What Next for Chip Start-Ups?

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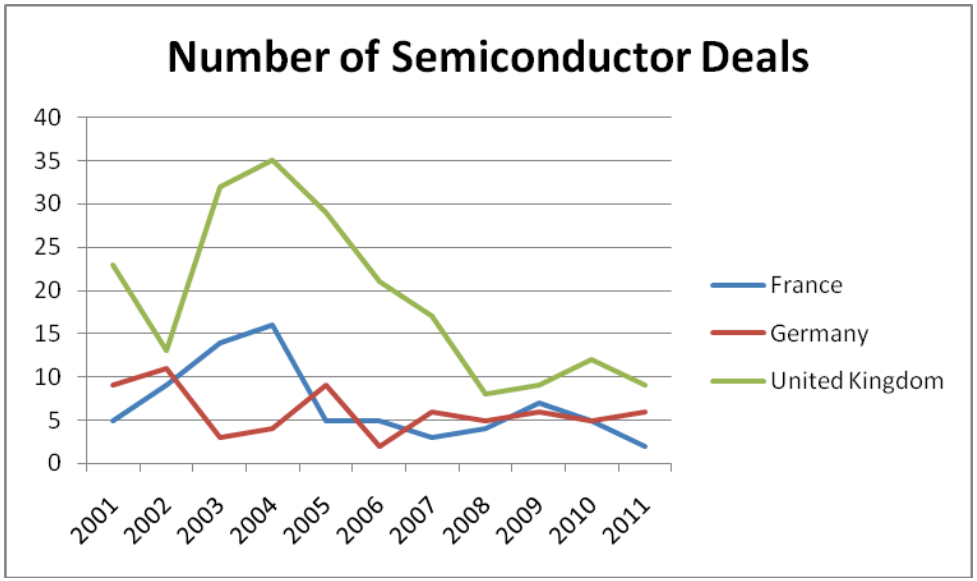
We live in difficult times...

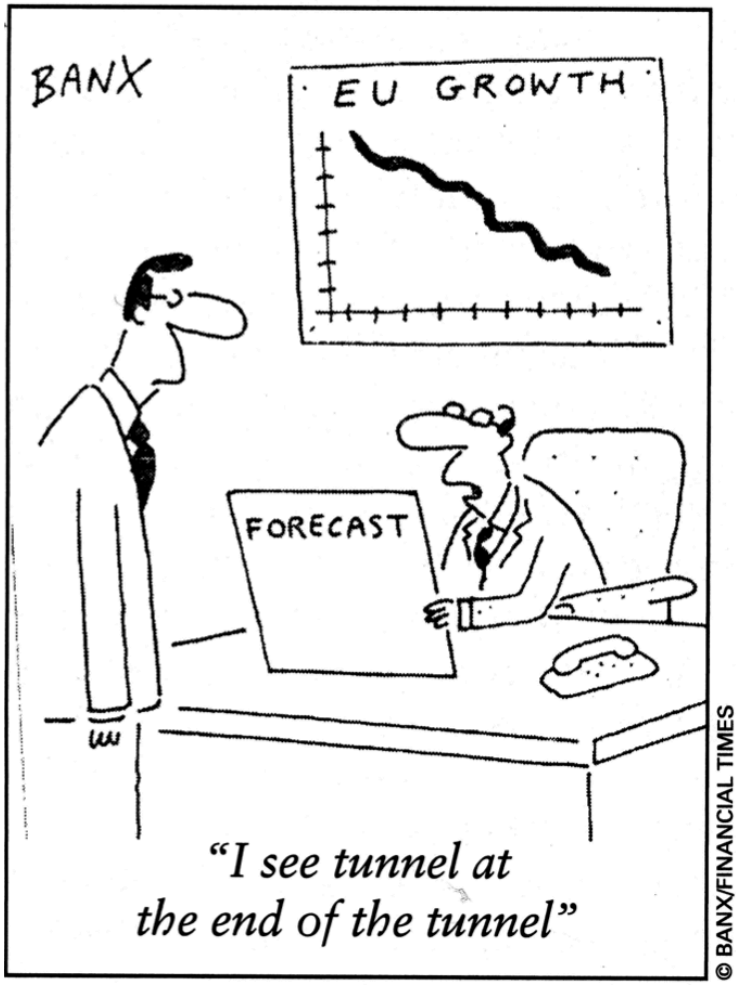
"Between 2002 and 2010 ... the aggregate venture investment in private semiconductor companies returned 1.21x invested capital"

(total US/EU/Israel investments $15bn)

Pagemill Partners, Jul-11



NESTA Oct-11



Fashion vs Opportunity

Entrepreneurs are in fashion with politicians.

Semiconductor investing is out of fashion. There are attractive bubbles elsewhere.

Pure-play chip companies are expensive and take a long time to profit. But they can achieve high exits and aren't particularly risky.

The rate of evolution of silicon capability is not slowing. In this sense the market is not mature.

Chips have a unique ability to deliver and protect product advantage. China isn't yet designing great chips, and can't clone your new chip in a quarter.

Large-cap leadership companies (Apple, Google) are vertically re-integrating key chip design.

Shapes for our times

Late 90's	2000's	2010's
		
"Bubble sprint"	"Old-school marathon"	"Unfashionable"
2 years to exit	9 years to exit	5 years to exit
75 employees	300 employees	50 employees
Exit pre-silicon	Exit pre-profit	Exit post-profit
$16m investment	$265m investment	$50m investment
$642m exit	$436m exit	$300m exit
IRR 1000%+	IRR 13%*	IRR 70%+

* IRR of NASDAQ over the same investment profile 3.2%

Exponential FUD

"Cost of chip design is ~~rising exponentially~~" ...constant, in man-years

- Design teams are the same size as 20 years ago.
- Design projects take a little less time, engineers cost a little more.
- Mask NRE rises fast, but still a small fraction of development cost.

"Cost of chip manufacture is ~~rising exponentially~~" ...constant, per unit

- Chips are the same size (mm^2) as 20 years ago.
- Still sell for "$1billion an acre" (at Intel's margins).

"Complexity of chip design is ~~rising exponentially~~" ...constant, relative to capability

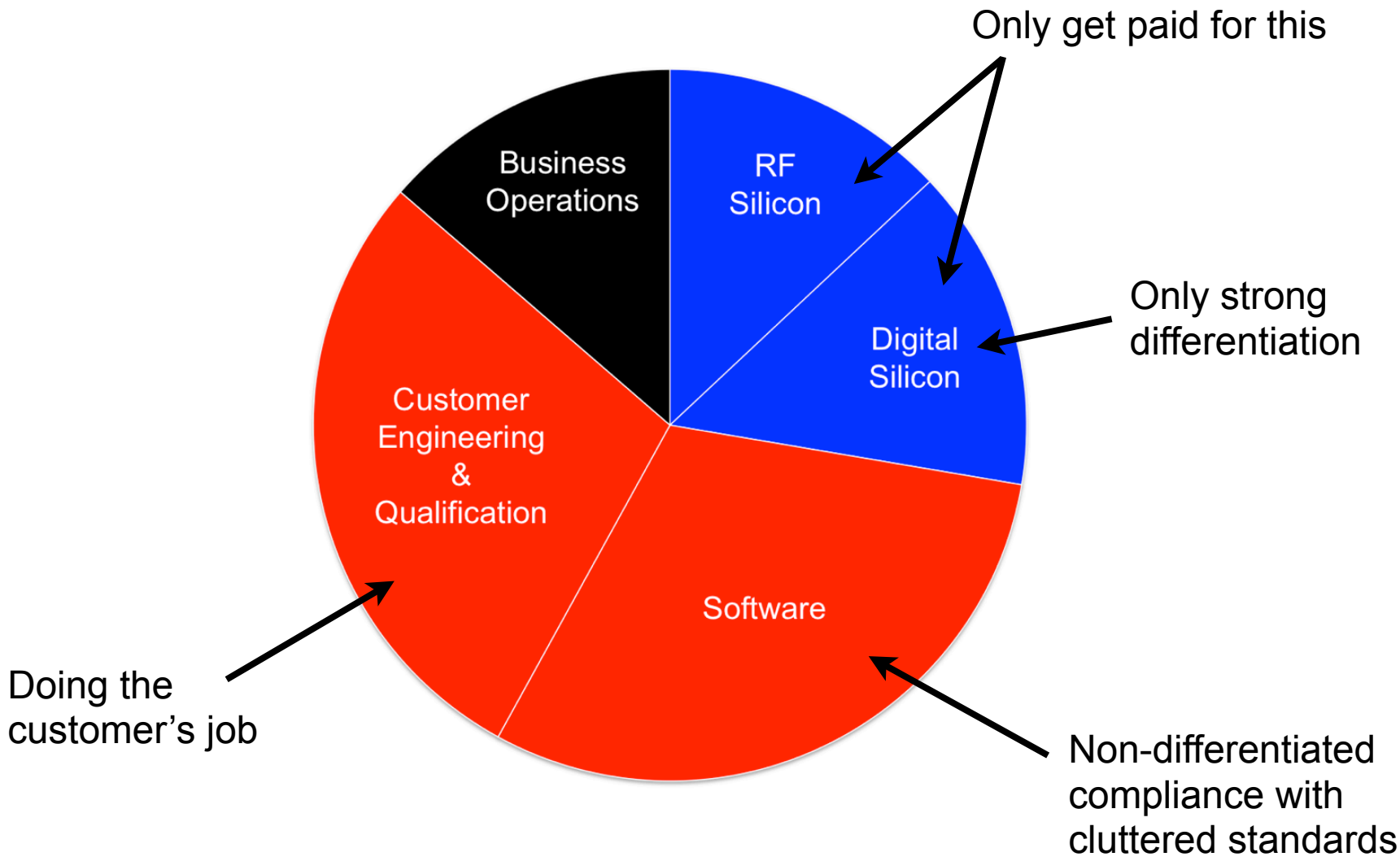
- Human nature accommodates a more-or-less constant quota of risk and challenge in any new venture. We are not cleverer or braver than our ancestors, we just use more transistors.

It's not the chips getting harder, it's the responsibility shift for the system...

(originally shown at Cambridge Wireless Silicon SIG panel, Oct-09)

Fabless start-up equity spend

Icera: about 1200 man-years



Business model

You only get to declare one business model to your customers - IP or Fabless or Box.

Have there been any successful venture-funded IP companies?

Fabless companies get paid by the square inch. They don't get paid for software or clever design or anything else.

Box companies don't get paid for silicon, but silicon can provide and defend the secret sauce.

Time for "impure" plays? Silicon-enabled Box company, with an option to back off to Fabless as competition matures...

The trouble with software

Development in C is too expensive, and hopelessly unreliable. An embedded modem shouldn't require 1m+ lines of code and a decade of bug-fix releases...

- Systems are parallel. There is no broadly-accepted corresponding software idiom.
- There is no broadly-accepted higher-level language than C.
- "Software engineering, as originally envisioned, does not yet exist"

  [D. Parnas, IEEE Computer, Oct-11]

Should programmers be required to anticipate every possible state of a complex system?

- "Computational intelligence" [learning, evolution] software has reached industrial scale (Google, Autonomy).
- Opportunity: [x86, GPU, FPGA] weren't designed for these algorithms.

The Cloud

x86 vs ARM server war ahoy. Start-ups can invent higher-performance ARM's and lower-power x86's.

But the cloud is also a great opportunity for specialized appliances with new silicon architectures...

- Search and recognition
- Mining and prediction
- Numerical supercomputing - matrices, graphs, particles
- Interconnect for massive parallelism

All with a ground-up power efficiency mandate (EDA innovation opportunity).

Avoid the big fights, at first

Companies in established big markets fight dirty wars, getting dirtier...

- China : the new super-buyer is fickle and bent. Everything you have heard about business in China relying on friendship and trust is wrong.
- Traditional US trade practices : MDFs, etc. are thriving. Unfair trade practises in China, by many nations, will be the norm for years.
- Patents : spurious litigation as an offensive weapon, and now trolls.
- Standards : over-complexity as a barrier to new entrants.

EU regulatory authorities have teeth, but don't move at start-up speed. And China is a difficult place to gather evidence.

Start-ups should either invent a new market, or plan growth to profitability in a niche before tackling the mainstream.

Chip customers will only buy from start-ups when they have no other practical choice.