ARM

Mike Muller
Chief Technology Officer

Judge Business School
Feb 2016

1980

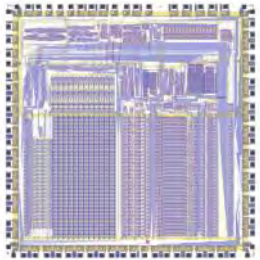
"We're going to sell millions" H Hauser

© ARM 2015

ARM

BBC Model B

1981



1985

1990

2015

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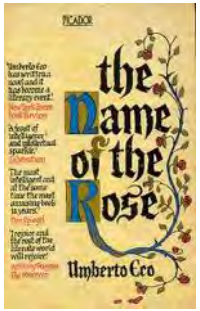
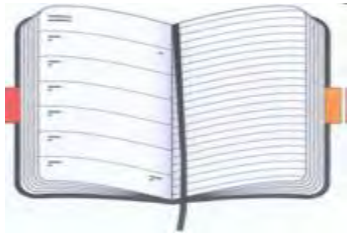
ARM

1983

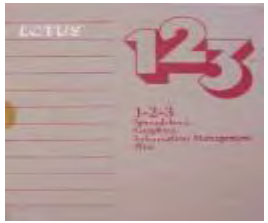


Compass

DynaTAC



Paper



Lotus123

Osborne

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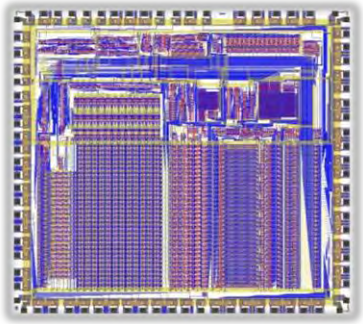
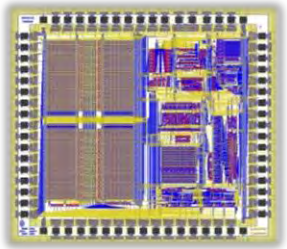
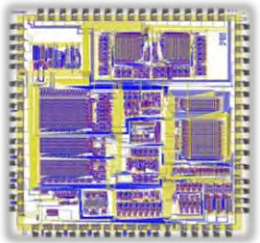
1985



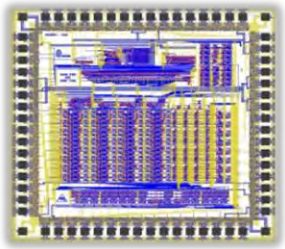
ARM™



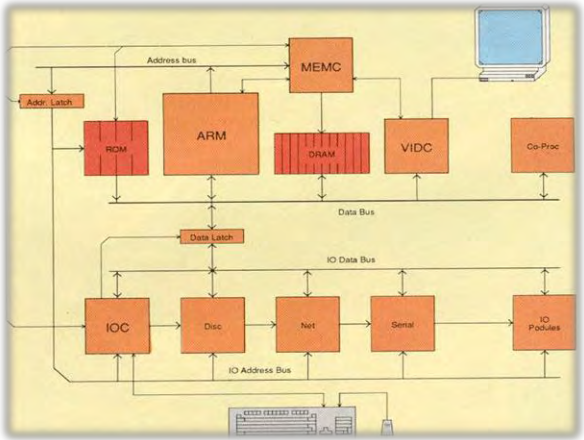
MEMC1

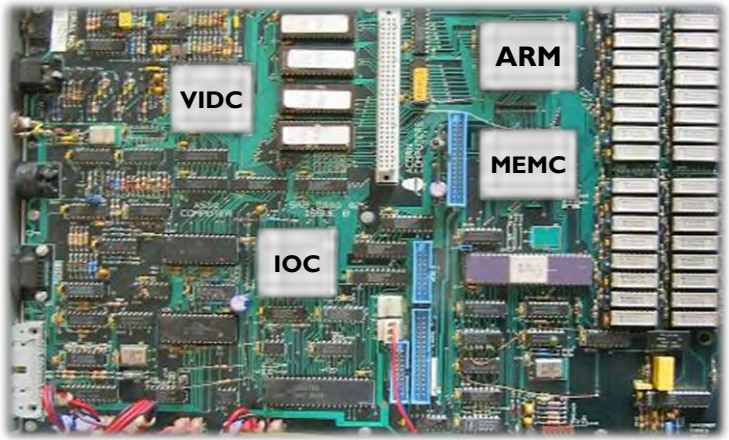


VIDC1



IOC1





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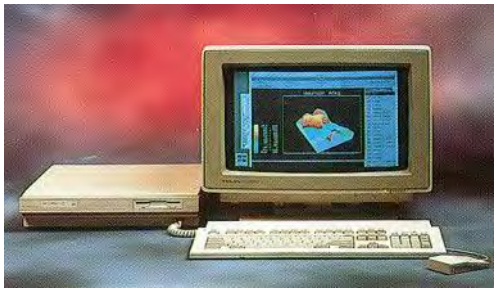
ARM Founded 27th Nov 1990

- £1.5M cash from Apple
- £250K cash from VLSI
- £1.5M of IP & 12 engineers from Acorn
- Proof of concept Acorn Archimedes
- No patents, no independent customers, product not ready for mass market
- A barn, some energy, belief, experience
  - 1 Partner VLSI Technology
  - 1 OS Acorn RISCOS
  - Some SW development tools



"We're going to be the global standard"

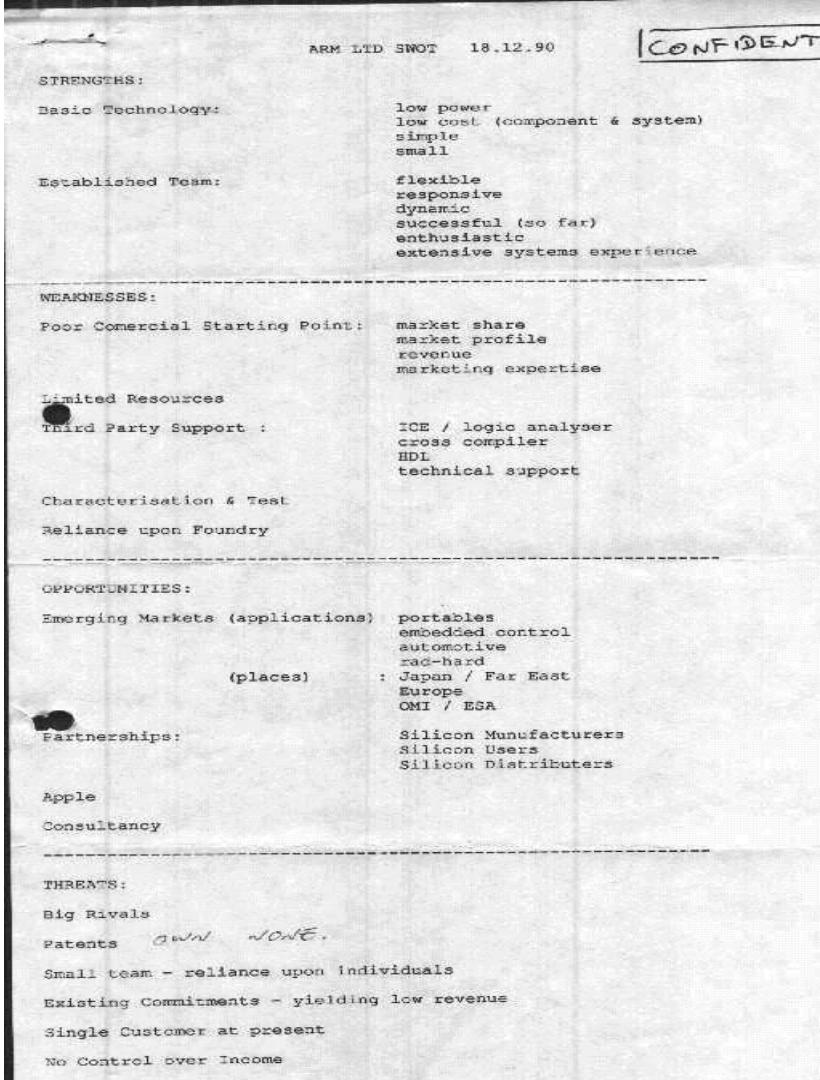
Robin Saxby

© ARM 2015

ARM

The Early Days

- SWOT Analysis
  - 5 yr plan
  - 1yr operation plan,
  - Monthly reporting
- Mean & lean "Cash is King"
  - Tight cost control – pay freezes '92
  - Profitable, generating cash since '93
- Think global, act local
- Customer focussed
  - Partnership model
  - First USA, Europe then Japan



ARM LTD SWOT 18.12.90 CONFIDENT

STRENGTHS:

Basic Technology: low power
low cost (component & system)
simple
small

Established Team: flexible
responsive
dynamic
successful (so far)
enthusiastic
extensive systems experience

WEAKNESSES:

Poor Comercial Starting Point: market share
market profile
revenue
marketing expertise

Limited Resources

Third Party Support : ICE / logic analyser
cross compiler
HDL
technical support

Characterisation & Test

Reliance upon Foundry

OPPORTUNITIES:

Emerging Markets (applications) portables
embedded control
automotive
rad-hard

(places) : Japan / Far East
Europe
OMI / ESA

Partnerships: Silicon Manufacturers
Silicon Users
Silicon Distributers

Apple

Consultancy

THREATS:

Big Rivals

Patents own none.

Small team - reliance upon individuals

Existing Commitments - yielding low revenue

Single Customer at present

No Control over Income

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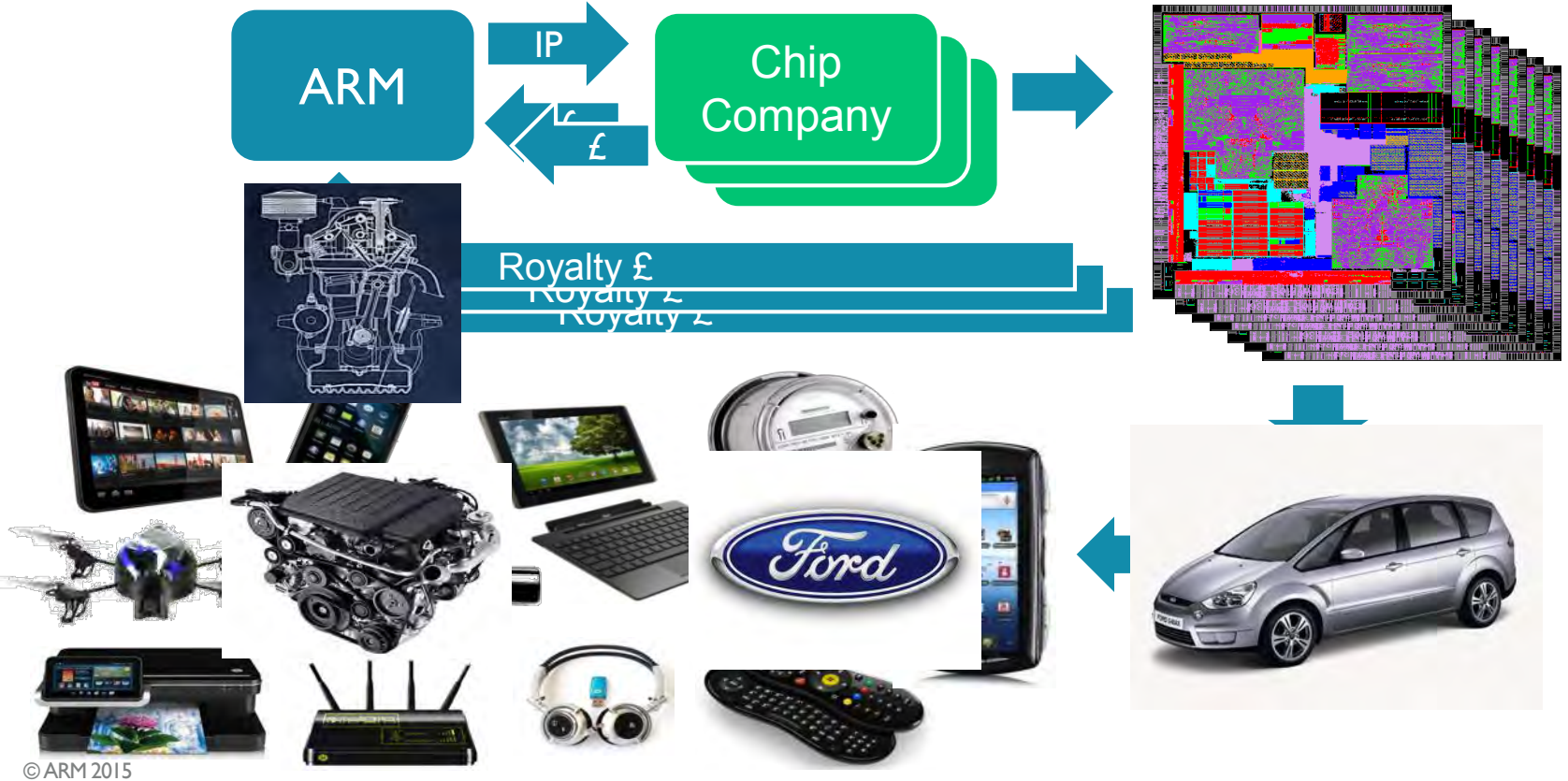
It’s all about customers and the business model

ARM

1990 Innovation in Business Model



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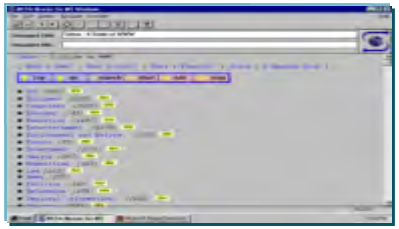
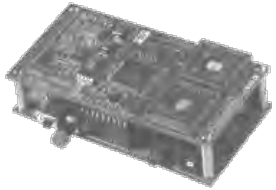
1993 The Tipping Point



Mosaic v1.0

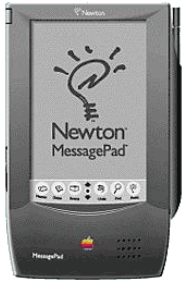
DVD

Game Boy



Zarlink Orion GPS

1st ARM GPS



1st ARM PDA

1st Consumer GSM

1st ThinkPad

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ARM

(1998)

1997

(1993)

ARM

2003 Unplugged

2004

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It’s all about the people

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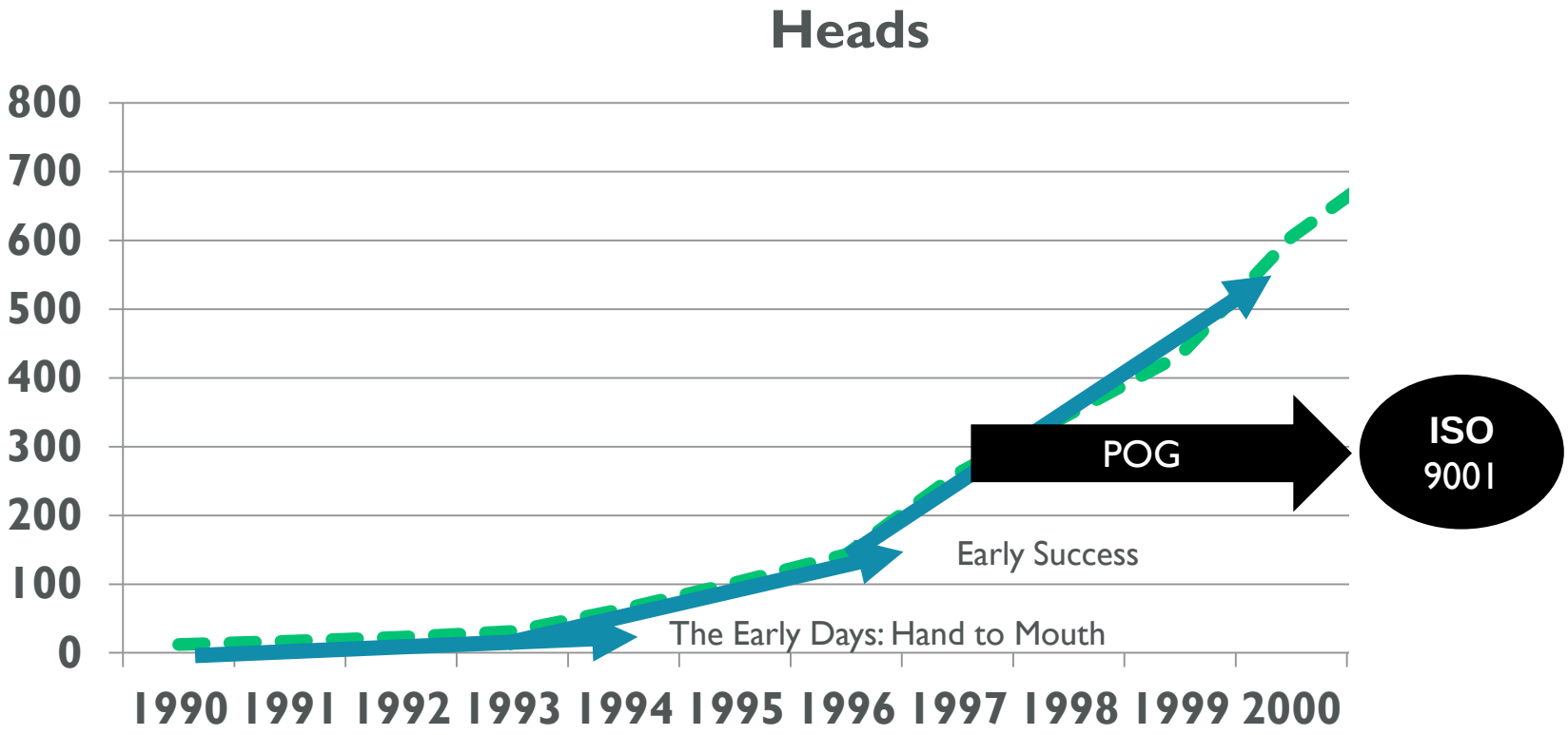
People Need to be Organised



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FTSE	Name	£Billion
26	Sky	18,221
27	Compass Group	17,094
29	ARM Holdings	14,622
31	BAE Systems	14,312
32	Standard Chartered	14,198
33	SSE	14,163
34	Tesco	13,565

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Today 2000 people have been with ARM less than 2 years

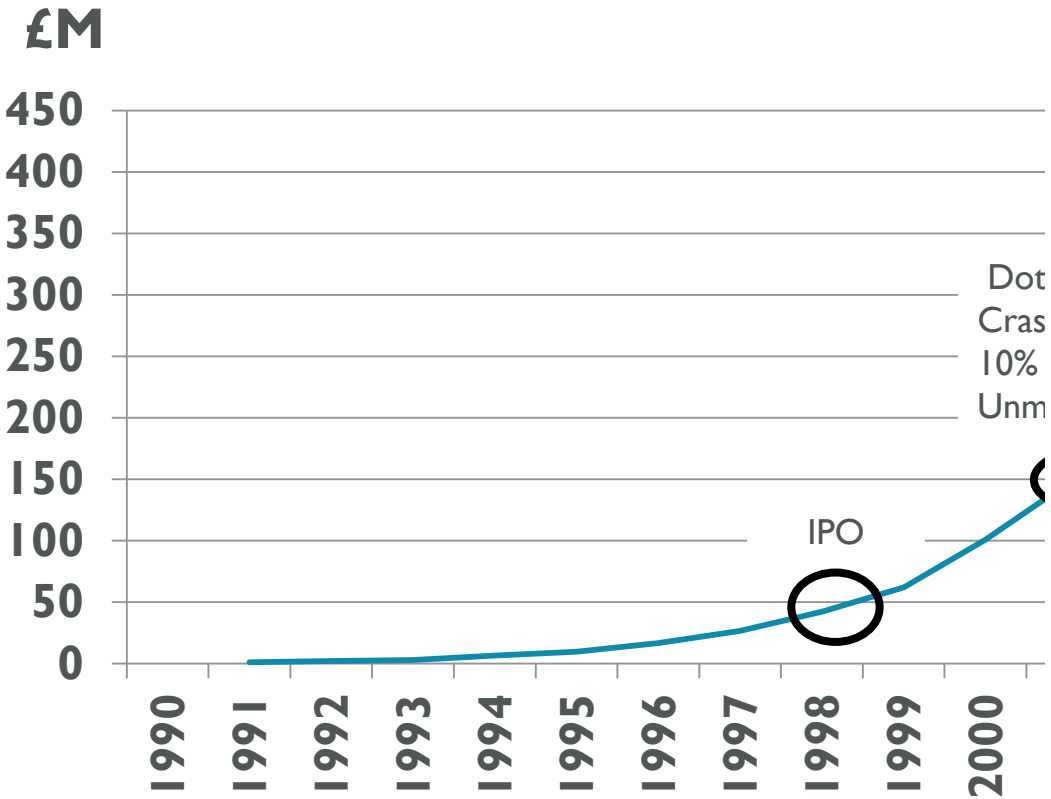
We, not I

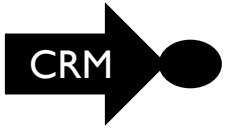
Passion for progress

Be your brilliant self

ARM

Learning about growth





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2008

"The smartphone is the defining technology of the age"

The Economist

March 2015

ARM

Newton
ARM610@20MHz
4MB ROM
640kB RAM
336 240 B&W
MessagePad

SAMSUNG
12:30 PM
2x Cortex A9 1.4GHz
16GBytes Flash
1GB RAM
1280 x 800 Color
meet me here
Phone
Contacts
S Memo
Messaging
Applications

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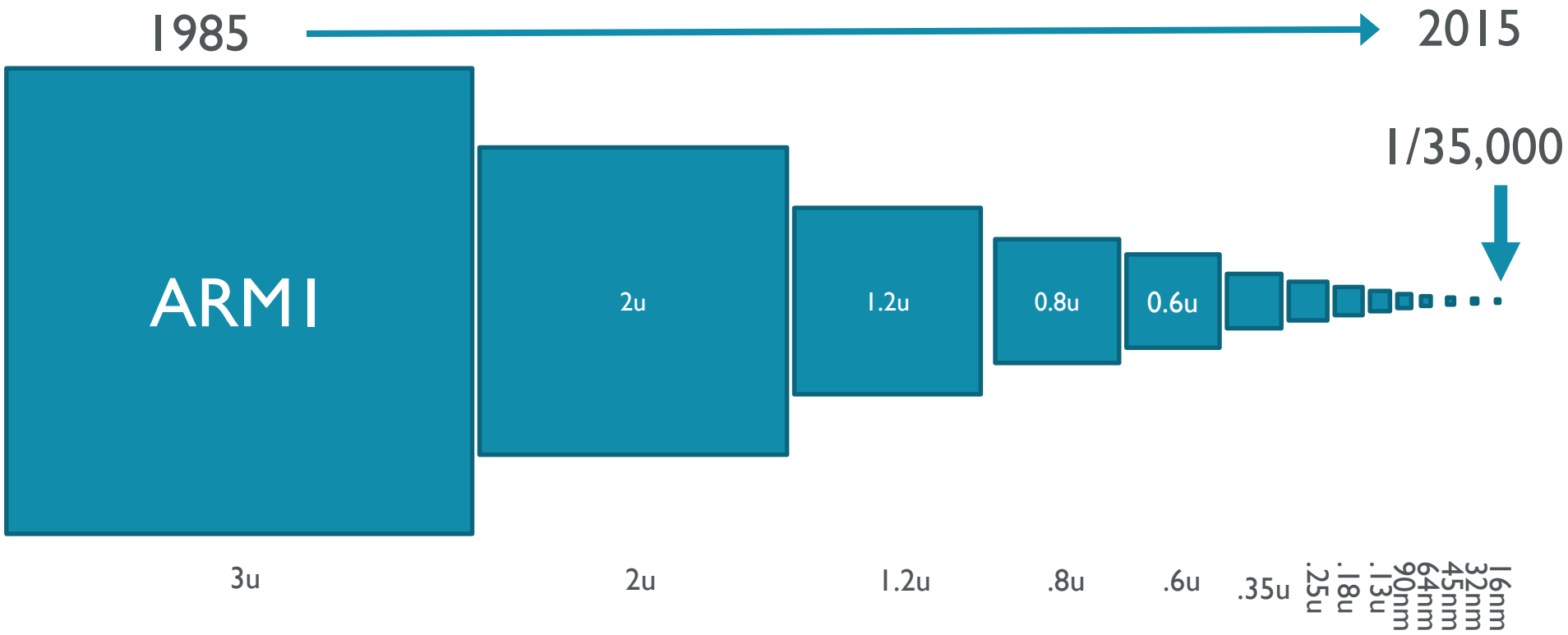
ARM

Moore's Law



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ARM

Moore's Law

ARM1
3u

ARM7TDMI
.6u

Cortex-M0
.18u

CortexA57
16nm

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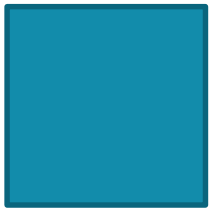
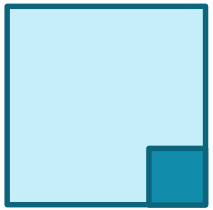
Moore's Law

1985
£20
CPU



ARM1
3u

1996
£20
SOC
Mobile Phone

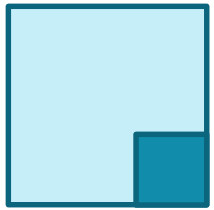


ARM7TDMI
.6u

2015
£1
SOC
Microcontroller

Cortex-M0
.18u

2015
£20
SOC
Smart Phone



CortexA57
16nm

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Why so few ARMs

Partnership ➡ Scale

Roadmap ➡ Longevity

Stickiness ➡ Pricing

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It's all about the (eco)system

ARM

What Makes ARM Sticky

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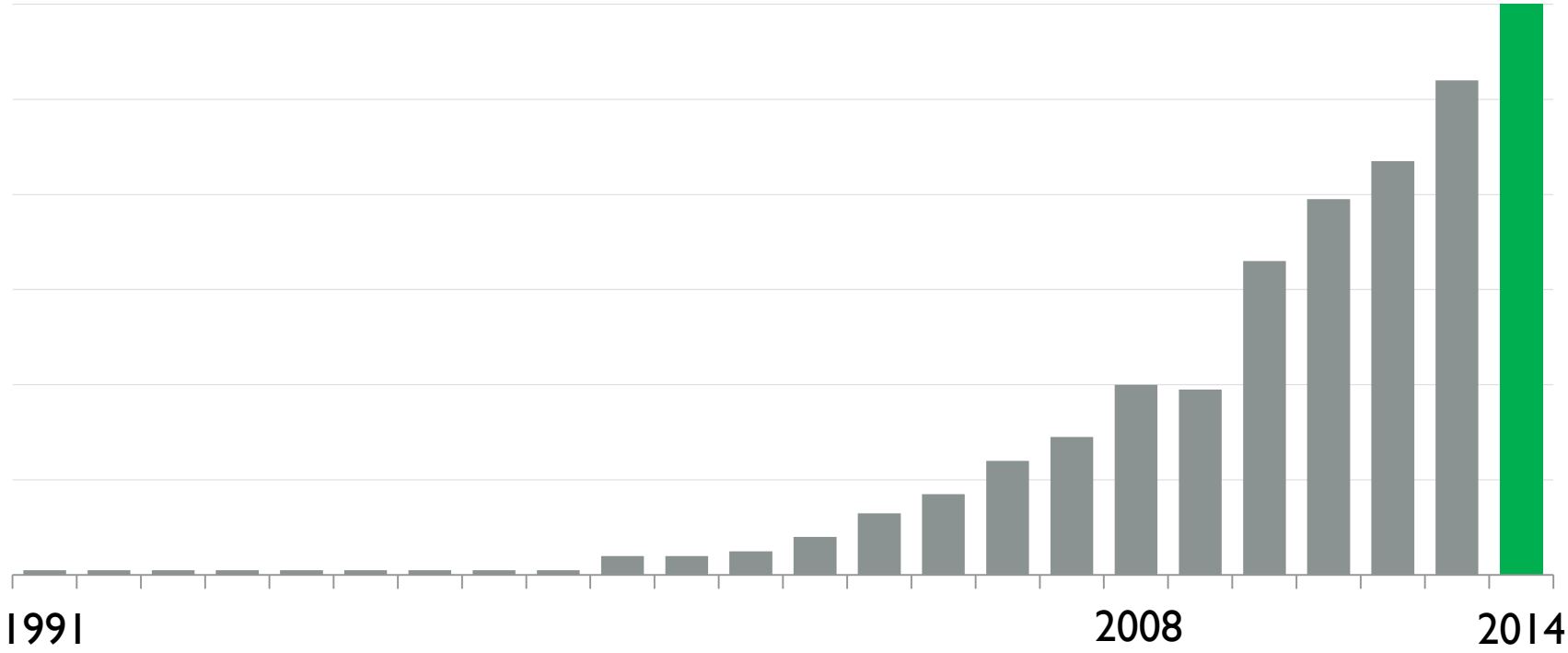
ARM Partner Chip Shipments



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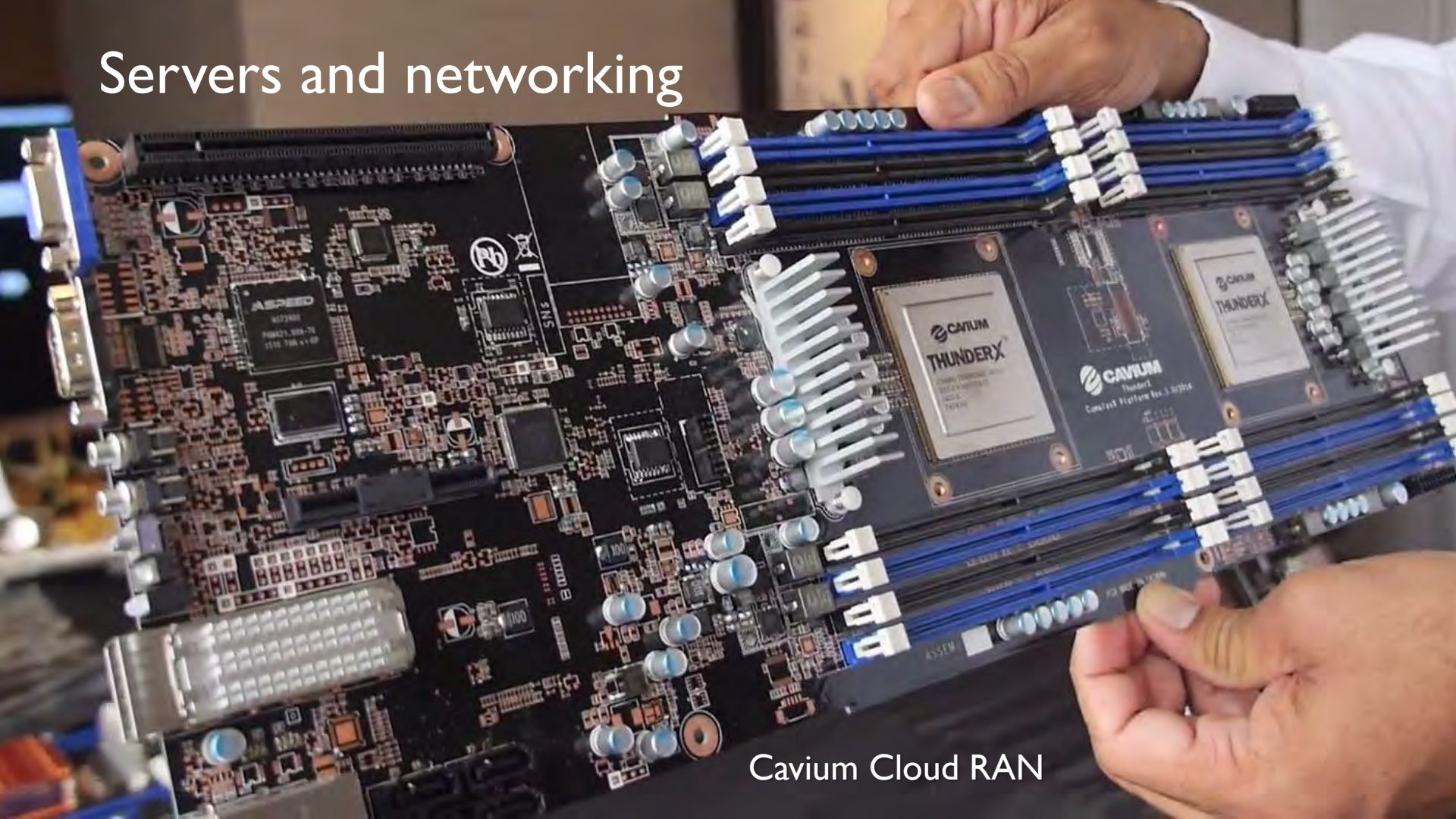
Everything Connected

12 billion

ARM-based chips shipped in 2014 alone
75 Billion total

ARM

Servers and networking

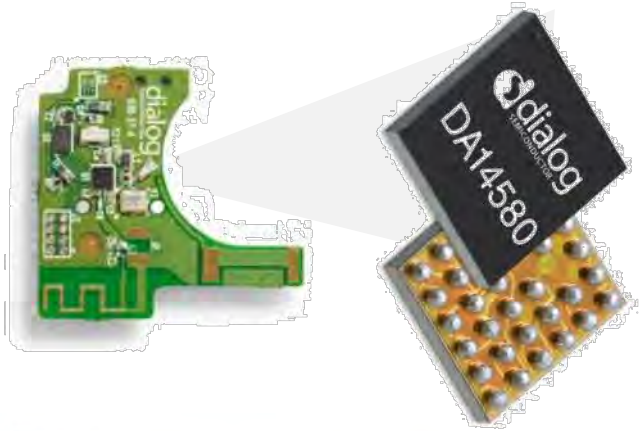


Cavium Cloud RAN

Beyond servers

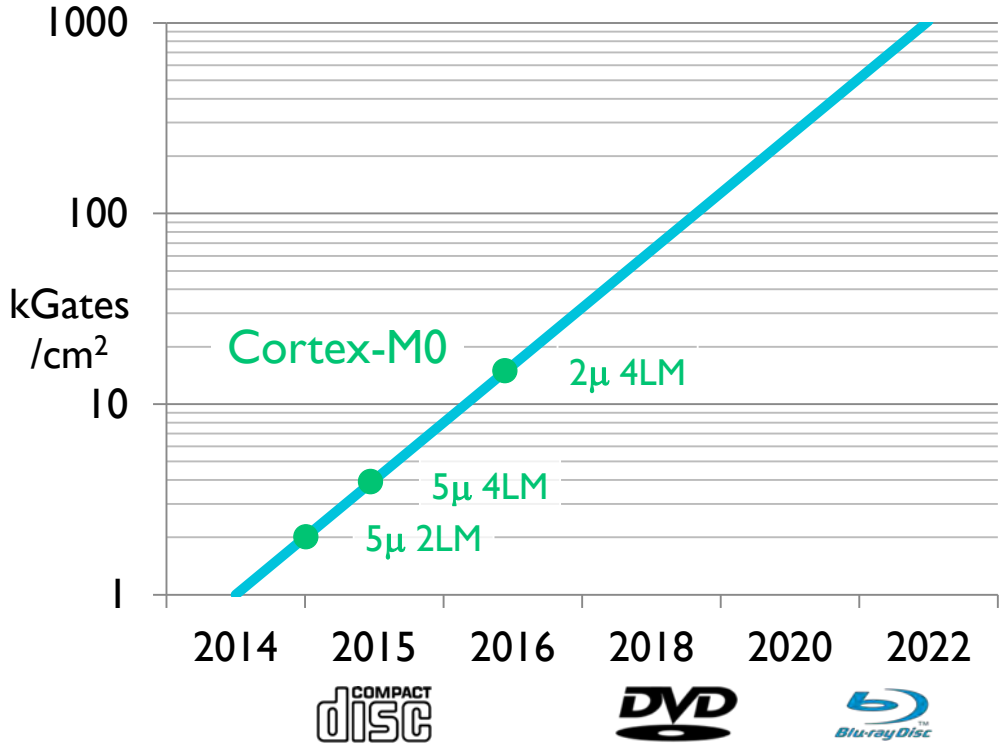
Last years favorite product

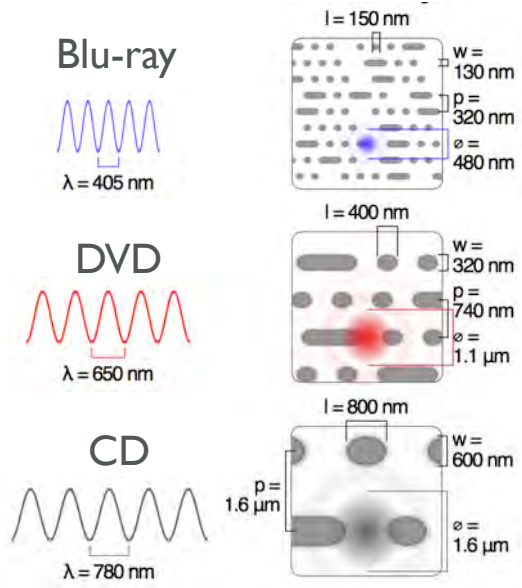
- Energy harvesting BLE insulin pen
- 400µJ energy from lid removal
- Cortex-M0 based



dialog SEMICONDUCTOR Cambridge Consultants

Moore's Law for imprinting





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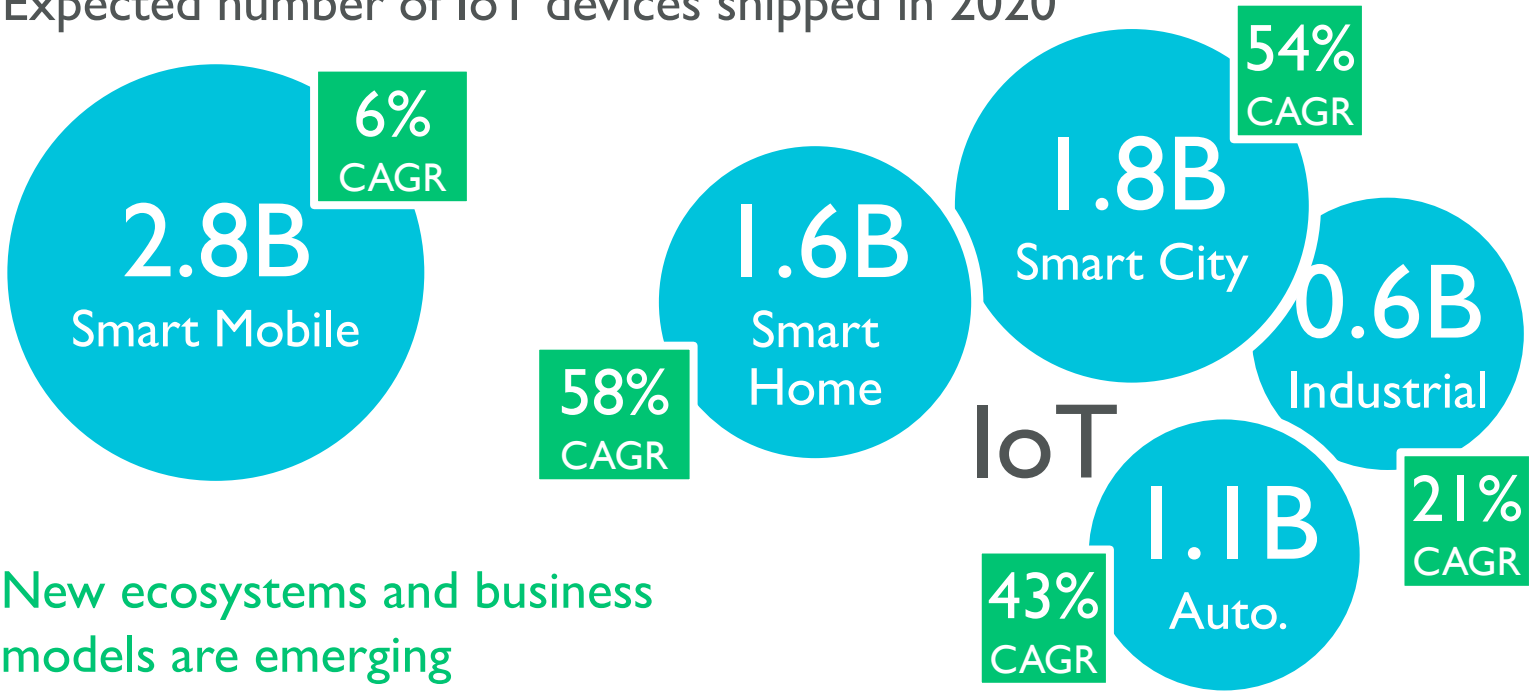
By 2020: explosive growth expected for IoT

Expected number of IoT devices shipped in 2020



New ecosystems and business models are emerging

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Source: Gartner, 2015

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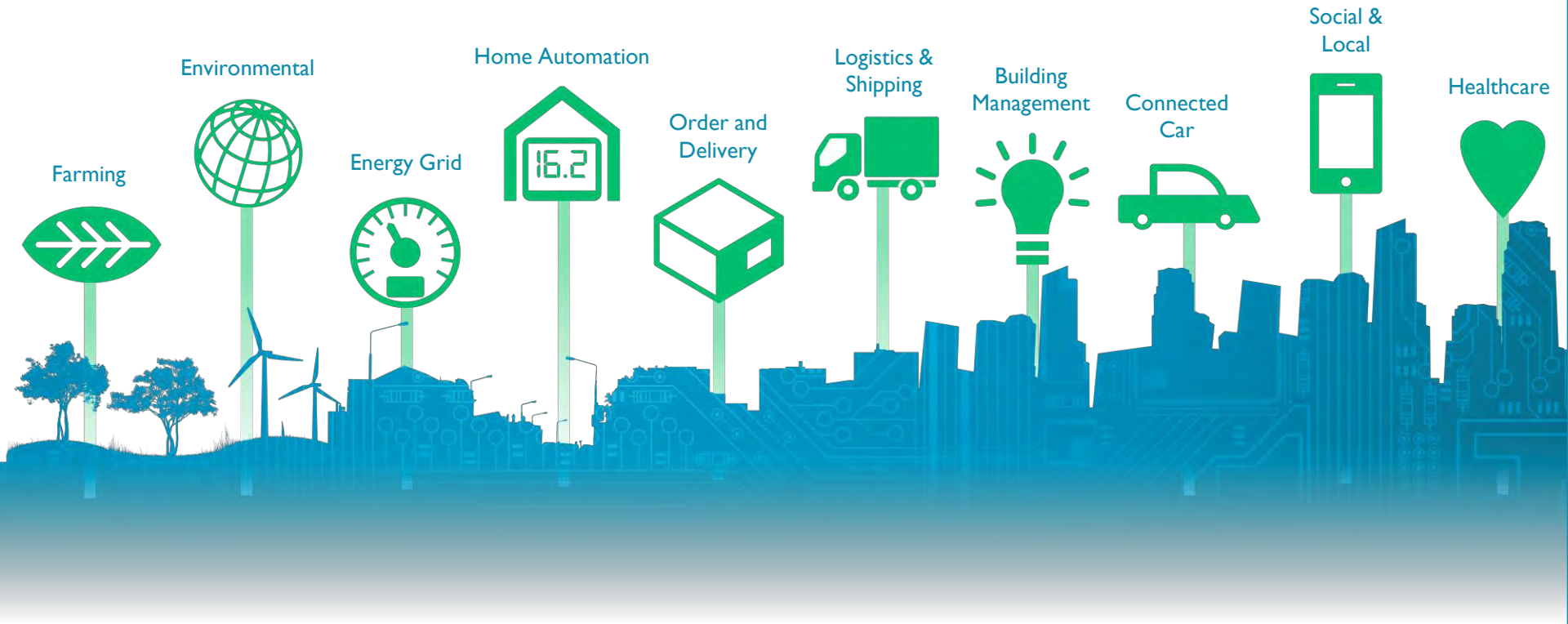
The Opportunity is Before Us



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It’s all about the money

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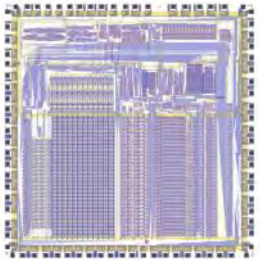
What's changed?

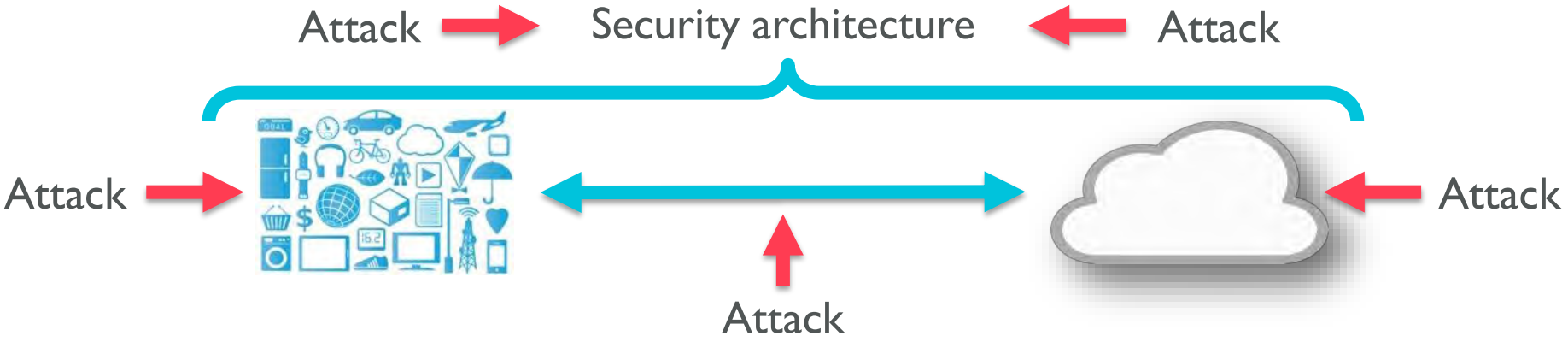
1981



1985

1990

2015



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We need to enable secure
< $1 microcontroller designs
done by people with absolutely
no security experience

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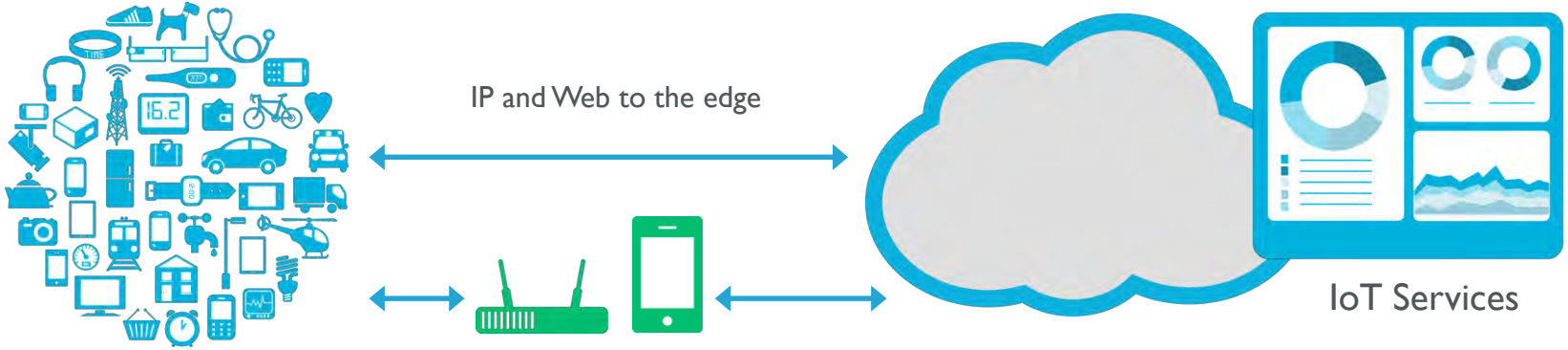
Sensors Need Software and Security



Little Data

End-to-End Security, Web, Data Objects & Management

BIG DATA

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ARMmbed

IoT Device Platform

mbed Clients

mbed OS and TrustZone

mbed™ REST API

Data Flow & Device Management
Directory, Subscription

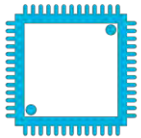
Security Management & Admin
Authentication, Multi-tenancy

LWM2M | REST | Pub/Sub

mbed Device Interface

CoAP-SMS | CoAP-MQ | CoAP | HTTP | MQTT

DTLS | TLS



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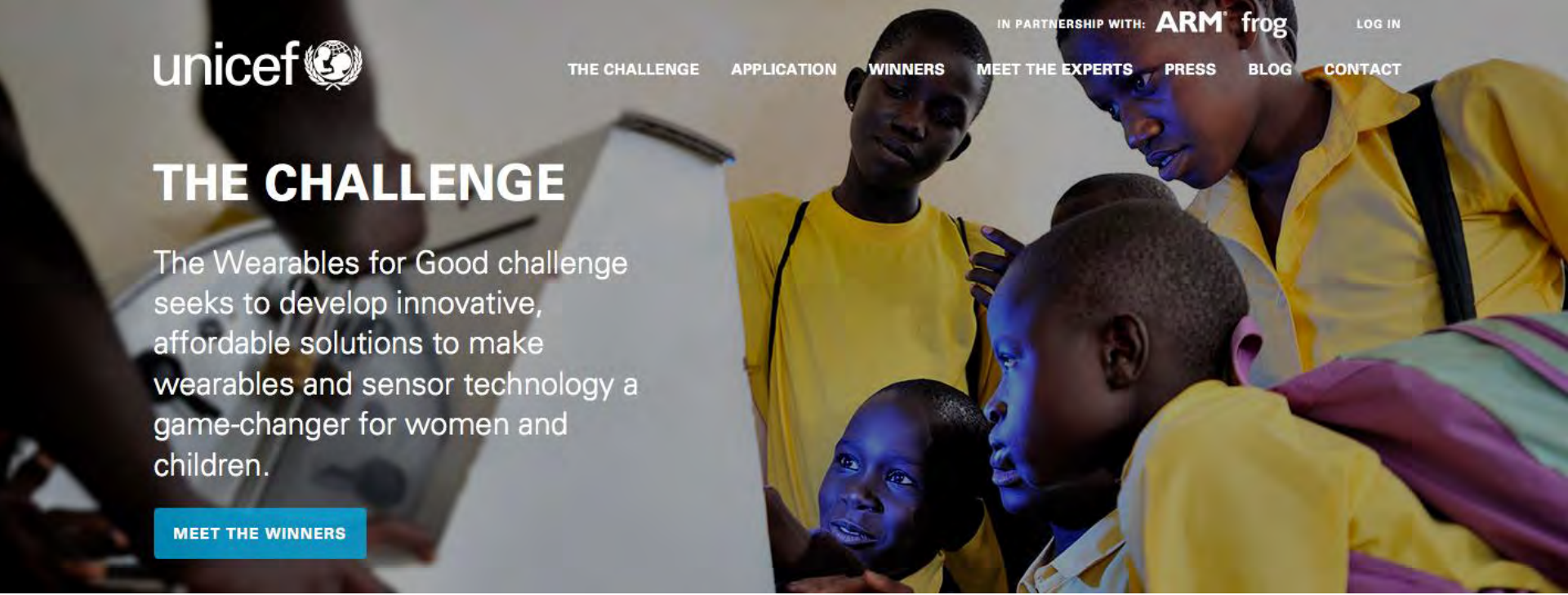

unicef ARM frog

250 entrants, 68 countries, six continents, 10 finalists, two winners…

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ARM

FEATURES

- Designed with the user
- Designed for scale
- No battery
- Waterproof
- Low Cost <1$
- Recyclable

Khushi Baby (KB), a wearable platform to bridge the world's immunization gap, is a system for tracking vaccination and mobilization in the last mile.

SoaPen is a wearable soap re-designed to encourage hand washing amongst children to reduce the risk of catching and spreading disease thereby.

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