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Green IT
FOR
DUMMIES®

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Introduction

Welcome to *Green IT For Dummies*, your guide to ways in which IT can help your organisation to go green and minimise its environmental impact. The computer industry impacts the environment during the manufacturing, delivery, operation and end-of-life of its devices. This book gives you some pointers for how you can decrease that impact. At the same time, IT can help other parts of your organisation to become more environmentally friendly, in the areas of transport, energy, and more. We hope that after reading this book you'll feel inspired to put some of the ideas into action – it's easier than you think!

About This Book

This book sets out the opportunities to reduce your environmental impact through the use of IT. We cover ways in which information and communications technologies can support a greener way of working and how IT itself can minimise its impact on the environment.

Foolish Assumptions

In writing this book, we assume that you fall into one of these categories:

- ✓ You hold a senior position in an organisation (whether large, medium or small) and are wondering how to maintain or even improve performance while following a more sustainable environmental agenda.

- ✔ You hold a senior position in the IT department and are wondering how to reduce your energy consumption, your general environmental impact and help the organisation meet its environmental goals.
- ✔ You're a concerned employee who feels that your organisation could do more for the environment.

How This Book Is Organised

Green IT For Dummies is organised into five small but perfectly formed parts:

- ✔ **Part I: Gearing Up to Go Green.** This part explores what motivates organisations to go green, and what IT's role is in that change.
- ✔ **Part II: Cleaning Up IT.** Next up we share ideas for how IT itself can go greener.
- ✔ **Part III: Greening Your Organisation.** You've cleaned up IT, but how can IT help the rest of your organisation clean up its act?
- ✔ **Part IV: Changing Staff Attitudes and Taking Action.** In this part we inspire you with practical steps you and your organisation can take towards a more sustainable future.
- ✔ **Part V: Ten Greenspirational Links.** Here you can find websites for further reading, tips and inspiration.

Icons Used in This Book

We highlight crucial text for you with the following icons:



The target highlights particularly useful advice.



The knotted string reminds you to bear these points in mind as you read on.



This icon highlights a real-world example of what we've been talking about.

Where to Go from Here

Have you ever read one of those books that lets you pick different ways to get to the ending? Well, think of this book in the same way. You can take the traditional route and read it straight through. Or you can use the section headings as your guide. Whichever way you choose, you can't go wrong. Both paths lead to the same objective – a clear understanding of how IT and the use of IT can reduce your organisation's environmental impact while also bringing commercial benefits.

Part I

Gearing Up to Go Green

.....

In This Part

- ▶ Considering motivations for change
 - ▶ The role of IT
-

You can barely move at the moment without being urged to make green changes to your lifestyle. And, at one level, doing so is very straightforward. It's relatively easy to cut travel, recycle your newspapers and glass or take a shower instead of a bath. And, indeed, the accumulated environmental impact of such actions is considerable. But, while these choices may be second nature to you as an individual, research conducted by Freeform Dynamics among almost 1,500 information professionals worldwide suggests that few organisations are motivated by green issues for their own sake (see Figure 1-1).

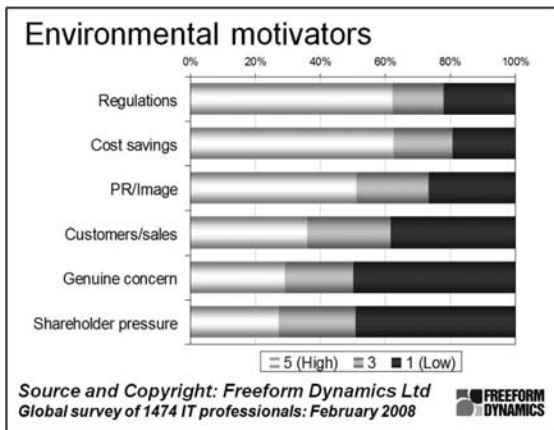


Figure 1-1: Drivers of environmental initiatives.

Getting Motivated to Change

When the benefits of changing to greener products or systems are expressed in terms of money, risk or brand, organisations start to sit up and take notice.

Fortunately, as we explain in this book, you can align these legitimate business concerns with the broader issue of leaving a planet worth living on for our descendants.



Carbon dioxide and its equivalents, such as methane and nitrous oxide (referred to, collectively, as CO₂e) are the main focus of concern for governments and other organisations.

These harmful emissions provide a convenient yardstick by which progress can be measured with respect to climate change. But some activities connected to IT harm the planet and the people on it in other ways as well. Certain manufacturing processes pollute the air, the soil and the water and deplete non-renewable resources. Such actions bring short-term benefits but they're unsustainable over a longer timescale.

The IT community – as well as the rest of the world – is becoming increasingly aware of the need for sustainable development that ‘meets the needs of the present without compromising the ability of future generations to meet their own needs’. That quote comes from the first major report on the subject, ‘Our Common Future’, which was published by the United Nations World Commission on Environment and Development in 1987 (often referred to as the Brundtland Report; see the link in Part V).

The role of IT

IT-related CO₂e emissions alone have been estimated at two per cent of the world's total. Not only can everyone work together to reduce this figure, but IT itself can support the greening of other processes as well (the remaining 98 per cent!). We explore how IT can help to clean up your organisation in Part III.

Stretching your mind to think in terms of lifecycles



Don't follow the herd and restrict your thoughts to CO₂ emissions. Think in terms of 'before, during and after' a product's lifetime when considering the impact on the environment. Whether it's energy, equipment or ancillary supplies, each comes with:

- ✓ An intrinsic environmental impact
- ✓ An operational impact
- ✓ An end-of-life impact

The good news is that manufacturers are improving their processes at each of these life stages, from minimising harm 'before' use by employing cleaner and leaner sourcing and manufacturing techniques, by designing products that consume less energy and materials 'during' use and helping with reuse and recycling 'after' use. Manufacturers are also beginning to produce environmental information that you can use when making your buying choices.

Read on to find out about how to clean up IT and how IT can help clean up your organisation.

Part II

Cleaning Up IT

.....

In This Part

- ▶ Balancing benefits and costs
 - ▶ Considering the lifecycle of IT products
-

In this part we consider the ways you can clean up IT in your organisation. No, we're not talking about those naughty pictures on the account manager's PC, but how you can reduce the environmental impact of IT before you buy IT devices, during their lifetime, and after you've finished with them.

Balancing the Benefits and Costs of Going Green

The reach of IT is wide, from a hand-held device such as a BlackBerry to a data centre; from office printers to building management. And every element provides an opportunity to reduce environmental harm. Sometimes the benefits accrue immediately and sometimes they take longer. Sometimes you need to change behaviour and at other times you need a change in procurement or operational systems.



The trick is to balance any negative consequences of making changes against the practical benefits to the organisation. Think about installing a wind turbine on an urban bungalow roof. Would the energy savings ever compensate for the environmental consequences of its manufacture?

Before: Purchasing Strategies



A good way to start cleaning up your IT is to include environmental questions in your purchasing requests. Questions such as ‘Are you ISO 14001 certified?’ or ‘Do the devices meet energy or environmental certifications?’ encourage your IT suppliers to demonstrate the environmental credentials of their company and the products you’re buying.

You can find many public databases where suppliers offer information about themselves and their products (check out EPEAT and the Carbon Disclosure Project described in Part V). Many goods come with labels certifying their environmental standards, such as their recyclability, their avoidance of harmful chemicals, their energy efficiency, and so on.



Your aim in purchasing should be to look at the *whole life* implications of your acquisitions, including the opportunities for reusing or recycling products when you’ve finished with them.

During: A Day in the Life of IT Products

Once you've chosen the products that meet your specifications and environmental expectations, you need to think about how they're used.

In the office

Look around any office and you'll probably see computers and printers lying idle. Unless the devices have a recognised environmental certification or label, or they have a sleep mode, they're burning up at least half as much power when idle as when they're working flat out.



When you're not using them, drop devices into sleep mode, ready for you when you come back. Ideally, if you're going to be away for a while, you can just turn things off. Don't forget that machines with external power supplies draw current, even when the device itself is switched off. If the charger feels warm, it's drawing current.

Consider your printers. Maybe your office doesn't need so many. Many companies have found that by reducing the number of printers, they not only cut energy bills, but they also cut down on paper (people are less inclined to print unnecessarily when it means an arduous trek to the other side of the office!). Much of the time documents can be read, reviewed and shared on screen, further cutting the need for hard copy. Reducing printing means saving paper and toner or ink, all of which saves resources, keeps costs down and reduces environmental harm into the bargain.

Depending on your setup and business needs, a *thin client* approach might be worth considering. This is where you have a low-power device on your desktop instead of the PC processor box, and all the meaty work takes place in the data centre. All that's sent between your device and the data centre are the keyboard, video and mouse signals. These devices take out a lot of the hassle of desktop computing because they're inherently more secure and software updates happen at the centre. And another piece of good news is that they don't have to be upgraded every two, three or four years. It's not unusual for them to be in use after eight years (and that's longer than the shelf-life of a Pop Idol winner).



Think about replacing your monitor screens, especially if they're cathode ray tubes, which consume power continuously and were designed with no thought to recycling. Instead, buy flat screen monitors that consume little or no energy when in standby mode. Some shift to standby mode automatically after a certain period of inactivity.

Out of the office

Most people use either a laptop or a PDA, or both, when they're on the move. These bring new issues. For example, do you leave mobile phone, notebook and PDA chargers plugged in to a live power supply, even when nothing's being charged? What do you do with your mobile phones at the end of their life? Most people put them away in a drawer 'just in case' rather than reusing or recycling them. Instead, look out for recycling schemes, ranging from bulk collections (ideal for out-of-date office mobiles) to freepost addresses for small quantities. Equipment is refurbished when

possible or stripped for precious metals and components when not. (Remember to include the power supply when returning used equipment.)

Consider using remote thin clients or even more powerful, but still thin, laptop or notebook devices on which you can continue working even when disconnected from the network, to save even more energy.

In the data centre

Data centres consume a lot of electricity and this demand, along with the size of the associated utility bill, attracts boardroom attention. The computers, storage devices and air-conditioning equipment are usually working fairly inefficiently so you can have a big impact here.

Many server computers run at less than 30 per cent capacity and, although more effective than the average desktop machine, this isn't using them to their fullest potential. If you can double the amount of work each processor does, you can halve the number of devices in use and cut the overall environmental impact.



A common way to achieve this is with virtualisation software which enables applications to run wherever there's room for them. Previously, a server might have run a single application. Now each one can run a mix of jobs and earn its keep more effectively. Reducing the amount of equipment releases space and liberates the redundant machines for reuse or recycling.

With more sophisticated sensing and localised air conditioning controls, parts of the data centre can run at different temperatures. Also, modern electronic

equipment can run at much higher temperatures than before, which brings two benefits:

- ✓ The data centre requires less energy overall because the cooling systems do less work
- ✓ When air temperatures are higher, recovering and reusing the waste heat is easier

Some organisations reuse waste heat for warming adjacent areas, cutting the energy required for that task. For example, one publisher warms the air of the editorial offices and the print room, another company warms a local swimming pool using a heat exchanger, while another redirects the air to keep the frost off car windows in cold weather. The last application doesn't really save money, but it keeps staff happy.

The opposite of dealing with the heat is chilling the air before pumping it into the computer room so the machines don't overheat. You can cut the energy bill by getting help from the outside environment. In cool seasons, you can use this outside air as a source for your chiller. This is sometimes referred to as 'free cooling'.

Data centres no longer need to be near users. Some companies have sited new data centres near readily-available sources of renewable energy such as hydro-electric or even geothermal, solar and tidal power in specific regions.



The only truly secure source of sustainable power is a local, directly connected, renewable supply, possibly one which you own yourself. If you're drawing from the National Grid, even if you've signed up for 'green energy', you'll fall victim to any supply restrictions.

After: What Happens Next?

After you've finished with your IT products, what happens when they're no longer needed?

In nature, organic materials rot down and feed future growth, so why not dismantle products at the end of their lives and use the elements as raw materials for future products? Several reputable computer manufacturers use metal and easily-separated plastics in order to maximise raw material reuse.



It's important that the environmental costs of recovery don't exceed the benefits expected. And that, of course, loops back to design in the first place.

The priorities for all material things are reduce, reuse and recycle - in that order of importance. If you can extend the working life of your IT products, you reduce the environmental consequences of mining, manufacture, packaging, shipping and disposal. Can you upgrade something rather than finish using it? If you have to replace it, can someone else inside your organisation use it? If not, charities and refurbishing organisations may be able to extend the product's life. And, waiting at the end of the line, many organisations, including some manufacturers themselves, are willing to take equipment back and recycle the components into new products.

Part III

Greening Your Organisation

.....

In This Part

- ▶ Reducing the need for travel
 - ▶ Reusing energy
-

IT can clean up its own act, as we explained in Part II, but greater gains can come from using computers to reduce emissions and other undesirable effects outside of IT.

So how can IT help companies to become greener?

Air Smiles: Transportation

If your business naturally involves a lot of air or road travel then you can achieve immediate savings and lessen your impact on the environment by trying to take fewer journeys and using electronic communication instead. Videoconferencing doesn't have to cost a fortune and it can repay its cost with the savings in long distance flights and hotel stays very quickly. It won't replace all face-to-face situations but videoconferencing is especially effective in smaller meetings of up to about 12 people, when the participants already know each other. Once installed, you can use it for those ad hoc meetings that oil the organisational

wheels but would never be considered if travel were required. The same goes for the lower-tech, but no less useful, web meetings and *webinars*, where people can share content and interact with each other through their webcams and PC screens.

If home working or flexible working is possible, you can reduce the emissions associated with the daily commute and give staff a better lifestyle. Such flexibility tends to result in staff who are more content with their work-life balance (as home-working often fits in well around family life) and, as a consequence, tend to stay longer in their posts as well as being more productive.



Companies have found that they can cut desks, and therefore office space, heating, lighting, power and so on, when significant numbers of staff work away from the office for at least three days a week.

The whole idea of replacing physical movement with electronic communications like videoconferencing reduces environmental impacts, not to mention associated costs. This also applies to how you manage your business processes. Consider distributing information electronically rather than printing it first and then distributing it. This 'print on demand' approach saves transport and unnecessary copies, not to mention saving money!

Companies with transport and logistics operations can reduce emissions by using software applications to optimise routes and eliminate wasted journeys. Solutions can range from simple sat-nav devices to more complex transportation management systems which coordinate multiple vehicles and routes, saving both time and fuel, and providing more predictable customer service too.

Offsetting: All it's cracked up to be?

You may be wondering why we haven't mentioned carbon offsetting as an option to improve an organisation's environmental performance. Well, a lot of organisations are using carbon offsetting (where you buy an 'offset' for the carbon dioxide emissions you produce – usually a payment towards emissions-reducing projects) as a 'get out of jail free' card and claiming carbon neutrality because they're planting a forest or outsourcing their manufacturing. While this is all very well, the projects need to be genuine, authenticated and sustainable, rather than simply shifting the blame, or excusing a lack of action. We suggest that you keep offsetting as a backstop to compensate for those unavoidable emissions that remain after you've taken all possible measures to improve your performance in the first place.

IT to the Rescue: Preventing Energy Waste

Although IT devices consume energy, you can use them to *control* energy, particularly electricity consumption.



You can use IT systems to take care of building management. For example, using movement sensors, thermostats can be adjusted, lights switched on and off, and computers switched off out of hours and reawakened for software upgrades.

One of the biggest challenges in reducing electricity consumption is ensuring that electricity users can monitor their own consumption. What gets measured gets managed – once people are aware of their consumption, they can go about reducing it. This isn't yet common practice, even in data centres. But, with new smart metering technologies, organisations could monitor the electricity usage of individual departments. Departments could be charged for usage, giving them a clear incentive to reduce their consumption and the ability to see the benefits of energy-saving initiatives straight away.



Increasingly, organisations are asked by governments and other stakeholders to disclose the amount of energy that they use – and therefore the associated CO₂ emissions. IT systems can play a role in enabling organisations to measure and report those emissions. IT systems also enable a greater exchange of environmental information up and down the supply chain.

Taking Bigger Strides

You don't have to be an office-based business to apply technology to greening your activities. Remote monitoring sensors, for example, make it possible to keep an electronic eye on remote locations such as farmland, storage tanks and reservoirs, reducing the need to travel there to take readings. Many industries already use these capabilities to monitor tunnels and pipelines all over the world. Even drinks dispensers can be hooked up, ensuring that no service or refill journeys are wasted trips.



The potential of IT to help you manage your environmental risks is significant and limited only by your imagination.

Ask yourself these questions:

- ✓ Can IT help me reduce my CO₂ emissions?
- ✓ Can I substitute a physical process flow with a digital one?
- ✓ Can I use IT to enable greater awareness and control of my environmental impact?



Making waves after the drought: Smart Operational Agriculture toolKit (SOAK)

Four university students won an international software innovation prize for SOAK, an agriculture toolkit designed to conserve water and increase crop production. It was partly inspired by the 59 per cent fall in crop yields in Australia during the drought conditions of 2007.

The software amalgamates information from weather forecasts and sensors which detect ground moisture, water supply levels, rainfall, wind speed and temperature. This data is then used to fine-tune the irrigation system to ensure that the crops get just the water they need.

Farmers monitor their entire farms through a web-based control panel that combines Microsoft Virtual Earth displays with statistical information that's displayed on a PC or PDA. SMS messages are sent automatically to alert farm managers of any urgent problems.

Armed with information, computer software can help you optimise all manner of things, from building management, factory operations and product design. By metering, monitoring, analysing and reporting energy and process flows, you can identify where best to focus remedial efforts.

Part IV

Changing Staff Attitudes and Taking Action

In This Part

- ▶ Changing attitudes
 - ▶ Taking action
-

The time has come to get your hands dirty (well, green) and take action. This part is packed with ideas and inspiration for steps that you and your organisation can take towards a more sustainable future.

Implementing Practical Steps

When Freeform Dynamics asked almost 1,500 IT professionals to compare their own attitudes to the environment with their companies', the results showed that staff tended to be ahead of their employer in their concerns. Over 50 per cent of respondents thought that it could do more for the environment. Any company deciding to take green steps, even if for commercial reasons, will find themselves pushing against a largely open door when it comes to securing support from staff.

The easiest place for organisations to start is where no measurement or groundwork is required, but simply a change in behaviour. The following lists of tips and suggested actions are roughly in order of cost and effort. The environmental impact will vary according to the nature of your organisation. A focus on print reduction won't amount to much for an online software publisher, for example, which prints hardly anything. So feel free to pick and choose according to your own circumstances.

Your starter for ten

- ✓ Commit to sustainability from the very top of the organisation
- ✓ Make use of the many sources of publicly available environmental information
- ✓ Include lifecycle questions in requests for proposals (RFPs) and when buying informally
- ✓ Specify equipment appropriate to its planned use
- ✓ Request energy efficient machines and power supplies
- ✓ Extend the working life of equipment if it's still functional and trouble-free
- ✓ Reuse redundant equipment elsewhere – including mobile phones and chargers
- ✓ Recycle IT hardware, but only if you can't extend or reuse

- ✓ Raise the temperature of (parts of) the data centre
- ✓ Drop PCs and screens into sleep or standby after 15 minutes of inactivity
- ✓ Switch off screen savers
- ✓ Turn off inactive equipment (such as PCs, printers and network devices) at night
- ✓ Switch off the power to PDA, phone and laptop chargers when not in use
- ✓ Get out of the habit of using paper – go electronic as much as possible
- ✓ Reduce the number of printers
- ✓ Print on both sides by default
- ✓ Encourage staff to participate in web-meetings and webinars to reduce travel when appropriate

Taking things further

- ✓ Make the chief information officer (CIO or equivalent) responsible for all computing energy accounting
- ✓ Enable remote access to applications to facilitate home and on-the-road working to cut commutes
- ✓ Secure your own environmental certifications; then encourage suppliers to do the same
- ✓ Install time switches for non-IT equipment

- ✔ Install electricity meters so you can see where power is being used
- ✔ Include environmental information in your own supplier records
- ✔ Install a power management system for networked devices, wherever possible
- ✔ Install print servers and print management systems
- ✔ Reuse waste heat from the data centre
- ✔ Implement delivery/pickup/route optimisation software

Nearing green nirvana

- ✔ Audit your data centre and remove unused equipment and software
- ✔ Virtualise applications, storage and servers in the data centre wherever appropriate
- ✔ Consider consolidating data centres
- ✔ Resite the data centre to a direct source of renewable energy
- ✔ Ensure that data centre cooling equipment is optimised to the new arrangements
- ✔ Incorporate free cooling if your climate is appropriate



Newsflash: Council optimises printer fleet

Although only part way through optimising its printer fleet, printer costs at Lancashire County Council are heading for a 36 per cent reduction. Before the initiative started, the council had 2,900 networked machines. The printers and photocopiers are being replaced with one multifunction machine for every seven that existed previously.

Energy consumption has dropped by 75 per cent. Mono print output dropped by 43 per cent and colour by 36 per cent in a year, so paper and toner cartridge consumption has dropped too.

New capabilities mean that documents can be securely printed to a machine in the nearest office, removing the need for staff to travel back to their own offices. Another win for the environment and for the bottom line.

- ✓ Install sensors and controls in company premises and remote locations to ensure that devices aren't on when no one's around
- ✓ Consider switching to thin client desktop devices (and maybe out of the office too)
- ✓ Move infrequently accessed data off continuously rotating disks (implement hierarchical storage)
- ✓ Introduce videoconferencing or telepresence facilities



Carbon cutting with telepresence

A team responsible for transferring manufacturing for an HP product from Oregon to Singapore cut an estimated 44 international employee trips from the project.

Eliminating those trips using the HP Halo telepresence solution (a videoconferencing room in which remote participants are heard and seen just as if they were sitting across the conference table) prevented 145 metric tons of carbon emissions from being released into the environment.

Part V

Ten Greenspirational Links

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If this minibook has whetted your appetite for going green in all things IT-related, here are some links to inspire you further.

- ✓ **Climate Futures:** The economic, political, social and psychological consequences of climate change: www.forumforthefuture.org/files/Climate%20Futures_WEB.pdf
- ✓ **Cradle to Cradle:** Michael Braungart and William McDonough wrote an influential book called *Cradle to Cradle: Remaking the Way we Make Things*, which sensibly suggested that manufacturing processes should, as far as possible, mirror nature's cycles: www.mcdonough.com/cradle_to_cradle.htm
- ✓ **Energy Star:** Save money and protect the environment through energy efficient products and practices: www.energystar.gov
- ✓ **EPEAT:** Evaluate, compare and select desktop computers, notebooks and monitors based on environmental attributes: www.epeat.net
- ✓ **Green Grid:** Follow energy efficiency developments in data centres and business computing ecosystems: www.thegreengrid.org

- ✔ **Green Computing:** Find out more about the role of IT in the push towards environmental sustainability: www.freeformdynamics.com/fullarticle.asp?aid=140
- ✔ **Hewlett Packard:** The starting point for the company's many environmental initiatives: www.hp.com/environment
- ✔ **Our Common Future:** A full hypertext version of The Brundtland Report, a sustainable development report published by the UN, that we talk about in Part I: www.un-documents.net/wced-ocf.htm
- ✔ **The Carbon Disclosure Project:** Find primary climate change data from the world's largest corporations: www.cdproject.net
- ✔ **The World Wildlife Fund:** IT solutions that help business and the planet (a 2.3MB report): assets.panda.org/downloads/it_user_guide_a4.pdf



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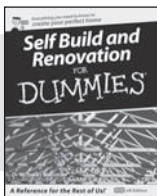
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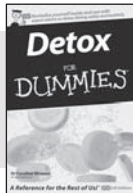


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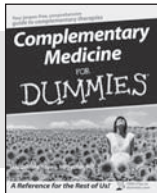


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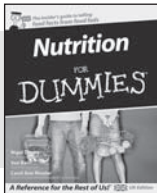
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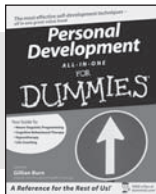


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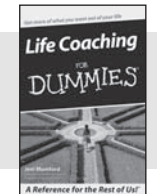


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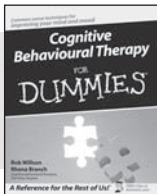
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