Let's Not Panic Over the Year 2000
by Michael A. Blackledge

"When the year 2000 arrives, our financial records will be inaccurate, our telephone system unreliable, our government paralyzed, and airline flights will be canceled without warning. In other words, things will be pretty much the same as they are now."
—Dave Barry

Over the past two years, I have given presentations and conducted panel discussions with subject matter experts on the Year 2000 (Y2K) software problem. I always start the proceedings with two questions for the audience: First, how many had not heard of the Y2K problem before this presentation? (no one has ever admitted they had not heard of the problem). Secondly, I ask them, "Since you have heard of this problem, then you have some thought in your mind of just how serious you think it is. I am asking you now to quantify that thought: on a scale of 0 to 5, what do you think is going to be the impact on you, your personal life and your business or professional life? Consider 0 to be absolutely no impact: the dawn of the new millennium will be like any previous day, the only way you'll know it's a new year is by the party you went to and the headlines in the morning paper. On the far end of the scale, a 5 would signify total Chaos — nothing will work, traffic lights will all be functioning irrationally, your car won't start, no electricity to your house, water and sewage and food will be problems, and there will be rioting in the street. So — pick a number between 0 and 5 that represents your feelings your emotions right now as to the effect of this software problem."

Did you pick a number in your mind? It's an interesting outcome: what I've found is that most audiences group at one end of the scale or the other, and that over the past two years my groups have been surprisingly evenly divided: about half represent the impact by a number between 0 and 2, inclusive, and about half between 3 and 5. Consistent outcomes up until this past summer. Then, at the Panel Discussion I moderated in September for the 16th International System Safety Conference (ISSC), held in Seattle, for the first time, about 2/3 of the audience went to the low end of the scale, and only 1/3 at the 'panic' end.

I've thought about this "temperature taking" outcome. Is this latest movement toward less impact indicative of a trend, or just an isolated data point? Could it be because this audience consisted of safety professionals, and thus are more used to dealing with "real" disasters or crises? Or is it that the American public is becoming more inured to the "Cry Wolf" or "The Sky is Falling" articles of the media over the past couple of years? Or is it possible that people are beginning to gain confidence in the many Y2K remediation activities of their businesses and government?

The Problem: By now, most Americans know something about the Year 2000 Software Problem: At 12:01 on New Year's morning of the year 2000, many computer systems worldwide could malfunction or produce incorrect information simply because the date...
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has changed. We have all read media reports: without action, the impact of these failures could be widespread and costly. Is this just the most over-hyped crisis since the Michelangelo virus, or will this situation seriously affect our personal lives? How will this quickly approaching deadline affect your company? How will it touch your personal life? What tools are available to help manage the risks involved? And doesn’t anyone have this problem under control?

First, let’s learn to be a more critical audience. Toward the Chaotic end of the spectrum, some of the scenarios that have been portrayed involve chain of event effects such as: the Federal Reserve system fails, thus the banks cannot obtain funds, thus there are runs on the banks, final result: panic and rioting in the streets. Yet Edward Kelley, the Federal Reserve Governor, has told the House Banking Committee that “The Federal Reserve is giving year 2000 its highest priority ... I can report that we expect to be fully prepared for the century date change.” How could they be any more strongly motivated to work the problem? - The goal of the Fed is “maintaining the stability of the nation’s financial markets and payments systems, preserving public confidence and supporting reliable government operations.”

Consider these actual quotes from the recent technical press:

“Most computer systems and software will not properly handle the date Jan. 1, 2000.”

Do you believe that statement? I submit a more accurate statement would be: “Most computer systems and software are not date dependent.” And for those systems that are date dependent, the next questions from a critical audience should be, “are they Y2K compliant? Do they work in 4-digit date calculations correctly?” and “if they are not Y2K compliant, what is the impact of their incorrect calculations?” If we’re just talking about a date on a report being inaccurate in the printout, we may be able to live with that consequence.

**Urban Folklore:** When running through the litany of things that could/might/may go wrong due to Y2K issues, one of the more dramatic is malfunctioning elevators. I have heard Grady Booch, a well known name in the area of object oriented programming and analysis, repeat the story that following the date rollover, some elevators are expected to suddenly realize they are 90 some years delinquent in their maintenance routine, and sink to the basement to await their overhaul. To begin with, even if this were a normal maintenance function, the elevators would certainly not plummet to the basement. And whatever mechanism is accomplished to indicate that maintenance has been performed, would be easy enough to switch and once again put the elevator right back into service. But the truth of the matter is, if you believe our two largest elevator manufacturers, elevators’ maintenance system is usage based and not date dependent, and in fact elevators like many embedded computer systems are not “date aware”. This assurance can be found on the Web site of Otis Elevators [www.nao.otis.com/year2000.htm] and Dover Elevators [www.doverelevators.com/whatsnew/y2k.htm]. (This assurance is also true for their escalator systems, but you don’t hear many people worrying about getting trapped on an escalator on New Year’s Eve.)
More urban folklore concerning Y2K centers around airplanes—"whatever you do, don’t fly on January 1, 2000!" Later in this article that folklore is rebuked by Boeing, but even Boeing can’t answer for all the ground systems involved. Who can? The FAA? Ray Long, the director of the Federal Aviation Administration Year 2000 Program, stated in a Government Computer News interview [July 20, 1998] that “the FAA’s program will be completed. We have a firm plan in place, we have all the resources to get it done, and we’re right on schedule to do so.” And where will Ray Long be on Jan 1, 2000? “I’ll be on a plane with Jane [Garvey, the FAA Administrator]. We’re going to board a flight on the East Coast shortly before midnight Dec. 31, taking into account Greenwich Mean Time, and we’ll fly west through all four continental time zones. I expect it to be a routine and deeply satisfying flight.”

Some of this Urban Folklore constitutes out and out hoaxes, or to be kind, bad jokes. The story spread this year on the Internet that the funeral industry has an oversupply of headstones precarved with a “19” prefix, as if all these headstones for pre-paid funerals were carved ahead of time and stored … presumably with a blank month of death, blank day of death, but nevertheless with a carved “19” before a blank year of death!

**Trust:** Any banking or financial system is based on trust of the customer. We all understand that every bank loans out the money we put in; that’s why they can pay us interest on our deposits. So if everyone went down to their local bank and pulled out all their money, the bank would cease to exist. Similarly, each of us will have a bank statement for the time period in December 1999. Would you also accept that banks, even if their systems malfunctioned in January, would have knowledge of what statements read in December, and what transactions had occurred?

Financial institutions are working as hard as anyone is on this problem. Not only their reputation but their continued customer basis of trust is built around the institution continuing to be trustworthy. To imagine that suddenly they will defend any inconsistency that occurs between December 1999 and January 2000 is counterproductive to their very basis of existence.

As a consumer myself, I have written to my top eight “suppliers” — financial or infrastructure. Most have provided replies, some rather high level, some surprisingly detailed. Most indicate that they have a Year 2000 project team that is assessing the impact the Y2K issue may have on the company’s software and equipment and the reprogramming, modifications and replacements which will be required. They state that they plan to have their critical systems Y2K compliant by mid-1999, with conversion of certain non-critical systems in late 1999. And each indicates that as part of their own initiative they plan to make inquiries of other companies with whom they must interface.

**Embedded Computer Systems:** “Embedded systems” are specialized computer systems whose primary purpose is not computing; rather, they are used to control, monitor or assist the operation of equipment, machinery or plant. "Embedded" reflects the fact that they are an integral part of a larger system or machine. In many cases, their presence is far
from obvious to the casual observer and even the more technically skilled might need to
examine the operation of a piece of equipment for some time before being able to
conclude that an embedded control system was involved in its functioning. At the other
extreme, a general purpose computer may be used to provide administrative functions for
a large organization, and its presence will be obvious.

What are companies doing about embedded computer systems and Y2K? Quite a bit,
depending on their product line. Texas Instruments assigned 70 programmers full time to
this problem as a three-year project, starting in June of 1996. In 1997, they added
additional resources. There are also oversight activities by government agencies. For
example, one of the Panel Members at the 16th ISSC was Julie Boyer of the state of
Washington’s General Administration, concerned with the embedded computer systems
throughout the state, from traffic lights to hospital systems. As part of her Y2K duties,
she has established Y2K embedded system pilot projects at such state concerns as the
penitentiary at Walla-Walla and Eastern State Hospital. For “show and tell” at the ISSC,
Julie brought an embedded computer system with her: a pump responsible for intravenous
feeding of patients. Her investigation found that the previous-series pump was Y2K
compliant, as was the prevalent current-series pump. But the brand new series was not!
Under the state’s current maintenance contract, she returned all these ‘latest and greatest’
pumps to the manufacturer for remediation.

An additional set of embedded computer systems can be represented by the avionics
systems aboard aircraft. As part of our Panel Discussion at the 16th ISSC, our Boeing
Commercial Aircraft Group representative, Roger Nicholson, was able to tell the
audience, “Let me reassure you that airplanes aren’t going to fall from the sky.” Bob
Barnes, another Panel Member mentioned, after leaving the Boeing factory, modifications
can be made to the flight deck by the customer/operator. More discussion of these views
was captured in an article in the Seattle Times — see the website address:

Government Systems: What about your Social Security check? Bob Vaccaro, the Social
Security Administration (SSA) Project Director for Y2K, states that the SSA has long
since planted seeds for success: they underwent a cultural change, starting in mid-80’s,
adopting a methodology of systems engineering technology. They published Rules for
Programming at SSA so any new programmer can come in, understand the rules and the
comments, and work to them. Today Y2K is one of four Key Initiatives of the SSA’s
Commissioner. Their philosophy: every functional change will include making Y2K
changes. They have used a Centralized Library System for over six years, so they know
where every module is and who the owner of that module is. They send out 50 million
checks per month. Yet during the last six years, they have gone from a staff of 89,000
down to 64,000. They have 6600 interfaces with states, other federal agencies, etc., of
these about 2000 are incoming interfaces, but only about 200 are critical (can change data
in the Master File). Their goal is to be complete by December 1998; Bob considers their
“A” grade by Congress to be “just a mid-term grade.” Why aren’t they done? Because
they are working toward a plan, and the plan calls for them to be done in December 1998.
But what about all the other government agencies? Rep. Stephen Horn and his House SubCommittee on Government Management, Information, and Technology have established grades for each of the government agencies, and the scores don't look good: Social Security Administration and National Science Foundation are the only agencies that have received a consistent A grade, and there are several that "earned" an F grade. But let's examine what those grades mean. They are derived from milestones missed, or expected to miss; but the original milestone established by the OMB was November of 1999. Not too long thereafter it was realized that such a date would not provide much recovery time if systems didn't complete their testing in time, so the completion milestone date was pulled back to March of 1999 [since they couldn't extend the January 1 deadline]. Many systems had already set their plans in place, and an accelerated schedule was not easy to implement; for example, financial systems are built/implemented around fiscal years, so plans to implement a new, compliant system with the FY00 start date of October 1, 1999, could not easily be pulled back to October 1, 1998, just to make the new March 1, 1999 deadline. Thus milestones missed, and grades assigned. A second point is that if an agency had 100 mission-critical systems to remediate, and 5% of them were completed in the first quarter, then the assumption was made that the rate would continue, i.e., the agency would complete 5% of the total each quarter. Not a good prediction model, and it ends up with far out completion dates, such as the Agency for International Development finishing their Y2K program in the year 2023. You can view the rationale for the grades under Rep. Horn's web site at http://www.freedom.gov/v2k/

Disclosure and Regulation: Most major companies publicly traded now seem to have Year 2000 material in their annual and quarterly reports, and most have easily located links on their web sites. Of course, there are still a few whose Y2K disclosures are poor or non-existent. Generally speaking, US corporations seem to be on top of Y2K, and have set up organizations or teams who are responsible for products, production and support infrastructure. As we have seen, government agencies are striving to attain equivalent readiness, but have different criteria. What has become apparent is the significant resources that are being spent to address Y2K. FAA alone has estimated $191.8 million cost for their Y2K program.

As we approach the end of 1998, we have seen additional interest in the Y2K problem, which generally translates into additional oversight activities. We should be concerned about regulators stepping in and asserting themselves with onerous regulations (for example, 4 digit year compliance) which could have enormous economic consequence. We live in an increasingly technological world with considerable customer convenience and economic features, most of which is not "mission-critical" to our lives. We need regulators to assure safety of products and services, delivery of vital services, and protection of assets (tangible and intangible). Whether a widget works flawlessly through the Y2K rollover or some other time or date event is a contractual and economic issue between the supplier and the user, and is arguably, outside of the scope of a regulator.
The Media and Y2K: Americans seem to thrive on conspiracy theories and horror stories. When Newsweek produced their cover story on Y2K [June 7, 1997], they filled their cover with the huge headline, "The Day The World Crashes!" This year, Y2K is making it into the tabloids: the September 15, 1998 cover of the Weekly World News proclaims, "January 1, 2000 - The Day The Earth Will Stand Still!" with many scary subheadings, such as "All Banks Will Fail! Food Supplies Will Be Depleted! Telephones Will Cease To Function! Domino Effect Will Cause A Worldwide Depression!" - yet inside you find a relatively straightforward two-page Y2K article, with the rest of the issue filled with more typical [non-Y2K] tabloid stories.

Y2K issues should be addressed with facts and data. It is easy and irresponsible to make bold doomsday statements, which are readily picked up by the media. Many of us have been close to an issue where we really have the facts at hand, and we are appalled by media coverage of these issues. As a critical audience, we should be prepared to refute blatant hyperbole, and state the facts about what has been done, and what is being done.

The Benefits of Y2K: Capers Jones, the software metrics guru and Chairman of Software Productivity Research [http://www.spr.com], has stated that he looks upon the Y2K issue as a blessing in disguise - it is a situation that is easily understood, and can be used to focus management attention upon software quality concerns in general. We should recognize that Y2K gives us the opportunity to declare that some early technologies have reached the end of their useful lives, and should be retired. However, it is reasonable to expect that successor technologies should learn from the Y2K experience and incorporate state of the art principles and processes, for example, structured and disciplined software development and testing, and planned maintainability and re-use.

Contingency Plans: The current push within government circles is to establish contingency plans, fallback, "Plan B" if indeed things go bad. We've only had computers for a mere 50 years — we may be dependent on them today, but we haven't always been. Things may be slower for awhile, but can we really think that everything will stop? If we really had to, could we not go back to direct pay lines for awhile rather than direct deposit? Sure, it would be inconvenient, but would it be impossible? Most organizations have disaster plans in place, and some have even had to exercise them under natural or man-made catastrophes. Man is an adaptive animal.

Not a Spike Function: Most media reports dwell on January 1, 2000, as if all heck will break loose as we roll over to that date. But many systems have already rolled over, and the impacts have not been so severe; more importantly, they have already been found and corrected, so those systems will march on through the millennium. Example: our credit cards. For awhile, credit card companies could not issue replacement cards that expired in 2000; it wasn’t so much that the credit card companies could not handle it, as it was the "card swipe" software in the local businesses that communicates the information back to the card companies. But that has been corrected, and most of us now carry working credit cards with expiration dates of 00 or later.
Another example: inventory systems were declaring products outdated that were being entered into the system with 00 or later expiration dates. Again, these systems were flagged and corrected, and will continue to work on into the next century. Other industries have been working with next century dates for years: banks with mortgages and bonds with maturity dates in the future have always had to use four-digit calculations.

The point is, rather than thinking only of all possible disasters, think of all the systems that are guaranteed to work. No date calculations are going to stop your 1968 Volkswagen from operating. What the experts are most worried about is the interfaces between working systems - how can you be sure that the gas pumps will work to fill your Volkswagen? Of course, there are ways, contingency plans if you will, to overcome almost any problem. For years, ranches and farms have had [admittedly small] gravity-based above ground gasoline tanks.

Meanwhile, Congress has not had the last say on what they will be doing with regard to this problem. Some proposed laws are punitive: proposed legislation that would make it illegal to sell the government any hardware or software that is not year 2000 compliant. Or legislation to make financial institutions liable for any damage, inconvenience or updates the Y2K problem may cause to their customers. But more important is proposed bills to remove from litigation any errors resulting from Y2K problems by a company that can demonstrate due diligence, that is, that it has made every effort to find and correct any problems beforehand.

**Conclusion:** So does my recent ISSC "temperature taking" which showed less Y2K concern indicate a trend, or only another data point? For all the reasons discussed above, all the work being accomplished, all the thought and action focused on this problem, I feel we as a nation are moving from the "Chaos" outcome toward the "little impact" outcome we all desire. Do I think there will be any problems due to the Year 2000 problem? Absolutely — as stated above, there already have been. But do I think these problems will bring the country to a standstill? Hardly. "Pockets of strong inconvenience ranging to high irritability" is probably a more accurate forecast. Tell your survivalist friends that it is all right, they can come down out of the mountains!

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**About the Author:**

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