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Technology and Innovation

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Technology is anything
that was invented
after you were born

Alan Key

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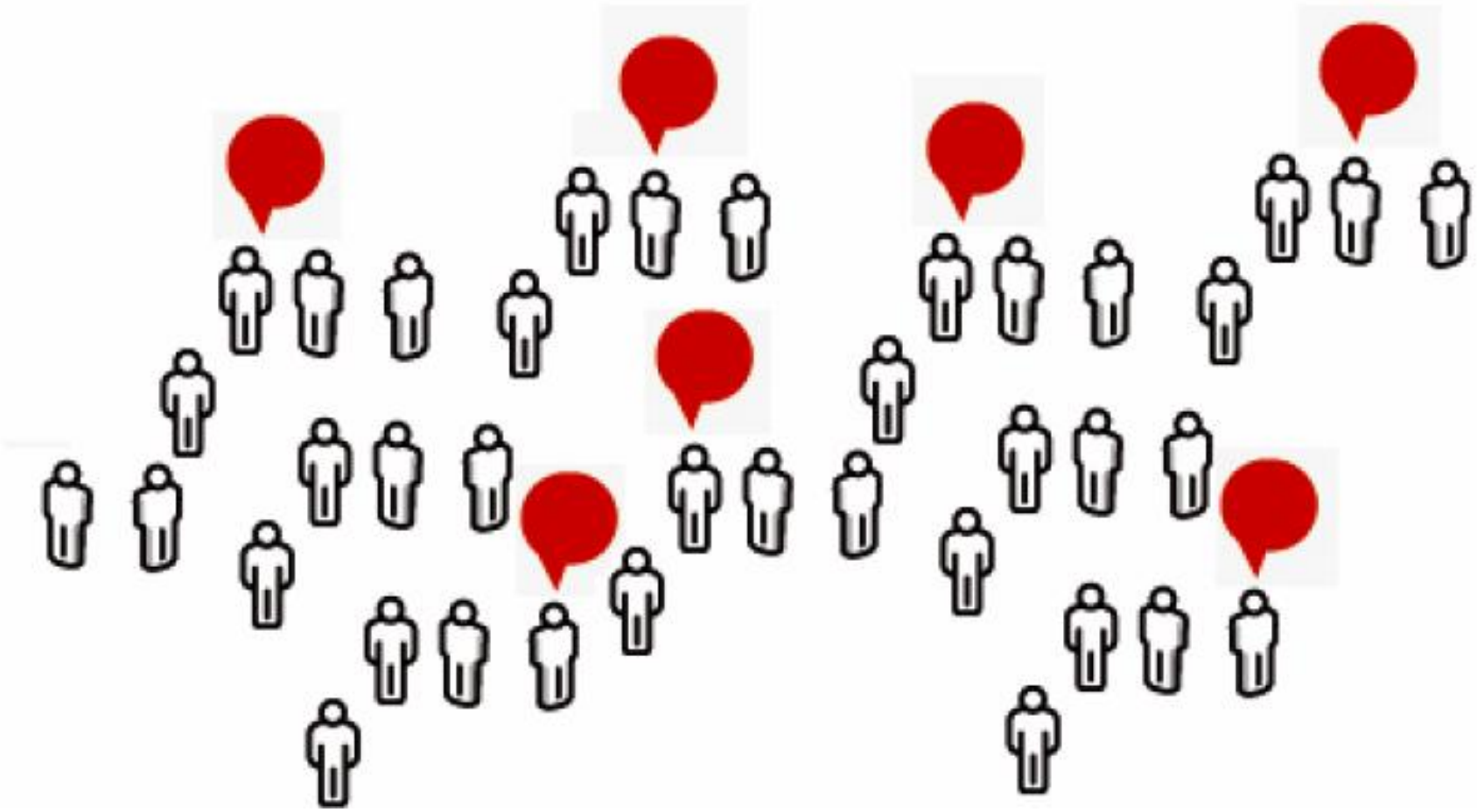
Innovation isn't what innovators do....it's what customers and clients adopt.

Michael Schrage M.I.T.

3



I)

Early in the morning

on February 14, 1876

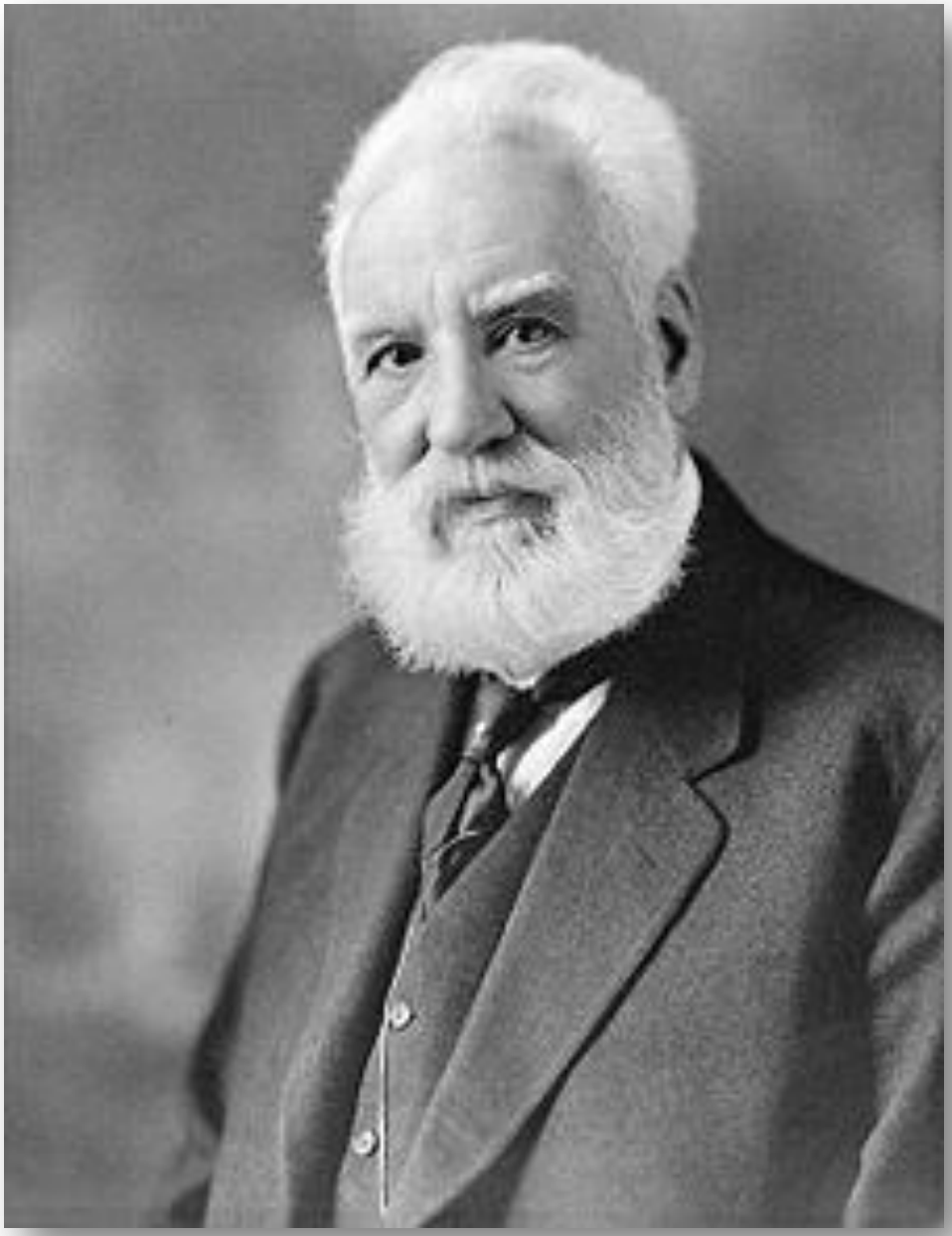

Underwood & Underwood, Publishers
Works and Studios, Washington, D.C.

filled a caveat for a patent

describing a
telephone
that used a
liquid
microphone

and remained in the basket ...

. . .shortly before noon



Bell's lawyer filled a patent and requested that the filing fee be entered immediately onto the cash receipts blotter and that Bell's application be taken to the examiner immediately

Late that afternoon, the fee for Gray's caveat was entered on the cash blotter however, the caveat was not taken to the examiner until the following day.

Gray abandoned his caveat and that opened the door to Bell being granted U.S. Patent I74,465 for the telephone on 7 March I876

2 Sheets—Sheet 1.

A. G. BELL.

TELEGRAPHY.

No. 174,465. Patented March 7, 1876.

Fig. 1

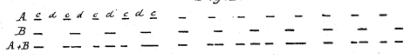


Fig. 2.

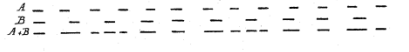


Fig. 3.

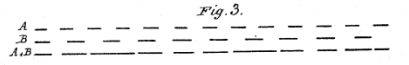


Fig. 4.

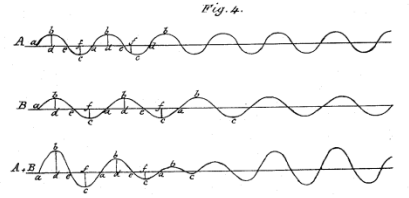
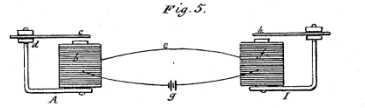


Fig. 5.



Witnesses
Ewell Stock.
W. J. Hutchinson

Inventor:
A. Graham Bell
by Atty's Pollock & Bailey

2 Sheets—Sheet 2.

A. G. BELL.

TELEGRAPHY.

No. 174,465. Patented March 7, 1876.

Fig 6.

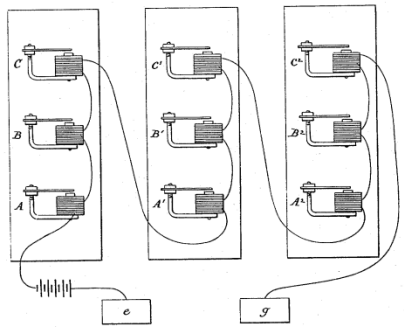
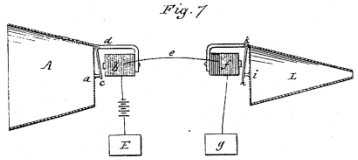


Fig. 7



Witnesses
Ewell Stock.
W. J. Hutchinson

Inventor:
A. Graham Bell
by Atty's Pollock & Bailey

UNITED STATES PATENT OFFICE.

ALEXANDER GRAHAM BELL, OF SALEM, MASSACHUSETTS.

IMPROVEMENT IN TELEGRAPHY.

Specification forming part of Letters Patent No. **174,465**, dated March 7, 1876; application filed February 14, 1876.

To all whom it may concern:

Be it known that I, ALEXANDER GRAHAM BELL, of Salem, Massachusetts, have invented certain new and useful Improvements in Telegraphy, of which the following is a specification:

In Letters Patent granted to me April 6, 1875, No. 161,739, I have described a method of, and apparatus for, transmitting two or more telegraphic signals simultaneously along a single wire by the employment of transmitting-instruments, each of which occasions a succession of electrical impulses differing in rate from the others; and of receiving-instruments, each tuned to a pitch at which it will be put in vibration to produce its fundamental note by one only of the transmitting-instruments; and of vibratory circuit-breakers operating to convert the vibratory movement of the receiving-instrument into a permanent make or break (as the case may be) of a local circuit, in which is placed a Morse sounder, register, or other telegraphic apparatus. I have also therein described a form of autograph-telegraph based upon the action of the above-mentioned instruments.

In illustration of my method of multiple telegraphy I have shown in the patent aforesaid, as one form of transmitting-instrument, an electro-magnet having a steel-spring armature, which is kept in vibration by the action of a local battery. This armature in vibrating makes and breaks the main circuit, producing an intermittent current upon the line-wire. I have found, however, that upon this plan the limit to the number of signals that can be sent simultaneously over the same wire is very speedily reached; for, when a number of transmitting-instruments, having different rates of vibration, are simultaneously making and breaking the same circuit, the effect upon the main line is practically equivalent to one continuous current.

In a pending application for Letters Patent, filed in the United States Patent Office February 25, 1875, I have described two ways of producing the intermittent current—the one by actual make and break of contact, the other by alternately increasing and diminishing the intensity of the current without actually breaking the circuit. The current produced by the latter method I shall term, for distinction sake, a pulsatory current.

My present invention consists in the employment of a vibratory or undulatory current of electricity in contradistinction to a merely intermittent or pulsatory current, and of a method of, and apparatus for, producing electrical undulations upon the line-wire.

The distinction between an undulatory and a pulsatory current will be understood by considering that electrical pulsations are caused by sudden or instantaneous changes of intensity, and that electrical undulations result from gradual changes of intensity exactly analogous to the changes in the density of air occasioned by simple pendulous vibrations. The electrical movement, like the aerial motion, can be represented by a sinusoidal curve or by the resultant of several sinusoidal curves.

Intermittent or pulsatory and undulatory currents may be of two kinds, accordingly as the successive impulses have all the same polarity or are alternately positive and negative.

The advantages I claim to derive from the use of an undulatory current in place of a merely intermittent one are, first, that a very much larger number of signals can be transmitted simultaneously on the same circuit; second, that a closed circuit and single main battery may be used; third, that communication in both directions is established without the necessity of special induction-coils; fourth, that cable dispatches may be transmitted more rapidly than by means of an intermittent current or by the methods at present in use; for, as it is unnecessary to discharge the cable before a new signal can be made, the lagging of cable-signals is prevented; fifth, and that as the circuit is never broken a spark-arrester becomes unnecessary.

It has long been known that when a permanent magnet is caused to approach the pole of an electro-magnet a current of electricity is induced in the coils of the latter, and that when it is made to recede a current of opposite polarity to the first appears upon the wire. When, therefore, a permanent magnet is caused to vibrate in front of the pole of an electro-magnet an undulatory current of electricity is induced in the coils of the electro-magnet, the

Bell Company
New England Telephone and Telegraph Company

1879 National Bell Telephone Company

1880 American Bell Telephone Company


BELL
SYSTEM
AT&T
and Associated Companies

21

in the 1990's

started a company called Fuse to develop the "Dell of the Consumer Electronics." One of the devices he had in mind was a small hard disk-based music player . . .

Fuse failed

Fadell offered the idea to Philips

Fadell offered the idea to Real Networks

in 2001

hires Fadell

Apple assembles a 35 person team lead by Tony Fadell

Philips
IDEO
General Magic
Apple
Connectix
Web TV

wolfson®
microelectronics

TOSHIBA

Texas Instruments

makes I5 /iPod sold

6 months after

Say hello to iPod.

Say goodbye to your hardrive.

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The 30GB, 5th Generation Video iPod of 2005
has around 400 inputs
with an average value of $0.05

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Table 1. The most expensive inputs in the 30GB 5th-generation iPod, 2005

Component	Supplier	Company HQ Location	Manu-facturing Location	Estimated Factory Price	Cost as % of all iPod Parts	Gross Profit Rate	Est'd Value Capture
Hard Drive	Toshiba	Japan	China	$73.39	51%	26.5%	$19.45
Display Module	Toshiba-Matsushita	Japan	Japan	$20.39	14%	28.7%	$5.85
Video/Multimedia Processor	Broadcom	US	Taiwan or Singapore	$8.36	6%	52.5%	$4.39
Portal Player CPU	PortalPlayer	US	US or Taiwan	$4.94	3%	44.8%	$2.21
Insertion, test, and assembly	Inventec	Taiwan	China	$3.70	3%	3.0%	$0.11
Battery Pack	Unknown			$2.89	2%		$0.00
Display Driver	Renesas	Japan	Japan	$2.88	2%	24.0%	$0.69
Mobile SDRAM Memory - 32 MB	Samsung	Korea	Korea	$2.37	2%	28.2%	$0.67
Back Enclosure	Unknown			$2.30	2%	26.5%	
Mainboard PCB	Unknown			$1.90	1%	28.7%	
Subtotal for 10 most expensive inputs				**$123.12**	**85%**		**$33.37**
All other inputs				$21.28	15%		
Total all iPod inputs				$144.40	100%		

Source: Portelligent, Inc., 2006 and authors' calculations

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Table 2. The geography of $190 of the captured value in a single $299 video iPod (very preliminary)

	U.S.	Japan	Korea	Total
Distribution and Retail	$75			$75
Apple	$80			$80
Seven Identified Inputs in Table 1	$7	$26	$1	$34
PortalPlayer suppliers	$1*			$1
TOTAL	**$163**	**$26**	**$1**	**$190**

Note: For this table it is assumed that the unit is sold in the U.S.
* PortalPlayer suppliers could also be located in Taiwan.
Source: Authors' calculations

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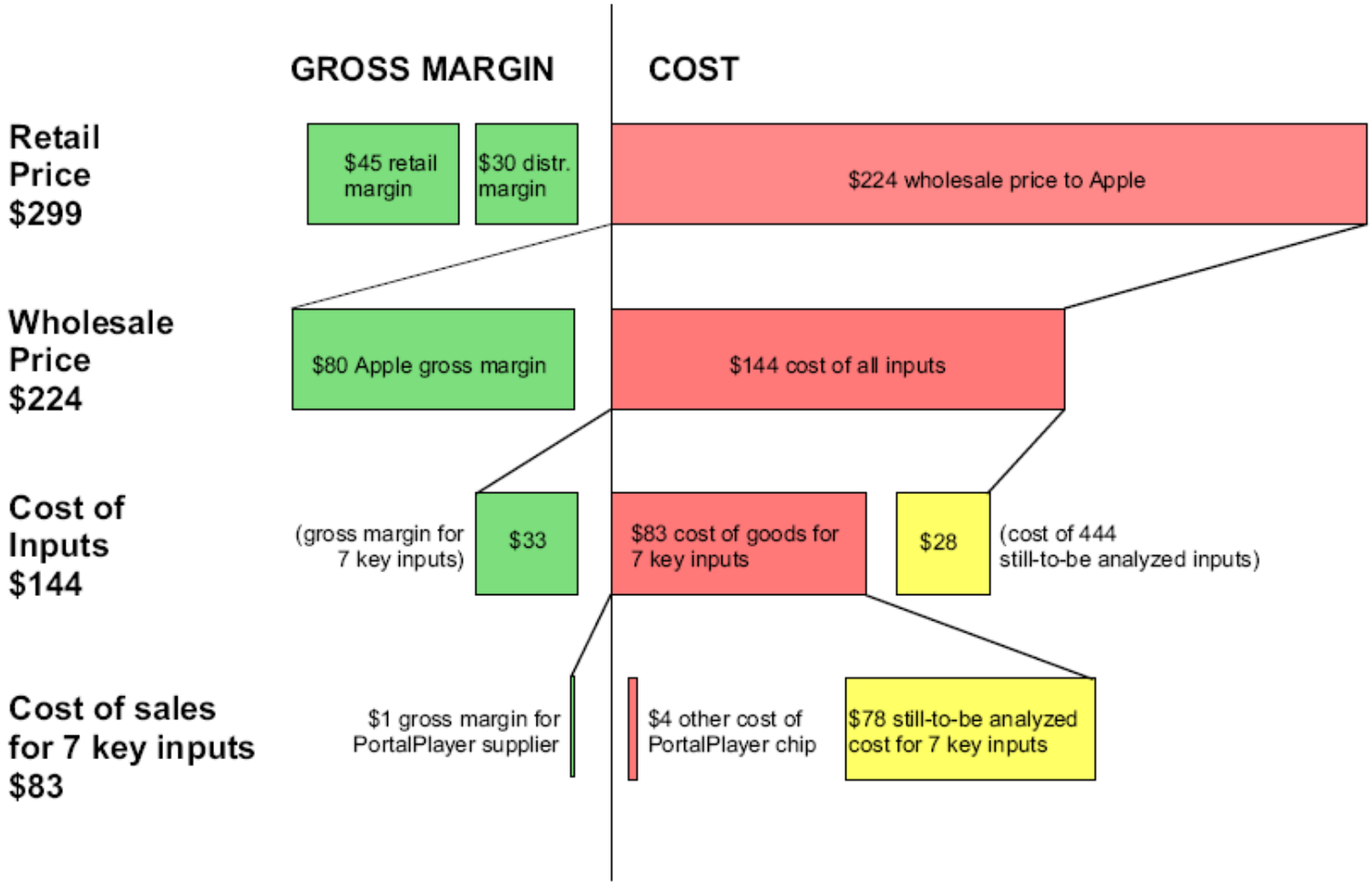
Figure 3. Breakdown of 30GB 5th-generation iPod retail price based on analysis so far



Source: Authors' estimates; see text.

3)


787
BOEING

The previous state of the art in aviation manufacturing was to have global partners work from a common blueprint to produce parts actually, whole sections of the airplane that were then physically shipped to a Boeing assembly plant near Seattle to see if they fit together.

There, successive iterations of the planes were built and refined with onsite teams from around the world.

Instead, on the 787 parts are designed concurrently by partners, and virtually "assembled" in a computer model maintained by Boeing outside its corporate firewall.

Ultimately, completed sections of the plane will be picked up by three specially fitted 747s and carried to a Boeing facility in Everett, Wash.

Thanks to the online modeling, Boeing can now trust its global partners with the process of creating entire sections of the plane, **from concept to production**.

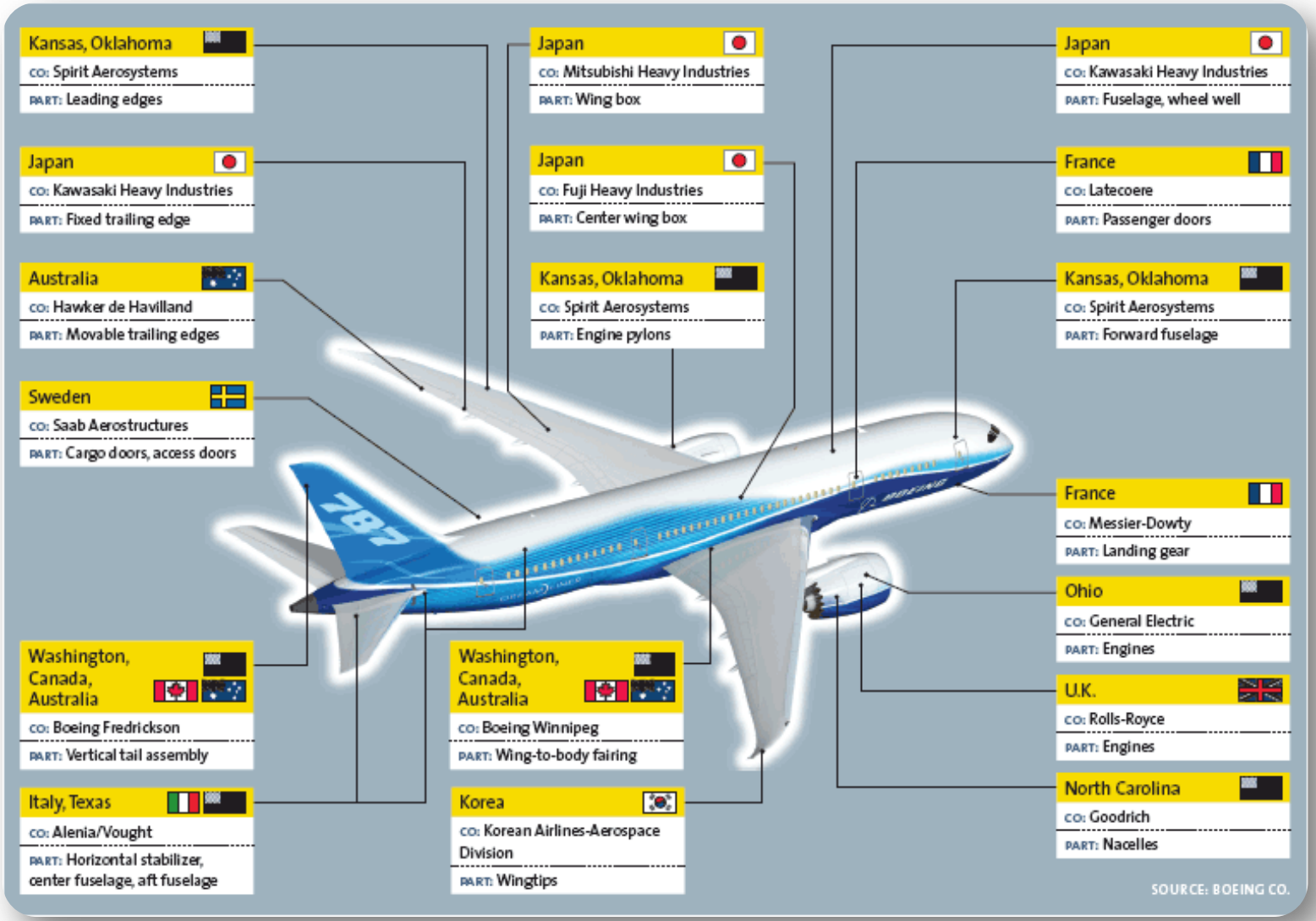
50 partners
130 locations
>4 years

"The design is occurring in Japan, Russia, Italy, the U.S.

This is not merely a PowerPoint or SharePoint collaboration, or looking at two-dimensional drawings to see if a company can bid on a contract.

This is big companies like the Japanese heavies, and our Russian design center, and Boeing in Everett working together. This is something
that creates competitive advantage."

Scott Griffin Vice-president and CIO - Boeing


Kansas, Oklahoma
CO: Spirit Aerosystems
PART: Leading edges
Japan
CO: Kawasaki Heavy Industries
PART: Fixed trailing edge
Australia
CO: Hawker de Havilland
PART: Movable trailing edges
Sweden
CO: Saab Aerostructures
PART: Cargo doors, access doors
Washington, Canada, Australia
CO: Boeing Fredrickson
PART: Vertical tail assembly
Italy, Texas
CO: Alenia/Vought
PART: Horizontal stabilizer, center fuselage, aft fuselage
Japan
CO: Mitsubishi Heavy Industries
PART: Wing box
Japan
CO: Fuji Heavy Industries
PART: Center wing box
Kansas, Oklahoma
CO: Spirit Aerosystems
PART: Engine pylons
Washington, Canada, Australia
CO: Boeing Winnipeg
PART: Wing-to-body fairing
Korea
CO: Korean Airlines-Aerospace Division
PART: Wingtips
Japan
CO: Kawasaki Heavy Industries
PART: Fuselage, wheel well
France
CO: Latecoere
PART: Passenger doors
Kansas, Oklahoma
CO: Spirit Aerosystems
PART: Forward fuselage
France
CO: Messier-Dowty
PART: Landing gear
Ohio
CO: General Electric
PART: Engines
U.K.
CO: Rolls-Royce
PART: Engines
North Carolina
CO: Goodrich
PART: Nacelles
787
SOURCE: BOEING CO.

Customers, including pilots and flight attendants, were asked to provide input before the design was handed off to design partners.

Scott Griffin Vice-president and CIO - Boeing

The new midsize passenger jet, will have an outer shell made of carbon-fiber-reinforced plastic, known as composite, rather than the familiar aluminum skin used on previous generations of airliners.

About half the plane's parts by weight will also be made of this advanced material, which will make it lighter and give the jet better fuel economy than its forebears.

Passengers will notice a difference, too, because the superstrong composite exterior will allow the cabin to be pressurized at much lower altitudes than is possible with metalskinned planes, resulting in a more comfortable ride.

Scott Griffin Vice-president and CIO - Boeing

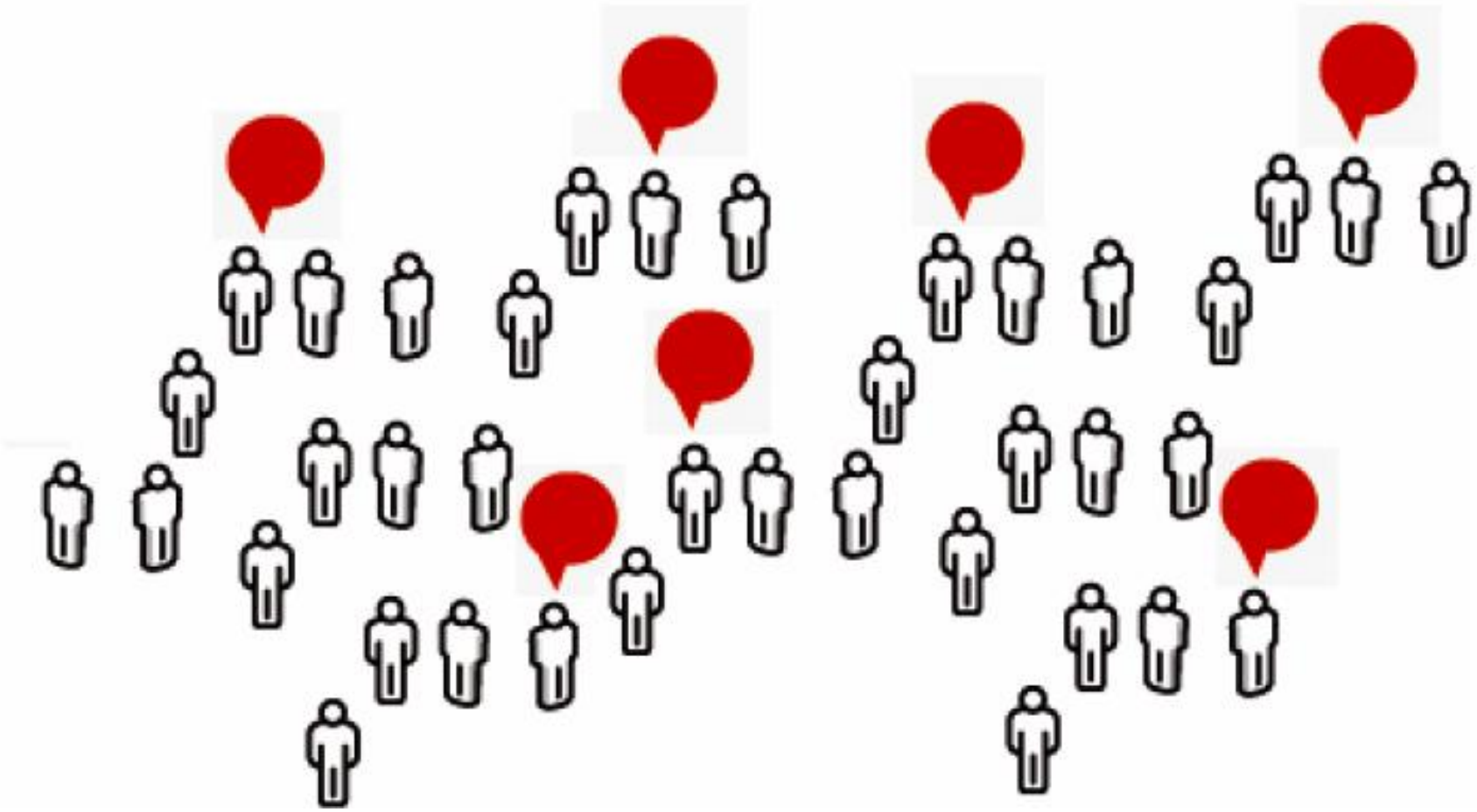
And key internal systems will depend on electronics, instead of on the hydraulic controls that have been used for decades.

Scott Griffin Vice-president and CIO - Boeing

"This kind of collaboration has taken a huge amount of time out of the process.

It's where the big savings are."

Scott Griffin Vice-president and CIO - Boeing



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