

# FACTS

November 2005

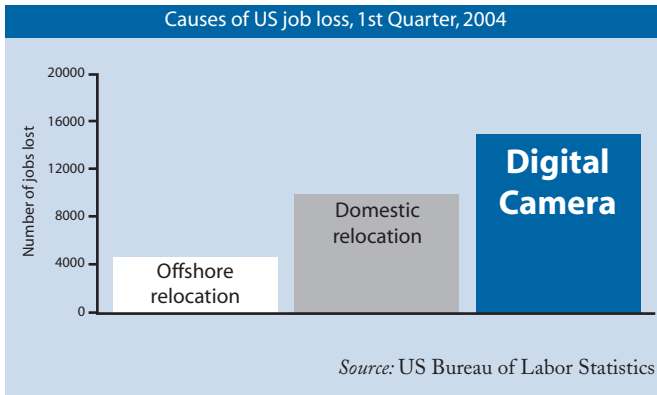
Vol. 44, Number 1

## CREATIVE DESTRUCTION

HOW TECHNOLOGY AND INNOVATION CHANGE THE WAY WE WORK AND LIVE, FOR THE BETTER;

OR

HOW TECHNOLOGY CAN CREATE UNEMPLOYMENT, AND WHY THIS IS A GOOD THING



Pessimists claim that outsourcing threatens our livelihood and employment prospects. In fact, the impact of new technologies is much more significant, and has wide ranging effects and benefits.

YOUR GUIDE TO THE NUMBERS THAT MATTER

*FACTS has been published by the Institute of Public Affairs since 1952. Each edition provides a handy reference of numbers and facts relevant to key policy issues.*

*“There is no reason anyone would want a computer in their home.”*

Ken Olsen, founder of Digital Equipment, in 1977.

*“Drill for oil? You mean drill into the ground to try and find oil? You’re crazy.”*

Drillers who Edwin L. Drake tried to enlist to his project to drill for oil in 1859

## “FUTURE PROOFING” IS IMPOSSIBLE

Things change. New **markets** are found. New **products** are discovered or invented. New **equipment** is used. There are new sources of **labour** or new sources of **raw materials**. There are new **organisational** and **managerial** methods developed. New ways of managing **inventory**, new methods of **transportation**, of **communication**, of **marketing**, and there are often new regulations.

It is impossible to predict where the next invention or innovation that will change how we work and live will come from. What will be the next electricity? The next printing press? The next production line?

**We don’t know.** Innovations can encompass any manner of activity. Incremental, informal modifications of on-the-job practice can result in huge breakthroughs for productivity and competition—the experience of the US retail giant Walmart clearly illustrates this. Dedicated research and development teams with huge budgets can come up with breakthrough innovations, but just as often fail. Meanwhile, small band of hobbyist computer users can revolutionise the way we experience music and movies.

*“The fundamental impulse that sets and keeps the capitalist engine in motion comes from the new consumers, goods, the new methods of production or transportation, the new markets, the new forms of industrial organization that capitalist enterprise creates.”*

- Joseph Schumpeter, Capitalism, Socialism and Democracy

## WHAT IS CREATIVE DESTRUCTION?

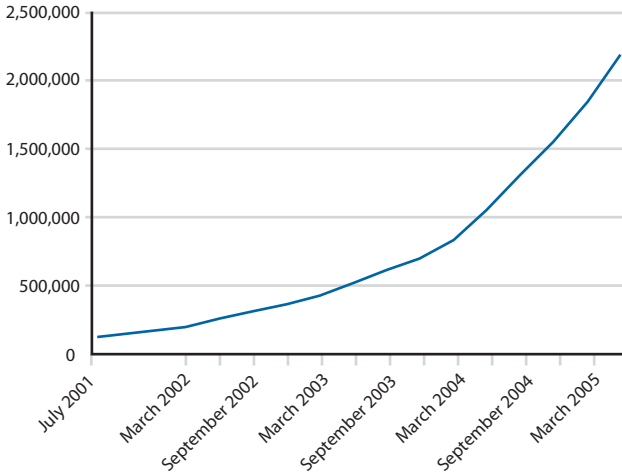
Technological innovation enhances our lives, but can be a cause of unemployment —although usually only temporarily. As technology and innovation create new jobs, old ones are taken away. This is what economist Joseph Schumpeter termed ‘creative destruction’.

<b>New product</b>	<i>Labour needed</i>	<b>Old product</b>	<i>Labour released</i>
<b>Automobile</b>	Assemblers Designers Road builders Petrochemists Mechanics Truck drivers	<b>Horse/carriage Train Boats</b>	Blacksmiths Wainwrights Drovers Teamsters Railway workers Canalmen
<b>Airplane</b>	Pilots Mechanics Flight attendants Travel agents	<b>Train Ocean liner</b>	Railway workers Sawyers Mechanics Ship hands Boilermakers
<b>Plastics</b>	Petrochemists	<b>Steel Aluminium Barrels/tubs Pottery/glass</b>	Miners Founders Metalworkers Coopers Potters Colliers
<b>Television</b>	Electronic engineers Actors Reporters Electricians	<b>Newspaper Theater Movies Radio</b>	Reporters Actors
<b>Computer</b>	Programmers Computer engineers Electrical engineers Software designers	<b>Adding machine Slide rule Filing Paper</b>	Assemblers Millwrights Clerks Tinsmiths Lumberjacks
<b>Fax machine</b>	Programmers Electricians Software designers	<b>Express mail Teletype</b>	Mail sorters Truck drivers Typists
<b>Telephone</b>	Electronic engineers Operators Optical engineers Cellular technicians	<b>Mail Telegraph Overnight coach</b>	Postal workers Telegraph operators Coach drivers
<b>Polio vaccine</b>	Chemists Lab technicians Pharmacists	<b>Iron lung</b>	Manufacturers Attendants

Source: Federal Reserve Bank of Dallas, *The Churn: The Paradox of Progress*, 1992

## CHANGE IS CONSTANT

Australian subscribers to broadband, 2001-05

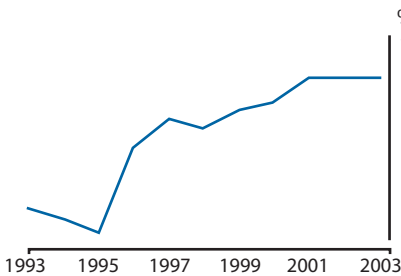


Australian broadband subscriptions have rocketed up over the last four years, from 120 thousand in 2001 to nearly **2.2 million** in July 2005.

Businesses and consumers recognise the substantial benefits that the Internet can provide them, and have rushed to utilise its possibilities.

Source: ACCC, *Snapshot of Broadband Deployment as of June 2005*

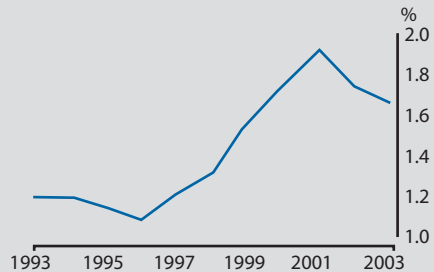
Proportion of managers and professionals in total workforce



Source: ABS, *Measures of Australia's Progress: The measures of Productivity*

“Knowledge workers” can include professionals and managers. These workers increased by **92%** from 1993-2003, whereas total employment rose by just 23%.

Investment in software as a percentage of GDP



Source: ABS, *Measures of Australia's Progress: The measures of Productivity*

Indications of technologies increasing importance to the economy can be gauged by the spending patterns of businesses.

**45%** of Australian homes have digital cameras.

## PHOTOGRAPHY

The first common method of photography was the Daguerreotype, made by exposing the image on a sensitized silver-plated sheet of copper. The resulting prints were highly fragile and difficult to copy.

But the invention of photography meant that portraits were now available on demand for those who could not meet the expense—or spend the time—needed to commission and sit for an oil painting. Nonetheless, a simple photograph could cost well over \$1,000 in 2005 terms.

Today, consumers can buy a 3.2 megapixel camera capable of producing good quality 7 x 5 prints for less than \$150. The cost of taking the photographs themselves is \$0.

Share of US households with telephones and cameras

Year	Telephones	Cameras
1890	2%	1%
1938	35%	44%
1958	77%	80%
1995	94%	94%

Source: Douglas Galbi, *Sense in Communication*, 2003



*The first photo was taken in 1826 by Joseph Nicéphore Niépce. It required over 8 hours of exposure time.*

**Challenged by digital photography, Eastman Kodak is cutting staff 20% by 2007 worldwide. This represents 12,000-15,000 workers.**

## Digital Cameras

- The first digital camera was invented in 1975. It weighed 8-pounds, was the size of a toaster, and recorded a black and white image onto digital cassette tape.
- Its resolution was .01 megapixels. In 2005, consumer level digital cameras are around 5 to 7 megapixels. Camera phones with 2 megapixel resolution are now common—200 times Kodak's 1975 prototype.

## COMMUNICATION

How much time, and how much does it cost to send a page of text across the world?

	Delay for 1 Destination	Delay for 100 Destinations	Cost for 1 Destination	Cost for 100 Destinations
Pre-Railway Mail (1840s)	252 hrs	260.3 hrs	\$0.25	\$107.17
Railway (1850s)	48 hrs	56.3 hrs	\$0.03	\$85.17
Telegraph (1850s)	0.083 hrs	8.3 hrs	\$7.50	\$750.00
Email (2000s)	~0	~0	~0	~0

Source: Thomas W. Malone, *The Future of Work*, 2004

Not only have travel agents been put under pressure from communications technologies, but a whole raft of other industries has been radically altered by innovation, and thousands of jobs changed.

Postal workers and mail sorters have been significantly reduced in number, and in 2005 there are few of the highly skilled telegraph operators. But in 1890, there were no computer programmers, or, for that matter, computer science degrees.

As a result, we communicate with each other much more often.

*Emails sent per day in 2005, worldwide:*  
**136 billion.**

**64%** of this is spam.

- *By the end of 2005, **94%** of Australians will have a mobile phone.*
- **36,000** people work in the Australian mobile phone industry.
- *The industry spends **\$1.3 billion** in wages alone.*

### We are also producing more information than ever before

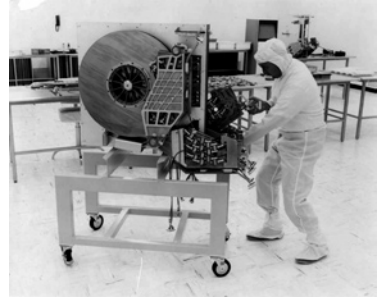
In 2002, print, film, magnetic, and optical storage media produced about *5 exabytes* of new information in 2002. 1 exabyte is equivalent to **37,000 new libraries** the size of the Library of Congress book collections.

Source: University of California at Berkeley, *How Much Information?* 2003

## THE PACE OF TECHNOLOGICAL CHANGE

History has shown us that technology and innovation can uproot entire industries and force people out of work. But it has also shown us that for each job that disappears, many others take its place.

This ‘creative destruction’ betters our lives by making us more productive, enhances our living standards and opens up better and more varied opportunities for every member of society.



*Fixed-head hard disk, early 1970s*

### Cost and capacity of hard drive storage, 1956-2004

Year	Manufacturer	Capacity	Price of drive (US\$)	Cost per megabyte
1956	IBM	5 megabytes	\$50,000	\$10,000
1981	Apple	5 megabytes	\$3500	\$700
1984	Percom/Tandon	15 megabytes	\$2095	\$140
1988	Supra	30 megabytes	\$995	\$33
1995	Seagate	1 gigabyte (~1000 megabytes)	\$849	85¢
1996	Western Digital	1.6 gigabytes	\$399	29.5¢
1997	Quantum	3.2 gigabytes	\$285	10.2¢
1998	Fujitsu	4.3 gigabytes	\$282	7.5¢
1999	Quantum	19.2 gigabytes	\$512	3.07¢
2000	Maxtor	30 gigabytes	\$319	1.19¢
2001	Western Digital	60 gigabytes	\$229	0.43¢
2002	Western Digital	100 gigabytes	\$179	0.2¢
2003	Maxtor	120 gigabytes	\$168	0.15¢
2004	Western Digital	250 gigabytes	\$249	0.11¢

Source: <http://www.littletechshoppe.com/ns1625/winchest.html>

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