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Getting closer

But eastern and western Germany may never quite meet

THE capitalist West had Kodak, Agfa and Fuji. East Germany snapped its photos on ORWO film, which had drawbacks. The images were easily smudged and the colours were weird. In Wolfen, where ORWO was manufactured, people said you could develop the film by dipping it in the river Mulde. Neighbouring Bitterfeld, a hub of the East German chemical industry, was known as the 'œdirtiest city in Europe'.

Since German unification in 1990 the federal and state governments have spent â,-230m on detoxifying the area. ORWO no longer makes film. Bitterfeld still produces chemicals, but hundreds of well-groomed firms have replaced the cheerless Kombinat (industrial conglomerate), and the chemical park now looks out over a nature reserve. Next to Wolfen is Solar Valley, a cluster of renewable-energy companies. ...

Much to learn

Germany's education system is a work in progress

GERMANY invented the modern university but long ago lost its leading position to other countries, especially America. These days the land of poets and thinkers is prouder of its 'dual system' for training skilled workers such as bakers and electricians. Teenagers not bound for university apply for places in three-year programmes combining classroom learning with practical experience within companies. The result is superior German quality in haircuts as well as cars. Dual training 'is the reason we're the world export champion', says Mrs Schavan, the education minister. Azubis (trainees) acquire not just a professional qualification but an identity.

But the dual system is under pressure. The number of places offered by companies has long been falling short of the number of applicants. Almost as many youngsters move into a 'transitional system', a grab-bag of remedial education programmes designed to prepare them for the dual system or another qualification. Often it turns out to be a dead end, especially for male immigrants. ...

A muted normality

United Germany is becoming more comfortable in its skin

“GERMANY is plagued by a severe economic malaise and by uncertainty about its place in the world,” wrote *The Economist* in a special report in 2002. A lot has changed in eight years. These days Germany lectures other countries on economic management and sends troops to Afghanistan. It may still not be a “normal” country. But now that the Federal Republic is a matronly 60 and unification is approaching a post-adolescent 20, the likely shape of normality is becoming clearer.

Germany has become more at ease with itself. That became obvious during the football World Cup held in Germany in 2006, when its black, red and gold flag fluttered above cars and balconies as though patriotism had never gone out of fashion. Atonement for Germany’s awful past is woven into the constitution and still shapes foreign and domestic policies; it is one reason why Germany is Israel’s best friend in Europe. But now it is invoked less often as an excuse to avoid doing something that would otherwise make sense. The economic crisis, ironically, has been a psychological boost; to Germans, the social-market economy looks more like a solution than a cause. ...

Inside the miracle

How Germany weathered the recession

“THIS is what we love,” exclaims Jan Stefan Roell, presenting an intricately worked ingot of gleaming steel as though it were a piece of jewellery. It belongs somewhere in the innards of a testing machine made by Zwick Roell, the firm he owns. One model rips the eyes off teddy bears (to see if children can), another pokes computer keyboards. Mr Roell wants the visitor first to admire the part, next the Swabian craftsmen who fashioned it and then the German genius for making expensive and indispensable things. His customers expect German thoroughness, he says.

Ulm-based Zwick Roell, which has 950 employees and sales of €150m (\$202m) a year, is a typical Mittelstand firm. Until the 1930s it made buttons from cow horn imported from Argentina, but when plastic took over it switched to testing machines. Like many Mittelstand enterprises Zwick works backstage, making things that are used in making other things. The thousands of Zwick-like firms that constitute the engineering sector are a cornerstone of Germany’s industrial economy. They employ nearly 1m workers, more than any other industry, and export almost 80% of their production. Often the product is not merely a machine, but also a panoply of services that go with it. ...

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Steady as she goes

Angela Merkel and the art of the possible

IT IS hard to think of another big country where a recent election was such a non-event. Both America and Japan responded to the economic crisis by electing governments of a different colour, and Britain may do the same in a few months' time. In Germany, after a flaccid campaign last September, voters made a judicious adjustment. Angela Merkel was re-elected as chancellor but the grand coalition she had been heading did not survive. Her conservative union—the CDU plus its Bavarian sibling, the Christian Social Union (CSU)—acquired a new coalition partner, the liberal Free Democratic Party.

The result was both an endorsement and a rebuke. Voters rewarded Mrs Merkel for her deft handling of the economic crisis. Polls show that Germans' trust in government rose during the crisis. Yet turnout in the election was a record low of 71%, and the two big parties that have dominated post-war politics were humiliated. The SPD's 23% of the vote was a disaster, and the CDU and CSU's combined 34% was their worst result in 50 years. Only the strong showing of the FDP, which won a record 15% of the vote, spared Mrs Merkel from having to continue a grand coalition that her party did not want. ...

What a waste

Germany scandalously underuses immigrants and women

HEINZ BUSCHKOWSKY, the mayor of the Berlin district of Neukolln, is famous for being blunt. He is in charge of an ethnic goulash: 140,000 of his 305,000 constituents are Turks, Arabs, Yugoslavs or other migrants. The local unemployment rate is 26%, and probably twice that among the immigrants. Work disappeared when subsidies to industry were withdrawn after the fall of the Berlin Wall. But Neukollners are all too willing to live off Hartz IV social-security benefits, which provide a family with children with enough to get by. "Long-term welfare paralyses people," Mr Buschkowsky observes, sounding more like an American Republican of the 1980s than a leading member of Berlin's Social Democratic Party. Children grow up thinking "money comes from the state," drop out of school and then raise children who repeat the cycle.

Neukolln's problems loom large partly because it is in Berlin which, unlike Paris or London, is poorer than the country it governs. In Ulm, which has more factories, Hartz IV is a less appealing option. Still, Mr Buschkowsky's message matters anywhere in Germany. He lambasts not only welfare dependency but also conservative shibboleths like the three-tier high-school system ("once at the bottom, always at the bottom") and paying women to stay at home with their children (he thinks the money would be better spent on pre-school education so that immigrant children could learn proper German). He is equally impatient with liberal multiculturalism. Immigrants have a chance, he says, "when they not only live in Europe but become European". ...

Older and wiser

For all its stolid reputation, Germany has become surprisingly flexible, says Brooke Unger (interviewed here). But it needs to keep working at it

ULM, like many German towns, is arrayed around a central church like an expectant congregation. Its Gothic spire is the tallest in the world. The city is also famous for being the birthplace of Albert Einstein. But Ulmers do not live in the past. They are too busy making things, or working out how to make them better, and dispatching them to the rest of the world. The family-owned Mittelstand firms that cluster in and around this modest town alongside the Danube river were among the prime beneficiaries of Germany's export boom, the main source of growth until the world economy slumped in late 2008.

That disaster has not shaken Ulm's self-confidence. Since the financial crisis Germany's economy has shrunk more than most, by around 5% in 2009 (see chart 1). That of Baden-Wurttemberg, Ulm's home state, dived by as much as 8%. But the region around Ulm itself held up better than the rest of the state because its economy is diversified, reckons Otto Salzle, managing director of the region's chamber of industry and commerce. Some local firms are in hard-hit industries like cars and machine tools but many are not: Ulm also makes pharmaceuticals and James Bond's favourite firearm, the Walther PPK. The region's unemployment rate rose from 3.3% to 4.6%, still well below the national rate. "We are the strongest region in Germany," crows Mr Salzle. ...

Sources and acknowledgments

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Sources ...

The green machine

A second wind for German industry?

THE Roding Roadster, a sports car unveiled at last September's Frankfurt motor show, has a powerful motor and lightweight construction that promise a thrilling ride. But at Munich's Technical University (TUM), which the Roding's designers attended, there is even more buzz about the Tesla, a battery-powered car from California. It shows that electro-mobility "could be fast and fun", says Markus Lienkamp, who teaches car technology at TUM. Annoyingly, Tesla opened a dealership in Munich on BMW's doorstep.

Germany invented the modern internal-combustion engine and intends to be a leader in any future automotive technology. It has helped to spread the idea that modern life can be transposed into planet-friendly technology. The government's promise to put 1m electric cars on the road by 2020 is one of many initiatives to ensure that Germany cashes in. So Tesla's brash entrance into the green enclosure was met with a mixture of derision and fear. Surely slapdash American engineering will be put to shame by the inventive perfectionism of the German Tuftler, car folk mutter. But that is a hope, not a certainty. Mr Lienkamp welcomes the threat. "When a German engineer gets angry," he advises, "watch out. ..."

Handling the cornucopia

The best way to deal with all that information is to use machines. But they need watching

IN 2002 America's Defence Advanced Research Projects Agency, best known for developing the internet four decades ago, embarked on a futuristic initiative called Augmented Cognition, or "AugCog". Commander Dylan Schmorrow, a cognitive scientist with the navy, devised a crown of sensors to monitor activity in the brain such as blood flow and oxygen levels. The idea was that modern warfare requires soldiers to think like never before. They have to do things that require large amounts of information, such as manage drones or oversee a patrol from a remote location. The system can help soldiers make sense of the flood of information streaming in. So if the sensors detect that the wearer's spatial memory is becoming saturated, new information will be sent in a different form, say via an audio alert instead of text. In a trial in 2005 the device achieved a 100% improvement in recall and a 500% increase in working memory.

Is this everybody's future? Probably not. But as the torrent of information increases, it is not surprising that people feel overwhelmed. "There is an immense risk of cognitive overload," explains Carl Pabo, a molecular biologist who studies cognition. The mind can handle seven pieces of information in its short-term memory and can generally deal with only four concepts or relationships at once. If there is more information to process, or it is especially complex, people become confused. ...

Needle in a haystack

The uses of information about information

AS DATA become more abundant, the main problem is no longer finding the information as such but laying one's hands on the relevant bits easily and quickly. What is needed is information about information. Librarians and computer scientists call it metadata.

Information management has a long history. In Assyria around three millennia ago clay tablets had small clay labels attached to them to make them easier to tell apart when they were filed in baskets or on shelves. The idea survived into the 20th century in the shape of the little catalogue cards librarians used to note down a book's title, author, subject and so on before the records were moved onto computers. The actual books constituted the data, the catalogue cards the metadata. Other examples include package labels to the 5 billion bar codes that are scanned throughout the world every day. ...

New rules for big data

Regulators are having to rethink their brief

TWO centuries after Gutenberg invented movable type in the mid-1400s there were plenty of books around, but they were expensive and poorly made. In Britain a cartel had a lock on classic works such as Shakespeare's and Milton's. The first copyright law, enacted in the early 1700s in the Bard's home country, was designed to free knowledge by putting books in the public domain after a short period of exclusivity, around 14 years. Laws protecting free speech did not emerge until the late 18th century. Before print became widespread the need was limited.

Now the information flows in an era of abundant data are changing the relationship between technology and the role of the state once again. Many of today's rules look increasingly archaic. Privacy laws were not designed for networks. Rules for document retention presume paper records. And since all the information is interconnected, it needs global rules. ...

The open society

Governments are letting in the light

FROM antiquity to modern times, the nation has always been a product of information management. The ability to impose taxes, promulgate laws, count citizens and raise an army lies at the heart of statehood. Yet something new is afoot. These days democratic openness means more than that citizens can vote at regular intervals in free and fair elections. They also expect to have access to government data.

The state has long been the biggest generator, collector and user of data. It keeps records on every birth, marriage and death, compiles figures on all aspects of the economy and keeps statistics on licences, laws and the weather. Yet until recently all these data have been locked tight. Even when publicly accessible they were hard to find, and aggregating lots of printed information is notoriously difficult. ...

A different game

Information is transforming traditional businesses

IN 1879 James Ritty, a saloon-keeper in Dayton, Ohio, received a patent for a wooden contraption that he dubbed the "incorruptible cashier". With a set of buttons and a loud bell, the device, sold by National Cash Register (NCR), was little more than a simple adding machine. Yet as an early form of managing information flows in American business the cash register had a huge impact. It not only reduced pilferage by alerting the shopkeeper when the till was opened; by recording every transaction, it also provided an instant overview of what was happening in the business.

Sales data remain one of a company's most important assets. In 2004 Wal-Mart peered into its mammoth databases and noticed that before a hurricane struck, there was a run on flashlights and batteries, as might be expected; but also on Pop-Tarts, a sugary American breakfast snack. On reflection it is clear that the snack would be a handy thing to eat in a blackout, but the retailer would not have thought to stock up on it before a storm. The company whose system crunched Wal-Mart's numbers was none other than NCR and its data-warehousing unit, Teradata, now an independent firm. ...

Show me

New ways of visualising data

IN 1998 Martin Wattenberg, then a graphic designer at the magazine SmartMoney in New York, had a problem. He wanted to depict the daily movements in the stockmarket, but the customary way, as a line showing the performance of an index over time, provided only a very broad overall picture. Every day hundreds of individual companies may rise or fall by a little or a lot. The same is true for whole sectors. Being able to see all this information at once could be useful to investors. But how to make it visually accessible?

Mr Wattenberg's brilliant idea was to adapt an existing technique to create a "Map of the Market" in the form of a grid. It used the day's closing share price to show more than 500 companies arranged by sector. Shades of green or red indicated whether a share had risen or fallen and by how much, showing the activity in every sector of the market. It was an instant hit and brought the nascent field of data visualisation to a mainstream audience. ...

Data, data everywhere

Information has gone from scarce to superabundant. That brings huge new benefits, says Kenneth Cukier (interviewed here)â€”but also big headaches

WHEN the Sloan Digital Sky Survey started work in 2000, its telescope in New Mexico collected more data in its first few weeks than had been amassed in the entire history of astronomy. Now, a decade later, its archive contains a whopping 140 terabytes of information. A successor, the Large Synoptic Survey Telescope, due to come on stream in Chile in 2016, will acquire that quantity of data every five days.

Such astronomical amounts of information can be found closer to Earth too. Wal-Mart, a retail giant, handles more than 1m customer transactions every hour, feeding databases estimated at more than 2.5 petabytesâ€”the equivalent of 167 times the books in Americaâ€™s Library of Congress (see article for an explanation of how data are quantified). Facebook, a social-networking website, is home to 40 billion photos. And decoding the human genome involves analysing 3 billion base pairsâ€”which took ten years the first time it was done, in 2003, but can now be achieved in one week. ...

Clicking for gold

How internet companies profit from data on the web

PSST! Amazon.com does not want you to know what it knows about you. It not only tracks the books you purchase, but also keeps a record of the ones you browse but do not buy to help it recommend other books to you. Information from its e-book, the Kindle, is probably even richer: how long a user spends reading each page, whether he takes notes and so on. But Amazon refuses to disclose what data it collects or how it uses them.

It is not alone. Across the internet economy, companies are compiling masses of data on people, their activities, their likes and dislikes, their relationships with others and even where they are at any particular moment—and keeping mum. For example, Facebook, a social-networking site, tracks the activities of its 400m users, half of whom spend an average of almost an hour on the site every day, but does not talk about what it finds. Google reveals a little but holds back a lot. Even eBay, the online auctioneer, keeps quiet. ...

All too much

Monstrous amounts of data

QUANTIFYING the amount of information that exists in the world is hard. What is clear is that there is an awful lot of it, and it is growing at a terrific rate (a compound annual 60%) that is speeding up all the time. The flood of data from sensors, computers, research labs, cameras, phones and the like surpassed the capacity of storage technologies in 2007. Experiments at the Large Hadron Collider at CERN, Europe's particle-physics laboratory near Geneva, generate 40 terabytes every second—orders of magnitude more than can be stored or analysed. So scientists collect what they can and let the rest dissipate into the ether.

According to a 2008 study by International Data Corp (IDC), a market-research firm, around 1,200 exabytes of digital data will be generated this year. Other studies measure slightly different things. Hal Varian and the late Peter Lyman of the University of California in Berkeley, who pioneered the idea of counting the world's bits, came up with a far smaller amount, around 5 exabytes in 2002, because they counted only the stock of original content. ...



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