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Daniel Burrus'

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# TECHNOTRENDS<sup>®</sup> NEWSLETTER

*The biggest ideas that are  
changing everything*

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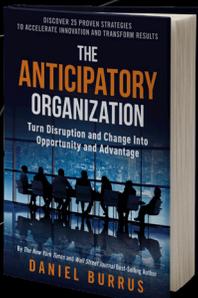
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# Using Pre-Mortems for Anticipation and Action

By Daniel Burrus, CEO of Burrus Research

In a medical setting, a postmortem has a rather grisly context—an examination to determine a person's cause of death and other contributing medical factors.

Postmortems are also routinely employed in businesses and organizations of all sorts. In these situations, they can involve reviews of product or service launches, projects, campaigns and other activities. The timeframe involved can vary considerably. In some cases, the project or product in question is still ongoing; in others, they may have been completed or discontinued. But, no matter the specifics, the objective is simple: Let's identify what went right, what went wrong and what adjustments, if any, we should make moving forward.

Those are valuable issues and goals, but actions and analysis after the fact aren't the only way to identify critical information.

Consider what competitive advantage you could secure if you had a system by which you could identify common postmortem issues before they had a chance to occur.

Welcome to the world of premortems, an essential component of my Anticipatory Organization Model.

## **Premortems—Anticipatory Problem Solving**

As the name might suggest, premortems are very similar to postmortems in that they involve careful analysis. But, unlike a postmortem, which is the review of something after it has been done, a

premortem is used before a new product, service or change is implemented, identifying predictable problems and any foreseeable barriers to success.

“ *A premortem offers you the opportunity to pre-solve problems ahead of time.* ”

That's not just information for information's sake. For one thing, a premortem offers you the opportunity to pre-solve problems ahead of time.

It can involve little more than some straightforward questions. For instance, before implementing a new product, service, strategy or imperative, ask yourself:

- What problems can you expect in implementation and execution?
- What objections or criticism will you encounter? Have major stakeholders bought into the idea?
- Will a product or service need to be updated? At what point can you expect that to occur?
- Can you identify a reasonable “shelf life”—the time in which a product, service or idea continues to remain viable?
- Can the product or service be revised or updated to boost its long-term appeal to customers?

Employing these and other similar questions, it's possible—in the case of predictable problems, to use one example—to pre-solve them before they have the chance to actually take place. On a more expansive level, the answers to premortem

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TECHNOLOGY NEWS HIGHLIGHTS

# Nutrition Scanner

A new handheld device is designed to help farmers optimize their harvests by providing on-the-spot analysis of a variety of grains. Called GrainSense, it utilizes near-infrared scanning—a technology that has been used for decades in the laboratory—to measure protein, moisture, oil and carbohydrate levels in wheat, oats, rye and barley for better crop management.

For example, the ability to assess moisture content allows farmers to tweak water levels as the grain matures, while a measure of protein provides important information for monitoring the nutritional content of feed for livestock. Carb levels are an important metric for industrial use (think fuel), and oil content is critical to farmers who grow and harvest seeds for oil.

In comparison to laboratory testing, which can take days or weeks to get results, GrainSense provides readings in about five seconds. It's also

less expensive than laboratory testing. Instead of requiring up to a half-kilo of grain, the handheld device can perform measurements on 50 to 100 kernels. It also records the GPS coordinates for more precise control of fertilization and water needs, and a smartphone app with cloud storage ensures that the data will be available for future analysis as environmental changes become more unpredictable.

The product will be launched in November at the Agritechnica fair in Hanover, Germany. The developers are already planning to add corn and rice to the list of grains that can be analyzed using the device, as well as adapting the technology to measure protein contents in other organic materials, such as meat.

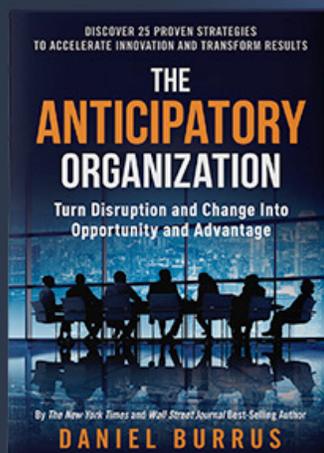
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## Daniel Burrus' New Book

*Discover 25 Proven Strategies to Accelerate Innovation and Transform Results*

The Anticipatory Organization gives readers the ability to accelerate innovation and growth by learning how to anticipate disruptive problems and game-changing opportunities before they happen.

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# Pain Algorithm

Researchers are working on a way to automate pain assessment accurately and reliably using a combination of facial recognition, neural networks and machine learning. The goal is to not only distinguish real pain from fake pain but also to reduce the use of potentially addictive painkillers by ensuring that appropriate therapies are being prescribed.

Past research into automatic pain recognition has focused primarily on generic models to quantify facial expressions. The new algorithm—known as DeepFaceLIFT—utilizes a two-stage learning model to account for individual differences in facial features and cues. The first stage combines self-reported pain scale data with facial landmark features to determine which expressions are most significant for that particular patient. The second stage estimates pain levels based on these personal features using a multitask learning system.

The system was tested on a dataset containing over 48,000 image frames from a total of 25 patients who suffered from one-sided shoulder pain. DeepFaceLIFT outperformed non-personalized models and also provided valuable information on the pain-relevant facial regions for each subject, which will allow for easier interpretation of pain-related facial features.

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# Curing Cancer with Zika

The same dangerous virus that causes severe brain damage in infants may someday be used to target cancer cells in the brain, according to recent research.

Many chemotherapy compounds consist of large molecules that cannot penetrate the body's natural defense mechanism—known as the blood-brain barrier—which is also impenetrable to most microbes. However, unlike most microbes, Zika does have the ability to cross this barrier where it infects and kills stem cells. And it's this very ability that could make it useful for attacking deadly brain cancers.

The virus has been tested on glioblastoma, a common type of cancer that is difficult to treat. Tumor samples grown in the lab were exposed to Zika where the virus destroyed the cancer stem cells. Furthermore, ordinary (i.e., non-stem cell) noncancerous brain cells were not affected. Subsequent testing in mice that had been implanted with glioblastomas showed that treated mice lived longer (sometimes twice as long) than would normally be expected.

Until concerns about possible transmission to pregnant women are addressed, there are no

current plans to begin human testing in the United States, but researchers are looking at ways to genetically modify the virus and still maintain its viability as a treatment. In the United Kingdom, however, where the mosquitos that carry Zika cannot survive, a team is considering a human trial of the unaltered virus to determine whether it could improve survival.

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paper spray mass spectrometry, the researchers analyzed 239 fingerprint samples from subjects seeking treatment at a drug rehab center. The results yielded a true-positive rate of 99 percent and a false-positive rate of 2.5 percent. By adding a silver nitrate solution and exposing the sample to UV light, fingerprint visualization was easily incorporated into the analysis. The test requires about four minutes per sample and requires no special sample preparation.

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## Fingerprint Cocaine Detector

A simple new test for detecting cocaine can provide results in a matter of minutes, a breakthrough that could revolutionize drug-testing for law enforcement agencies as well as rehabilitation providers.

Scientists have found that, when a person uses cocaine, two chemicals—benzoylecgonine and methylecgonine—are excreted through the skin. These trace chemicals can be detected in fingerprint residue, even after the user washes their hands, capturing their identity as well as their drug use in a single sample.

Using a chemical analysis method known as



## Say “Ahhhhh” to the Robot

The first fully automated dental surgery was recently performed in China, where a robotic dentist installed two implants in a human patient without intervention by the supervising doctors.

According to reports, the implants matched the standards for this type of procedure, being installed through a set of preprogrammed commands with a 0.2mm-0.3mm margin of error. The teeth that were implanted were also created using 3-D printing technology.

The use of robotics in dentistry is not new. Robots have been increasingly used to assist with procedures such as implantations because

of their ability to maneuver more accurately in small spaces like the oral cavity. The first—known as Yomi—was approved by the U.S. Food and Drug Administration in March of this year. Assistive robots are also being used more widely in orthodontics and root canal surgeries. This is the first time, however, that a robot has operated on a patient without the assistance or guidance of a human dentist.

It is hoped that this new technology will help alleviate the shortage of qualified dentists in China, where a recent survey revealed that around 400 million people are in need of dental implants. The developers also believe that robotics has the potential to improve quality of care and reduce human error.

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# Nanotube Yarn

Harvesting energy from motion within the environment has met with limited success except in applications where there are high levels of vibration, such as mounted on a high-traffic bridge or railroad trestle. Known as piezoelectric sensors, these systems transform mechanical

strain into electrical current that can be used to power relatively low-power devices. The same principle has been applied to sensors that harvest energy from movement of the human body to power things like watches.

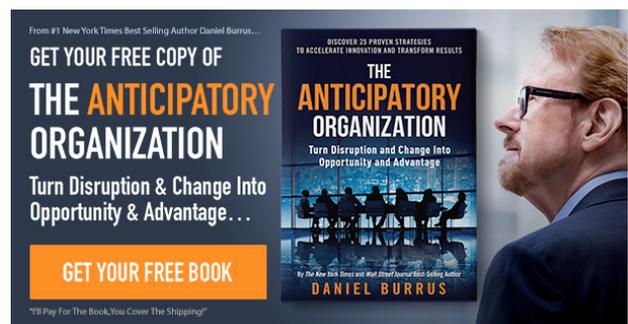
One area in which harvesters would be extremely useful is in ocean-based, pollution-sensing buoys.

The continual need for battery power often limits their practicality, and ocean waves simply do not supply enough energy for typical piezoelectric sensors to function efficiently. But researchers recently developed a new device called a “twistron harvester” that generates power at higher levels than any other harvesters to date.

The key is a twisted “yarn” made of carbon nanotubes and spun into a coil approximately one-twentieth of a millimeter in diameter. When submerged in an electrolyte, it generates enough energy to power a sensor from wave motion alone.

Other applications could include sewing the yarn into a shirt to monitor respiration. The fibers are also capable of converting thermal energy into power, and the performance is scalable—that is, the larger the diameter, the more power they can generate. The next hurdle is to decrease the cost to the point where “twistrons” are commercially viable.

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## Spotting Alzheimer's Early

A machine learning algorithm has been developed that can identify structural changes in the brain that are characteristic of Alzheimer's Disease (AD) nearly a decade before symptoms appear. Such a tool would be incredibly useful in slowing the pace of the disease, as most of the drugs currently in development work best the earlier they are administered.

The algorithm was initially developed using magnetic resonance imaging (MRI) brain scans from 67 patients—38 of whom had been diagnosed with AD and 29 of whom who had not. The scans were divided into small regions, and the neuronal connections between them were analyzed.

The system was then tested on an additional set of scans from 148 subjects—52 of whom were healthy, 48 of whom had AD and 48 of whom had mild cognitive impairment (MCI) but had subsequently developed AD up to nine years later. The algorithm correctly distinguished between healthy brains and those from AD patients 86 percent of the time. More importantly, it was able to correctly differentiate MCI with an accuracy of 84 percent.

In the future, the researchers hope to apply the same technique to diagnosing other conditions, including Parkinson's Disease.

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## Single-Dose Vaccine and Booster

Vaccines are no fun—particularly for small children—and the ability to deliver multiple doses in a single shot would save a lot of tears and anxiety. The problem is that vaccines are unstable and break down easily at body temperatures, so multiple shots are needed to provide optimum protection. But now a microscopic container has been developed that could allow secondary and even tertiary doses to be released over time. By altering the thickness of the polymer walls, the time to degrade and release their contents can be varied to stagger the doses by weeks or even months.

The time-release microparticles were tested on mice. A single injection containing a mix of vaccines was administered. The individual polymer cubes were filled with different proteins that were designed to trigger a unique immune response. As planned, the proteins were released at nine, 20 and 41 days.

The team has plans to develop particles that can last up to 200 days in the body before releasing their contents. The technique may also someday be applied to deliver multiple vaccines to protect against a broad range of diseases in a single shot.

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# Using Pre-Mortems for Anticipation and Action

*continued from page 1*

questions may prompt you to delay a product or decision or, for that matter, scrap the entire idea completely. That can save time, money and needless frustration.

A similar opportunity exists with any upsides that a premortem identifies. For instance, if you can anticipate that one aspect or element of a project or product is going to go particularly well, what steps can you take in advance to make sure that it happens and leverage that success even further? Does expected success give rise to other similar ideas and projects that may prove equally effective? Can marketing and other campaigns attached to that product or service be applied elsewhere?

## **Premortems and the Law of Opposites**

Looked at another way, premortems are an example of my Anticipatory Organization Model's use of opposites—more specifically, what I refer to as The Law of Opposites. The thinking behind this idea is simple but exceedingly effective. If everyone is going in a certain direction, what insights and advantages may be uncovered by taking a different tack?

For instance, prior to Starbucks, coffee was often seen as an adjunct item, something that you drank after dinner or in the morning alongside a roll or bagel. Starbucks took an opposite approach and, in effect, made coffee more a culinary hub than an accompaniment. Any visit to a Starbucks outlet and a glance at the encyclopedic menu of coffee-related items underscore the company's very successful effort to go counter to the prevailing mainstream.

That's the opposite approach that premortems afford—while competitors are routinely employing postmortems, your organization can anticipate and address many problems, challenges and opportunities in advance. In the case of Starbucks, it's easy to see how company executives thought to approach coffee in a different manner from competitors, well before the very first cup was ever served.

We did that very thing when we were developing our Anticipatory Organization Learning System. We had a number of CEOs and other leaders from a broad array of industries test the program. We solicited their feedback prior to releasing the product. They told us what problems they foresaw in implementing the system in their organizations, what they liked, what they didn't like, what was confusing and other valuable information. We then solved those predictable problems and made adjustments prior to launch. It worked like a charm, and the awards we have received for the program testify to that.

A premortem that derives from an opposite approach can also spell the difference between success and merely surviving. Let's say you own a small neighborhood food market. For you, the notion of a major supermarket chain or a Walmart super store starting up a block away may send shivers up your spine. After all, how can you be expected to compete against an operation whose sheer volume ensures lower prices on most every item?

You can't be expected to compete head on—nor should you.

By conducting a premortem—in this case, before a behemoth competitor opens its doors—consider how going opposite may not only let you stay in business but actually flourish. Think about how you can provide a better in-store service experience. Look into forms of technology that allow you to know your customers better than bigger competitors (an obvious advantage to

being smaller). Provide cooking classes and other programs that further customer loyalty and interaction. Offer specialty foods, ethnic items and other goods that many larger grocery chains may overlook (or, at the very least, bury amid shelves that are already so filled that consumers fail to notice them).

### **The Best of Both Worlds**

This isn't to suggest that postmortems are passé. Not at all. A review of a product or service once it's in use is exceedingly valuable—in fact, it's another aspect of elevated, comprehensive planning. Once you investigate how something is actually performing, you have the opportunity to make any necessary adjustments to help it function even better.

A premortem takes that same approach, only proactively. To further elevate your planning, take the time to anticipate possible problems, drawbacks and other aspects of any project, product or service before they're implemented. That's a form of proactive planning that offers one of the most powerful benefits of anticipatory thinking—the opportunity to pre-solve problems before they occur.

In fact, it can be particularly effective to employ both premortems and postmortems in tandem. Prior to releasing a new product or service, conduct a comprehensive premortem to identify potential problems as well as areas of opportunity. Similarly, hold a postmortem when sufficient data has been compiled for analysis. How did the two match up? Did your premortem miss certain problems identified in the postmortem? Does that suggest any change in your methodology to improve results?

### **Execution Isn't Everything**

Pairing premortems and postmortems can also help your organization avoid an undue focus on execution. By that I mean attention given to drafting a plan and executing it to the exclusion of other ideas and forms of analysis. In many

organizations' eyes, if you have a plan, all you need to do is execute well. Nothing else matters.

Execution is extremely important, but in an environment of rapid, exponential change, it can lead to a form of tunnel vision. That can keep you from missing game-changing disruptions and problems that could render your plan far less relevant or even obsolete before it's fully executed. Recent history is littered with companies whose execution was spot on—Dell, Sony, just to name two—but, by the time that execution took place, the future had already changed.

Using both premortems and postmortems can help skirt that understandable pitfall. By examining products and services before and after the fact, you can gain as complete picture as possible of factors that contributed to your success or, by the same token, hindered it. That keeps execution in a place of justifiable importance but moves your thinking to a larger, more valuable plane. As a result, overall planning is elevated.

In fact, premortems and postmortems can do more than just identify what worked and what did not. By taking the time to thoughtfully consider a project and service before as well as after the fact, you often can identify forms of innovation that may have been lost in the limiting focus on execution. And, innovation is the cornerstone of growth and success for the future.

Analysis and insight don't always appear once a project or product has been put to bed. By adding a premortem to any project or service release, you can greatly boost your chances for success while limiting or eliminating problems and issues that otherwise can cripple or completely undo even the very best of ideas.

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