CSR: Innovation to Global Scale-Up

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Chairman, Twelve Winds

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http://www.cir-strategy.com/events

THIS PRESENTATION

1. CSR Innovation

2. Global Scale-Up

3. Lessons from CSR

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The Bluetooth opportunity

Bluetooth solved a business need by democratising the exploitation of radio;

1998	Today
Highly skilled engineers	**Less skilled engineers**
Specialised manufacturing	**Low tech manufacturing**
Long approval process	**Less onerous qualification**

- Specialist RF design engineers
- RF production engineers
- "Exotic" RF components
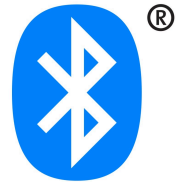- Tight production tolerances
- Radio type-approval

- PCB layout technicians
- Electronics production engineers
- Standard RF components
- Standard FR4 PCBs
- Bt qualification administrator

The Bluetooth standard

The Bluetooth standard was announced on 20 May 1998*;

- short-range radio
- low-cost and low-power and licence-exempt.

The standard was created by a strong consortium;

- Ericsson, IBM, Intel, Nokia & Toshiba followed by
- Lucent, 3Com, Microsoft, & Motorola.

The big semiconductor Goliaths had not seen Bluetooth coming and were unprepared.

* Bluetooth became a big band-wagon with 32,271 SIG members as of June 2017. CSR was member number 10.

Harald "Bluetooth" Gormsson (935–986) was a king of Denmark and Norway. He had blue teeth.

Bluetooth standard was not a slam dunk

The Home RF Working Group was founded in 1998 and grew to a consortium of 100+ companies including Intel, Siemens, Motorola and Philips. The Home RF Group was disbanded in 2003.

In 1998 we had developed Bluetooth-like radio technology at CCL. In 1999, we spun out Cambridge Silicon Radio Ltd which we grew in to CSR plc. Within 4 short years, the;

- **emerging Bluetooth standard** plus the
- established **fabless semiconductor model**

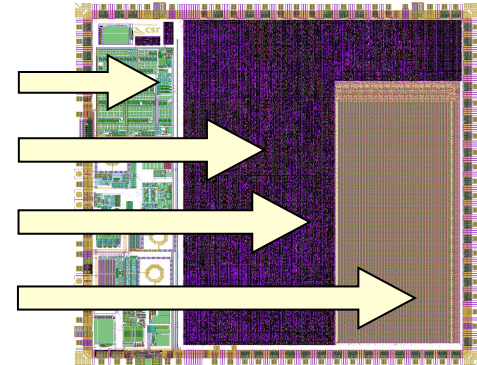enabled CSR to become the market leader for the supply of Bluetooth chips.

Note: This emerging strategy play does not work with established and evolutionary standards like GSM and WiFi.

BlueCore™: A highly innovative product

BlueCore™ Single Chip Wireless in CMOS;

Common dust mite to the same scale
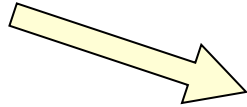
Radio
Baseband
Microprocessor
Software

1999; Some Design Issues

- **Weak analogue and strong digital signals**

- **On-chip frequency planning**

- **Tight hardware / software coupling**

- **Testability AND reprogramability**

- **CMOS was uncharacterised at 2.4GHz**

- **Very small footprint ➔ low cost of Si**

- **Package choices: fpBGA or WLCSP ?**
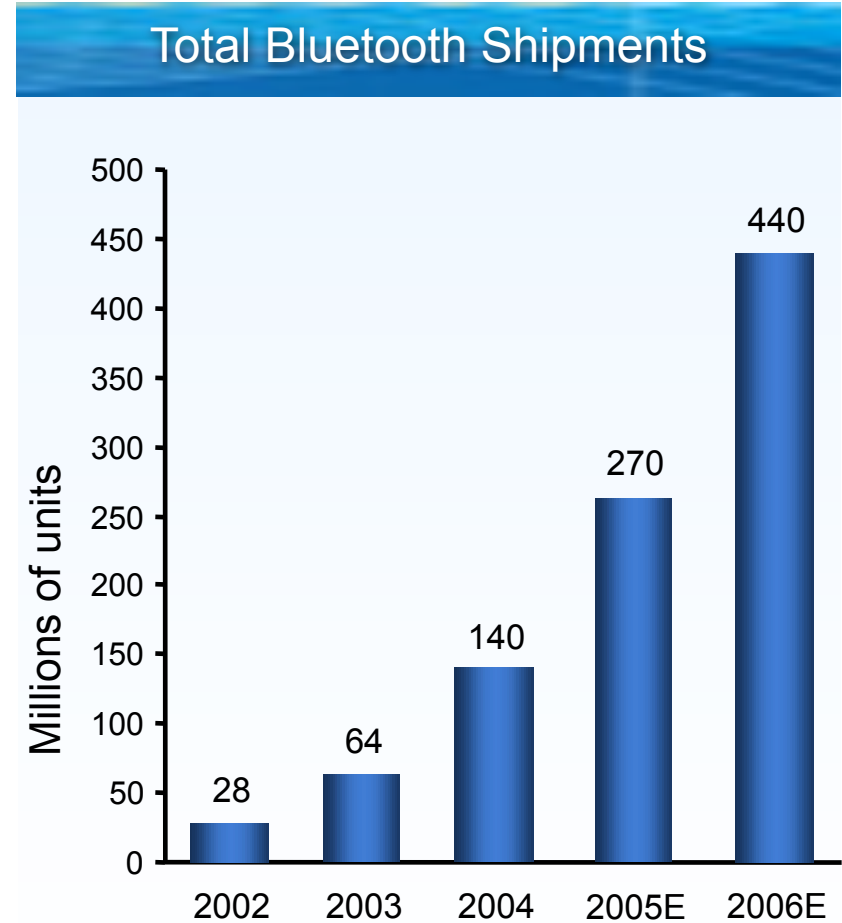
2000; Some Product Firsts

- **Design in standard CMOS**

- **Single chip for under $5**

- **Re-configurable and Self-test**

- **Own processor (no 3rd party IP needed)**

- **No legacy designs to hold us back**

- **Fabless model from Cambridge**

- **MacRobert Gold Medal awarded in 2005**

Growth of the Bluetooth market was significant

CAGR of 99% over 5 years;

- Key growth driver was cellular

- Hands-free driving legislation was important

- Emergence of consumer products added growth

- Stream of CSR products, eg Bt v3.0 with UWB, supported the standard.

Total Bluetooth Shipments

Millions of units

Year	Value
2002	28
2003	64
2004	140
2005E	270
2006E	440

Source: IMS Research
(now part of IHS), July 2005

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Fabless semiconductor manufacturing model

Proven manufacturing model;

regional sales & support offices; sales, prod mkting, FAEs

stream of new products

Cambridge HQ;
- product design
- engineering
- test development
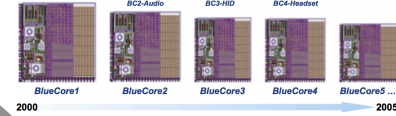
fab management;
- shared working
- capacity
- margins
- returns
- pricing

customers spanning the world

world-wide design partners

TSMC Taiwan fab facility;
- manufacture
- package
- test

Focus increased early market penetration

Focus on **Segments** + **Customers** supported by **Design Partners;**

5 Target Segments
- dongles
- headsets
- modules
- PCs
- phones

With **3 Leading Customers** in each Segment

Detailed membership criteria for each partner category

Design Partner Categories

Software

Embedded

Hardware

Test Eqpt

Design & Dev

Modules

Distis & Reps
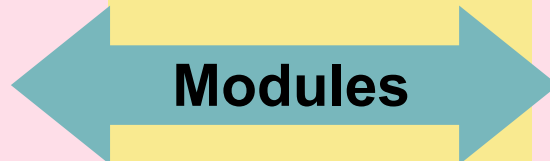
See **www.btdesigner.com**

Module Design Partners

ALPS
ALPS ELECTRIC CO., LTD.

AMBIT

BLUEWINC
Wireless Information & Communication

Gemtek
Wireless Broadband Anywhere

INTEGRA

LG Electronics

MITSUMI

SAMSUNG
ELECTRO-MECHANICS

UNIWILL
Uniwill Computer Corp.

USI
A MEMBER OF ASE GROUP

Windigo
SYSTEMS

zenocom
The Worldwide Leading Player in Communication

CSR: 500 customer products in 4 years ...

By 2003

(5 years from start)

CSR had 500 qualified Bluetooth design wins (10 times more than our nearest competitor)

The single chip Wireless company

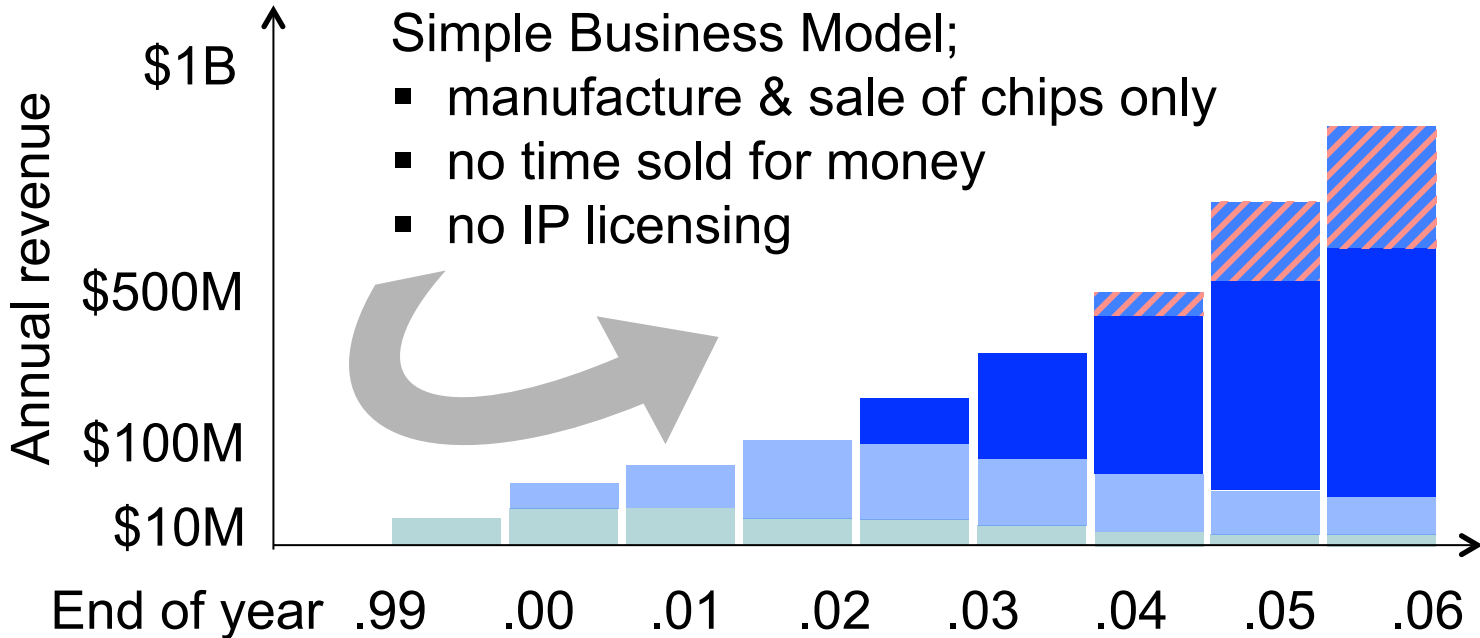|	
Mobile phones	PC cards
Headsets	PC Modules
Cordless phones	Modems
Mobile "phongles"	Cameras
Car kits	Medical devices
Handhelds & PDAs	Watches
Keyboards	Sports goods
Faxes and printers	Tags
Mice / presenters	Nav systems
Serial port adapters	Pointers
USB devices	White goods
Portable PCs	Toys
Access points	Other

By 2003

(5 years from start)

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The single chip Wireless company

SDKs delivered early revenue

Simple Business Model;
- manufacture & sale of chips only
- no time sold for money
- no IP licensing

Annual revenue: $1B, $500M, $100M, $10M

End of year: .99 .00 .01 .02 .03 .04 .05 .06

Early revenue

Key	Offering	Benefit
	Sys Dev Kit (SDK)	Early revenue
	BlueCore1 Chip	Design wins
	BlueCore2,3 Chips ...	Maintenance of design Wins
	Bt + WiFi Chip	Further Functionality and design wins

The Casira SDK

The CSR Casira SDK (System & Software Development Kit) enabled our customers to better design-in our **BlueCore^{TM}** chips.

Advantages of the SDK approach;

- for the **customer** − design of their product before your volume chip is available
- for **you** − secure customer **design wins** plus SDK revenue prior to the ramp in volume of your chip.
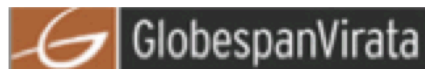
Mother-board for Data and Audio Input and Output

Audio Connection for Headsets

BlueCore^{TM}01

LEDs to help Software Debugging

Detachable Antenna

Replaceable Bluetooth Module

CSR plc: Raising sufficient cash

VC Round 1 — 3i, Amadeus Capital Partners, Gilde Investment Management

Corporate Round 2 — intel.

Partner Round 3 — The Capital Group Companies, SONY, PHILIPS, COMPAQ, ALPS, SIEMENS, ARM, GlobespanVirata, wavecom, razorfish
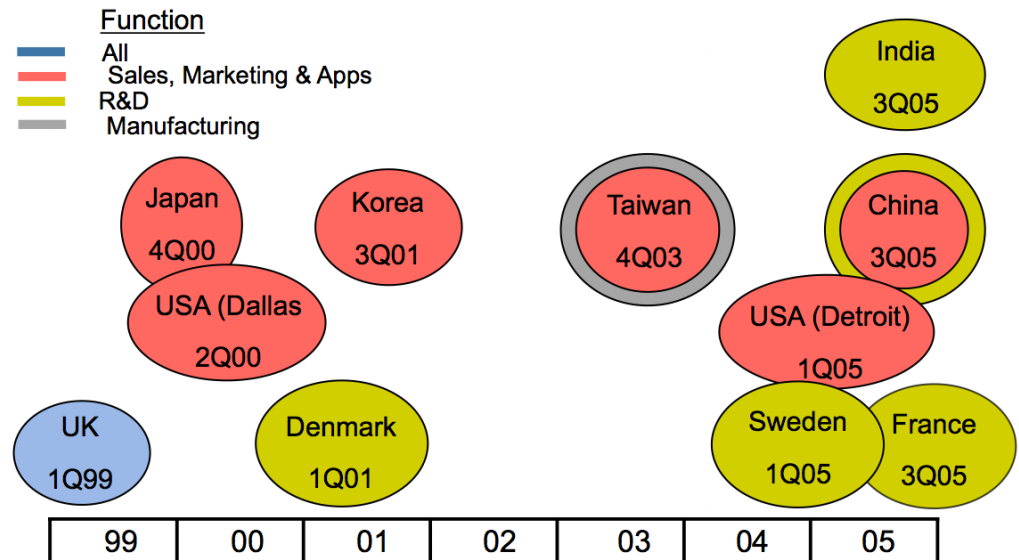
Bank Round 4 — scottish equity partners, LDC
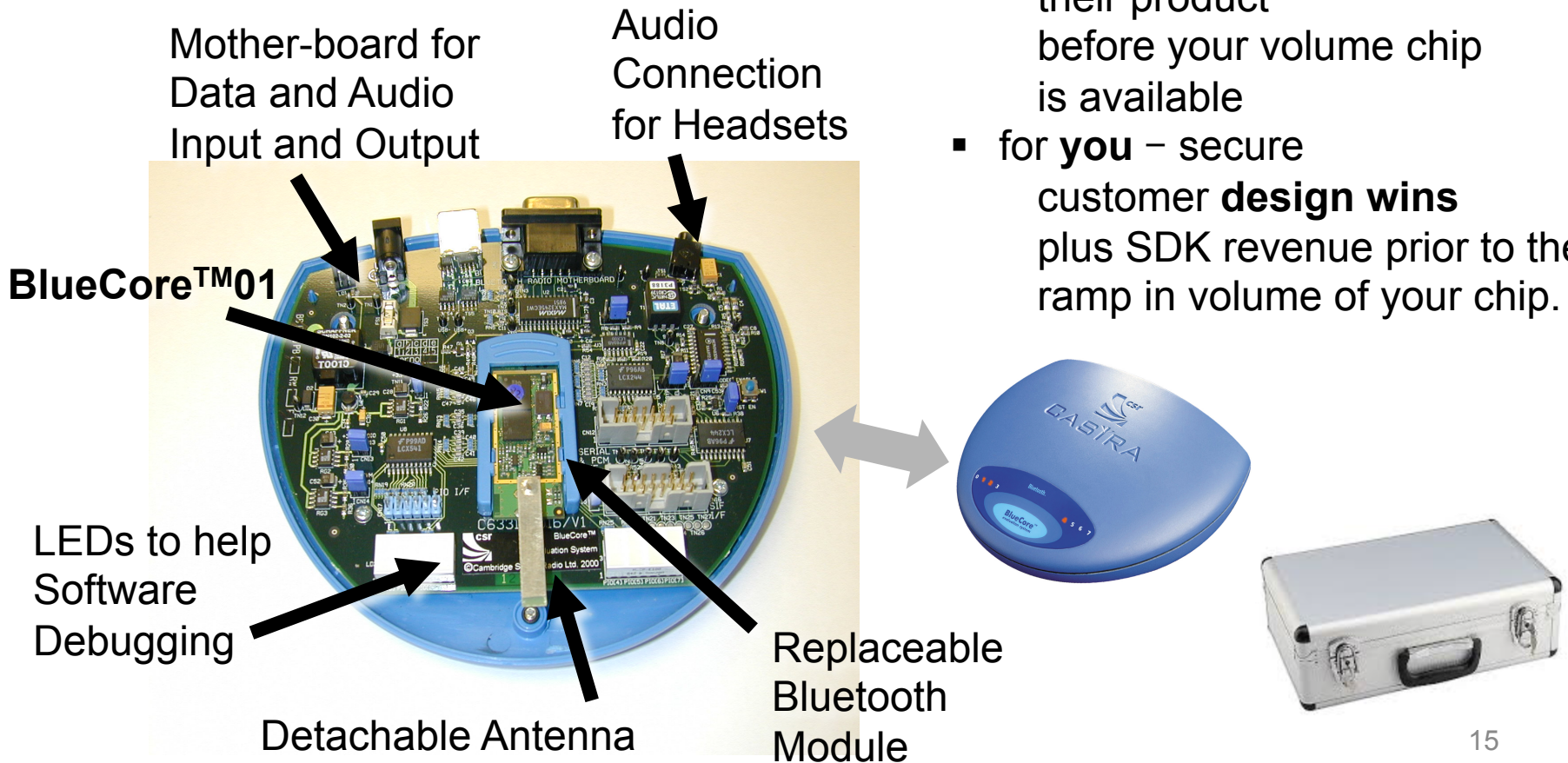
- £330M LSE Flotation in March .04 with FTSE 250 in July .04

- .13 revenue of $960M & underlying operating profit of $104M

- .15 acquisition by Qualcomm ($130B mkt cap) for $2.5B.

Recruitment was managed as an engineering project;

- Founded in .98 and launched in April .99 with 9 founders

- From 9 to more than 1,000 global staff in 8 years

- Cambridge peak recruiting = 160 engineers (10+ nationalities) pa

- 2,000+ people in 23 offices in 10 countries in 15 years

- Meritocratic "can-do" culture and share options for all.

Cambridge Silicon Radio
Founding Team 1998

Function
- All
- Sales, Marketing & Apps
- R&D
- Manufacturing

India 3Q05
Japan 4Q00
Korea 3Q01
Taiwan 4Q03
China 3Q05
USA (Dallas 2Q00
USA (Detroit) 1Q05
UK 1Q99
Denmark 1Q01
Sweden 1Q05
France 3Q05

99	00	01	02	03	04	05

To grow sales we extended our reach to;

- access developer communities
- support FAEs
- establish sales offices
- support our manufacturing fab.

To enter new territories we;

- used our personal n/w's
- employed nationals
- used embassy intros' judiciously.

In general we ignored distractions including;

- consultants and facilitators
- UK and other government offers (relocation, grants etc)
- acquisition offers.

CSR UK Cambridge

CSR US Detroit

CSR US Dallas

CSR France Sophia-Antipolis

CSR Sweden Lund

CSR Denmark Aalborg

CSR Korea Seoul

CSR China Shenzhen

CSR Japan Tokyo

CSR India Bangalore

CSR Taiwan Taipei

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CSR: Innovation to Global Scale-Up

Lessons from CSR*;

1. Choose an **emerging global** product market

2. Raise **sufficient cash** to enable rapid growth

3. Be **first to market** with an **innovative offering**

4. Focus on **early adopters** in key **volume segments**

5. Develop a **partner programme**

6. Create **"mindshare"** and **"buzz"**

7. Win **early revenue** (using, for example, SDKs)

8. Start with the **"right"** BM and culture and stay hungry.

* CSR used the global high volume fabless
   semiconductor product Business Model

TW Twelve Winds

THANK YOU