

Preface

Where the name came from

Shewhart Statistical Process Control Charts are the engine that drives BPChart software. Don Wheeler has promoted a new terminology calling them Process Behavior Charts¹. The 3M Statistical Practitioners forum has coined the phrase **Business Process Charts**, hence the title for the Software **BPChart**. If Wheeler were selling the book and software it would be called PBChart.

How to use the book

Chapter 1 is a quick introduction to Statistical Thinking where I try to emphasize the importance of ceasing use of traditional tabular business reports and replace them with BPCharts.

Chapter 2 is a quick tour of the interface features of BPChart.

Chapter 3 is a case study of how one would use BPChart to answer an inquiry about high travel expenses in a fictional Engineering Department. It demonstrates how this simple analytical tool provides insight superior to standard business reports. If you just want to jump in and make BPCharts; read this chapter first. You will learn how to create effective BPCharts by reading this one short chapter.

Chapters 4 through 6 describe the commonly used features of BPChart. They contain enough topics to enable you to properly use BPChart software effectively, allowing one to edit charts to obtain good limits.

Chapters 7 through 13 describe intermediate level topics. Anybody mastering these chapters would become a master BPCharter.

The Appendices A to F would be considered advanced topics providing all the rest of what there is to know about using BPChart software.

Appendix E is a great refresher on the do's and don'ts of using BPCharts.

¹ "The New Terminology" by Donald J. Wheeler is found at <http://www.spcpress.com/pdf/DJW129.pdf>

Appendix F attempts to clarify the interpretation of the Goal indicator on the I chart. Goals need special definition in order to be unambiguously interpreted.

Appendix G addresses all you every need to know about the technical and statistical aspects of making Business Process or Process Behavior Charts. The appendix contains the chapter titles from Don Wheeler's new book² by the same title. I hope it tickles your interest and I recommend it as required reading for statistical process control practitioners. All the excuses people use for avoiding Process Behavior Charts are addressed in twenty clear concise chapters.

Appendix H contains two articles by Davis Balestracci, a former 3Mer, who writes weekly articles for Quality Digest Magazine. I included the first because it specifically addresses the problems with Stoplight Performance Indicators that I discuss on the inside cover of this book. The second gives a glimpse of how to address improvement of common cause processes, not addressed anywhere else in the book.

Appendix I shows how to get additional support and how to order more copies of this book.

Michael C. Mercer

² *Twenty Things You Need To Know*, by Dr. Donald J. Wheeler, SPC Press, Inc., Knoxville TN, 615-584-5995, ISBN 978-0-945320-68-5, \$39.

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Acknowledgements

BPChart was a team effort by the 3M Statistical Practitioners Statistical Thinking Special Interest Group. The team won the 1997 3M Team Quality Achievement Award for their efforts.

It all began in 1995 when the 3M Statistical Consulting Group under the inspired leadership of Pete Jacobs, sponsored a two day workshop for employees from around the world who were avid users of statistical methods.

Don Wheeler gave a presentation on the contents of his book, *Understanding Variation, The Key to Managing Chaos*³, now in its second edition.

Naively I approached him after a thrilling presentation and asked if I could have copies of his slides. He was brutally frank when he said he wouldn't give out his slides. He then instructed me to buy his book instead. I did, I read it cover to cover in a very short time, it was the beginning of a journey that would take two years to complete.

Again naively I asked Don what software he used to calculate the Control Charts⁴ he had presented in his talk. He responded MacDraw. I was astounded, I said I didn't know that MacDraw could do statistical calculations. He said it didn't, it's how he drew his charts for the book. He had no recommendations for answering the gist of the question that I had asked.

Coincidentally Minitab had recently completed their transition from a completely MS DOS version 7.0, to a hybrid GUI version 8, to a completely native Windows version 9. A little enhancement that went almost unnoticed by the majority of users was a fully programmable macro language that allowed one to write procedures that appeared like native procedures found in Minitab Version 9.

Stan Lindell, then the Quality Manager for the Tape Manufacturing Division had been using Minitab version 7.0 to make black and white fan folded ledger sized paper copies of Process Behavior Charts. (I'll try to use the new terminology, but I sometimes inadvertently slip

³ *Understanding Variation: The Key to Managing Chaos 2nd Edition*, by Dr. Don Wheeler, SPC Press, Inc., Knoxville TN, 615-584-5995, ISBN-13: 978-0945320531

⁴ Today Don calls them Process Behavior Charts. He originally presented the proposal for the change in terminology in a newsletter under the title "A Modest Proposal" in *SPC Ink 1998 no. 2* Copyright © 1998 SPC Press. Later he incorporated it into the second edition of *Understanding Variation—the Key to Managing Chaos*. You can find an excerpt titled, *The New Terminology*, on his web site at <http://www.spcpress.com/pdf/DJW129.pdf>

back to calling them control charts.) He charted waste and productivity for all the 3M Tape manufacturing plants. He asked me if I could improve upon them as they were printed with the old style of keyboard characters. He mentioned the new macro language in Minitab version 9 and the incorporation of high resolution graphics he thought might make the chart more appealing

I was busy, as we all are with the daily requirements of our jobs, so I decided to work on it at home; after all how long could it take? Our four boys ranged in ages from 11 to 18 and the family required attention. The only time I had to work on it was after everybody else went to bed. Some of the problems were so difficult, and I was so obsessed, that often I looked up and it was time to go to work. Those were some tough days.

Finally I had a working version. I showed it to Stan. And he liked it. Of course he had a few suggestions to improve the looks of it. So after a series of ping pong sessions of suggestions and revisions, I finally got it right (ha ha).

Next I showed it Rich Mills, a marketer I greatly respected, and suggested we use it in his business to look at all the P&L lines we were constantly reviewing in our meetings. "Great idea Mike," he stated, "When can you start!" This surprised me a little; I had kinda planned on him picking up the task and running with it. Another lesson I learned while at 3M. If you bring up a suggestion about doing something new, you will be tasked with implementing it, you will only get encouragement not support from the members of your team.

I did get a little support. Steve Shields was the team accountant and he provided all the data for me and showed interest early on, but not enough to help right then.

So back home I charted up the sales figures for the business, and immediately found a big problem. The chart was full of special causes. Dah! This was a growing business under the leadership of Rich Mills and the sale figures were increasing month after month. This caused me to ponder the solution which was readily apparent, I needed to incorporate a regression equation for the centerline, but how, what statistical techniques were appropriate? It was time to call in a trained statistician. I lucked out when Andy Kirsch, who has since become a friend and a personal hero, answered the phone and in a few minutes was able to set me off in the right direction.

I was really proud of my accomplishment, and I made the mistake of showing it to Stan again. "Mike, can you show the special cause codes on the sales trend chart?" he asked simply. Ugh, how the heck was I going to figure out the code to create the eight special cause codes? To the rescue came Terry Ziemer, Minitab's ace Macro Programmer. Version 13 of Minitab was mostly macro code that Terry had written. He gave me the code to calculate the special causes and coached me how to add it to the trend charts.

Now I was cooking. I made another mistake by showing the charts for Rich's business to his manager, the business director for all 3M Tape businesses. "This is great," he said, reviewing page after page of business P&L results. "Can't you put all the charts on a single page?" That's how Layout was invented.

Back to the drawing board, again! By this time Steve Shields was very interested and he purchased Minitab, installed the macro code and made charts for each of the 30 P&L lines from each of the seven separate businesses in the 3M Tape Business. He printed and sorted each chart with its appropriate business report in a tabbed 3 ring binder. He had 210 individual charts! When asked a question about why something was lower this month (two point comparison), he would look at the appropriate charts and see if there was a special cause or not. If not he would say, "For the same reasons the results were high last month." End of discussion. He used the "Manage by Exception" button looking for recent special causes. He dug in and found out explanations before anyone even asked about them. His comment was, "Using BP Chart I know more about my businesses, than I ever did before. I know where to concentrate my efforts to identify real problems rather than spending time answering well-meaning but inconsequential inquires."

I jumped for joy, all we needed to do now was show the rest of the accountants at 3M this miraculous invention of the BPChart Macro in Minitab!

To my great surprise, no one jumped on the bandwagon! "I use Excel™ not Minitab" said one accountant directly in my face. "And I've got too much to do, I'm not learning how to use Minitab, convert my data from Excel to Minitab and keep two sets of books, I'm not doing it!!!"

All the while I had been reporting my progress to the Special Interest Group (SIG) at 3M (who contributed their share of suggestions too.) They had been developing background materials; literature, articles and presentations on what became adopted by the American Society for Quality (ASQ) as Statistical Thinking⁵, Don Emerling and Bob Mitchell, 3M employees who were very active in ASQ, championed it with ASQ. The consensus of the SIG was that I had developed a very good prototype⁶ but now it was time to port it to Excel™, the software of choice for the financial community.

Now it was Bill Rolfes turn to literally burn the midnight candle. He too only had time to work on it at home. As I wrote this booklet I have new appreciation for how well he managed to convert and improve the application. It was at this time that either Bill on his

⁵ *Statistical Thinking: Past, Present and Future*, See a former 3Mer, Don Hlavacek's article at http://216.171.160.55/documents/FTC%202008%20Stat%20Think%20PastPresentFuture_100208.pdf

⁶ By this time the code for the Minitab Version of BPChart was over 40 pages.

own or the SIG suggested adding Exponential, Seasonal and Custom Charts, probably due to the same “cantcha” chant I had so often experienced.

My additional contribution to the Excel version was the incorporation of the English language versions of the special cause codes found as comments in the Special Cause Code cells on the I Chart Tab. I couldn't convince the statisticians to use my definitions as the primary explanation of special causes and instead use the statistical terminology behind the scenes. So we're stuck with language like, “2 of 3 beyond 2 Sigma” which I simply call “A large shift from normal.”

Microsoft contributed to the implementation in numerous negative ways. Every time they introduced a new version of Excel™, they changed something that crashed BPChart and required fixing. The latest change to Excel 2007 is the most recent issue. And the current version is still subject to minor glitches due to Microsoft. The good news is BPChart v2007d.xlsm seems to work fine with Excel 2010, and Windows 7.

Bob Mitchell hired me as a consultant to 3M, to provide direction, consulting and evaluation of the efforts of the team of programmers who were upgrading BPChart to Excel 2007.

Bob Mitchell also encouraged me to update the two “90 Minute Workout” booklets written by the Stat Prac SIG as self-help instructional booklets. By the time I got around to it some executive at 3M, no doubt responding to two point comparisons, put a stop to spending money on consultants, in 2011.

Despite the loss of this income opportunity, I determined to take an entirely new approach. I became obsessed with writing a new comprehensive illustrated user manual. My hope is that it helps encourage others to adopt Statistical Thinking and use BPChart to really tell a story, and to put a little money in my pocket as well.

3M has granted me permission to share the BPChart file with my clients, as a way of thanking me for my collaboration with 3M and Bob Mitchell helping upgrade and improve BPChart 2007.

Mike Mercer
Woodbury Minnesota
February 6, 2011.

**Introduction
To
BPChart**

**Making Business Charts
that really tell a story!**

