ESL or transaction-level design. Transactional interfaces support function calls across the interface. An abstractor in each object handles the mapping between wire models and function call models to allow mixing of objects at various levels of abstraction in a single design. All these models can be assembled and configured in an IP-

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XACT compliant design environment. Such an environment is the hub where the top-level model of a system is defined before it is passed to the automated EDA tool chain. This is where the IP-XACT generator-based architecture kicks in.

IP-XACT includes two levels of API that allow compliant tools to integrate – a loose generator interface (LGI) and a tight generator interface (TGI). The LGI simply allows meta-data to be dumped for consumption by compliant tools. The TGI allows direct database query and modification for tools that need, like the name says, a tighter connection. For any particular tool or flow, a generator is developed based on the TGI. The generator talks across the TGI in an environment, language, and location-independent manner. Location independence allows remotely located data to be accessed by a link to an executable via a URL so a remote server can supply deliverables such as licensed content. Generators can be clustered into chains so that multiple generators can be singly invoked.

IP-XACT is also a boon for IP providers, particularly those creating IP for commercial sale, because it gives a neutral framework for IP development that is independent of the vagaries and specifics of proprietary EDA tools. It thus enables IP development that can be used across various mixed-vendor tool chains and with various source design languages. It also allows aggregation of IP into larger, pre-verified, subsystem-level blocks, facilitating design at a much higher level of abstraction, where the productivity benefits of IP-based design are greatest and where the potential differentiated value of commercial IP can best be realised.

Technicalities aside, a pre-requisite for successful standards is the establishment of an ecosystem of companies willing to support them and this is where it seems SPIRIT shines. With a firm foundation of the “big three” EDA companies – Cadence, Mentor Graphics and Synopsys plus an A-list of IP, semiconductor and systems houses including ARM, Freescale, LSI, NXP, ST and TI, there is now sufficient industry mass to actually make things happen. There is even a Quick Start available that walks through the major concepts with a fairly simple step-by-step how-to approach guide for the most common tasks.

IP-XACT thus seems to be a standard that has been conceived (refreshingly) in a way that closely reflects the way many teams actually do design work and protects the way that EDA and IP companies need to operate to be competitive and protect their proprietary technologies. It may thus really help get a lot more work done in a shorter amount of time, particularly with the new 1.4 transaction-level support. The industry could use a few more standards like this!

This report is based on an original article by Kevin Morris, IC Design & Verification Journal, Techfocus Media Inc ([kevin@techfocusmedia.com](mailto:kevin@techfocusmedia.com)), with permission.

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# Forthcoming Events

## Sign Up Now For IFS2008-MT

**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](http://www.futurehorizons.com/new_web/seminars/ifs/ifs.htm)*

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## 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 6<sup>th</sup> 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](http://www.futurehorizons.com/new_web/forums/ieforum/ieforum.htm) for details.*

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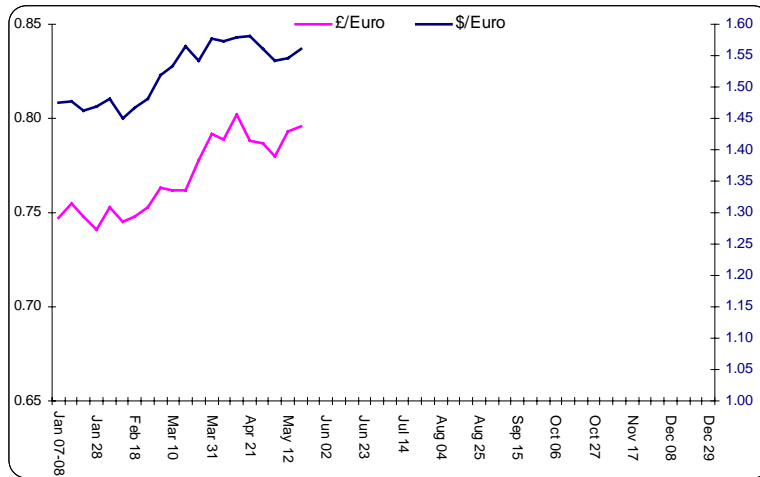
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**Exchange Rates**

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

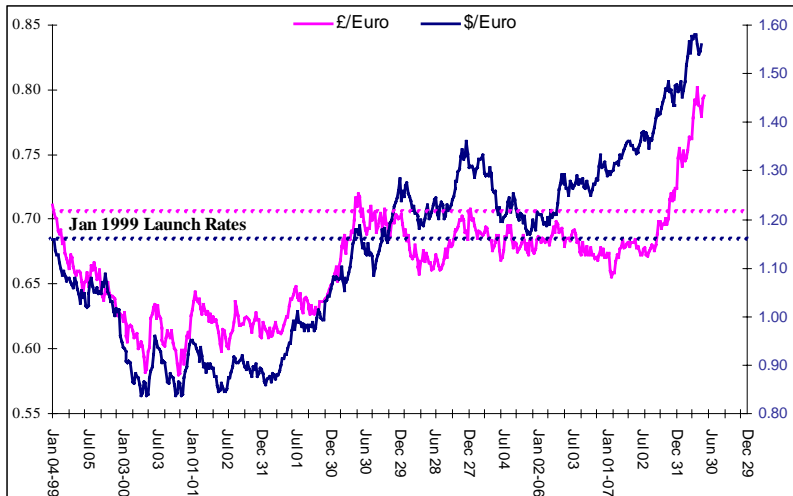
**Figure R1 - 2008 Exchange Rate Trend**

(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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- ❑ Penn On Paper Newsletter (12 issues p/a)
- ❑ East European Report Newsletter (12 issues p/a)
- ❑ 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](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](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](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](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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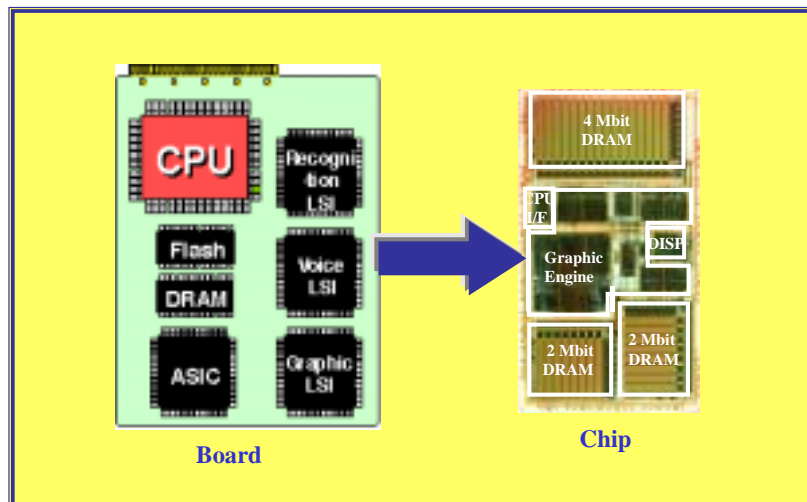
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Jan	<b>29<sup>th</sup> - IFS2008, Semiconductor Industry Briefing, London</b> Annual analysis & forecast of the European & WW semiconductor market
Mar	<b>10<sup>th</sup> - Silicon Chip Industry Training Seminar, London</b> Presented in layman's terms, this seminar provides a complete overview of the integrated circuit industry, its background, technology, manufacture & markets
May	<b>7<sup>th</sup>-9<sup>th</sup> - International Electronics 2008 Forum, Dubai, UAE</b> IEF2008 - 17 <sup>th</sup> 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	<b>19<sup>h</sup> - Silicon Chip Industry Training Seminar, London</b> Presented in layman's terms, this seminar provides a complete overview of the integrated circuit industry, its background, technology, manufacture & markets
Jul	<b>22<sup>nd</sup> – IFS - MT2008-Mid-Term Semiconductor Industry Briefing, London</b> Mid-year analysis & forecast of the European & WW semiconductor market
Sep	<b>8<sup>th</sup> - Silicon Chip Industry Training Seminar, London</b> Presented in layman's term, this seminar provides a complete overview of the integrated circuit industry, its background, technology, manufacture & markets
Oct	<b>8<sup>th</sup>-10<sup>h</sup> - International System &amp; SoC Forum 2008, Venue TBA</b> IFF2008 - 6 <sup>th</sup> 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
Nov	<b>24<sup>th</sup> - Silicon Chip Industry Training Seminar, London</b> Presented in layman's term, this seminar provides a complete overview of the integrated circuit industry, its background, technology, manufacture & markets

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# Future Horizons



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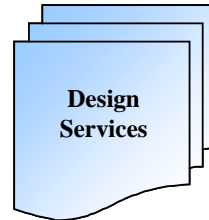
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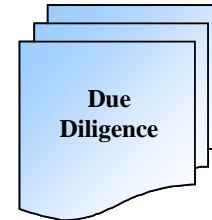
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