

Dow Chemical achieves major Transformation of PO&E R&D group

Personality-Oriented Approach Improves NPD Results

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For years researchers have been trying to figure out the “secret” of innovation. In this case history, the authors show how matching personality type and job function improved NPD results dramatically at one division of Dow Chemical over a 10-year period. In the article, they walk readers through how managers of this division orchestrated the change—laying out the results, measured in a variety of ways, which were achieved by the end of this 10-year time frame.

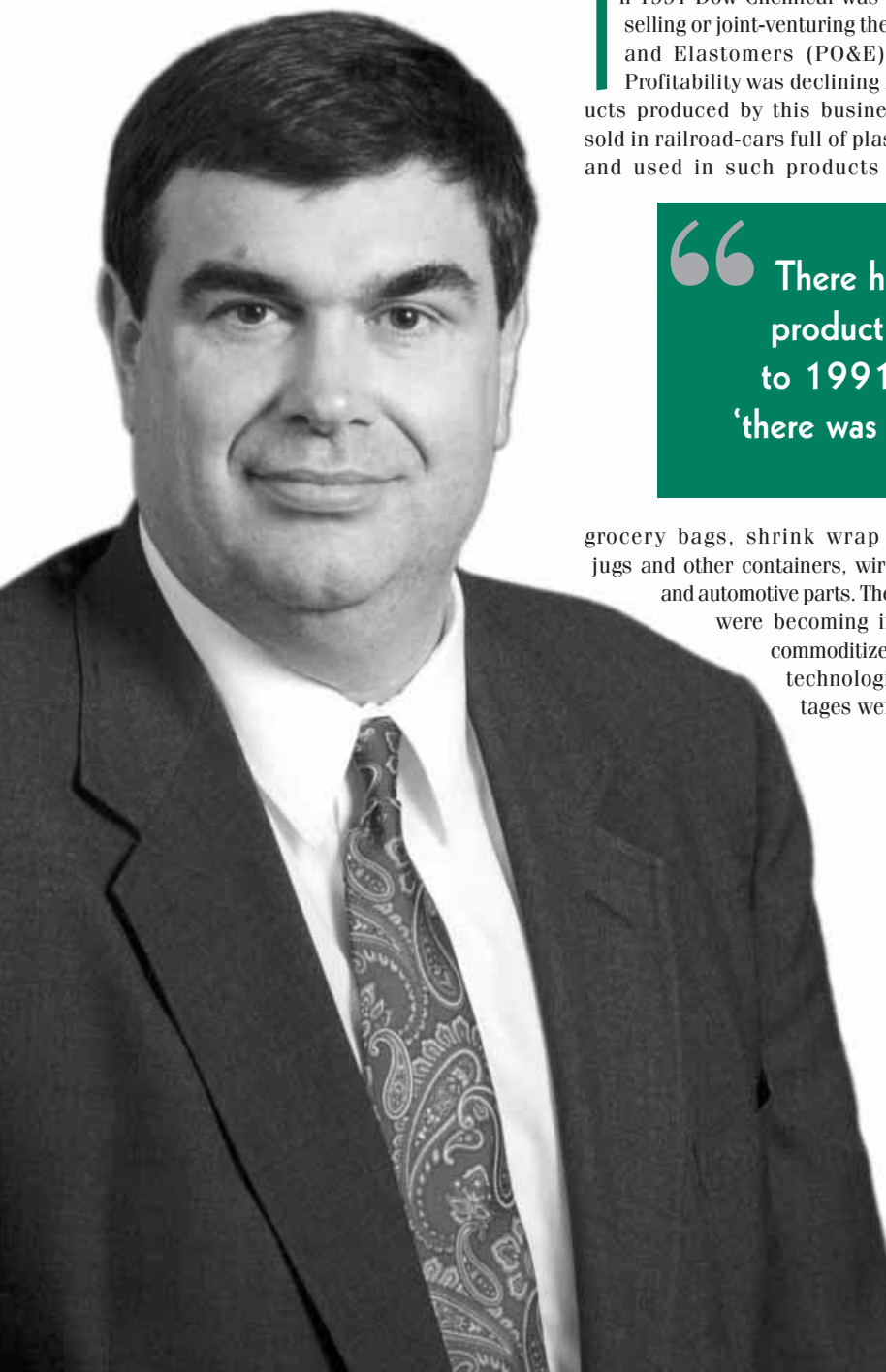
In 1991 Dow Chemical was considering selling or joint-venturing the Polyolefins and Elastomers (PO&E) business. Profitability was declining in the products produced by this business, usually sold in railroad-cars full of plastic pellets, and used in such products as plastic

Dow's PO&E business had a few innovations in the pre-1991 timeframe. But there had not been a single new product line in several years prior to 1991, and it was believed that “there was nothing new under the sun.” The very culture of the R&D organization itself seemed lacking in cre-

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grocery bags, shrink wrap film, milk jugs and other containers, wire insulation and automotive parts. These products were becoming increasingly commoditized, as earlier technological advantages were lost.

activity. Even trying to obtain patents in new product areas was highly questioned in 1991. A mantra was often heard to the effect that, “Patents don't really matter... The competition will just get around them in a year or two,” or “There is nothing to Polyethylene but three yards and a cloud



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Left: Kurt Swogger, The Dow Chemical Co.

of dust,” implying that all that could be done was to “grind it out” as in a ground-game of football. Indeed, it looked like “the sun was setting” on the Polyolefins and Elastomers business at Dow.

Taking up the challenge

This was the challenge that Kurt Swogger inherited in 1991, when he became head of R&D for Polyolefins and Elastomers (PO&E R&D). Yet Swogger and his management team were able to transform the business within a ten-year time period. Performance metrics documenting this transformation are shown in Exhibit 1 on this page. The exhibit compares performance of the R&D group in 1991 before the culture transformation with performance in 2001, 10 years after this transformation had been started, although the cultural transformation itself was largely complete well before 1995. The bottom line of this transformation is clear: The value created by the Polyolefins and Elastomers business since 1991 now represents a significant proportion of the shareholder equity of The Dow Chemical Co.

How Was The Innovation—Transformation Achieved?

Innovation has always been a key to corporate success.¹ To build a more innovative and agile culture, Dow’s Polyolefin & Elastomers R&D (PO&E R&D) group instituted a number of unique procedures which led to the rapid formation of a more creative and effective culture. The group started this transformation in 1991 with a different perspective on how to change culture, based primarily on the personal observations and judgment of management.

The approach was influenced by the work conducted over an earlier 10-year time span in a different part of Dow, which had revealed that certain types of personalities involved in the early stages of NPD out-earned other types. These types were referred to by two of the authors, Stevens and Burley, as “Rainmakers.” These Rainmakers out earned other types by a factor of 95 times—a 9,500-percent improvement—when measuring corporate profits that later resulted from their early-stage NPD analyses.²

Portfolio Management

A look at trends and success stories

In today’s economy, companies face a huge dilemma: They need to invest in NPD or risk falling behind. But at the same time they must reduce or keep R&D spending flat.

One way to handle this challenge is through effective portfolio management (PM)—the selection and management of products as they go in and out of the pipeline. That is why “Strategic and Operational Portfolio Management” was selected as the focus for an in-depth, three day conference held by PDMA and IIR in Orlando, Florida in late February of this year.

The conference took a look at trends in the field and how PM goes beyond the

traditional techniques such as stages and gates used to develop individual new products. Highlights of the conference proceeding can be found on pages 11-13.

We also bring you an article outlining a new approach to portfolio management developed by a division at Dow Chemical—the Polyolefins & Elastomers R&D division.

See Alan Rae’s “Manager’s Journal” from the Orlando PM Conference. Pages 11-13

These findings were reported by Stevens in the early 1990’s to PO&E R&D top management and executives. The results became woven into the fabric of the thinking of many key executives within the group.

Stevens and Burley’s thinking about the genetic nature of personality—and creativity—had been influenced by an article published by Thomas Bouchard et al, in the October 1990 issue of *Science*. This seminal review article in *Science* reported the results from the long-term study of identical twins

Two types of personality

First, management identified personalities as Starters/Innovators or Finishers/Implementers through both intuitive and qualitative means. The aim was to match personalities with job roles to put people in the roles they did best. The Starter personality types were those who are creative, intuitive, curious and visionary. These individuals continuously challenge the status quo ask “Why not?” They are risk takers, and often are hard to manage. The Finisher personality types are detail minded, practical, respectful of authority and rules, well focused and task oriented. These are the people who “get the job done.”

Second step

A group such as PO&E R&D needed both types of personalities. But it had to be determined which personalities were needed to do which jobs. Upon reflection,

it became evident to management that Starter job roles included determining what new polymers are needed to meet customers’ needs, and then creating them. This requires breakthrough thinking and usually requires broad, multidisciplinary experiences. Finisher job roles included developing and commercializing these products, keeping plants running well, and implementing procedures as required, to make money. Continuous improvement and

raised apart. These studies revealed that personality—including creativity—is heavily influenced by genetics.³ All these elements went in to creating the overall approach used by management to transform the culture of PO&E R&D. It took two to three years, and a false start or two, to come up with the approach. Many refinements have been added since then. Here is a brief description of the approach that emerged from this journey.

Exhibit 1: Increase in Performance Metrics
Dow PO&E R&D, 1991 versus 2001

Performance Metric	Change 2001 vs. 1991
Intellectual Property, # of Patents	4 Times More
Pilot Plant Efficiency	18 Times Better
Technical Service Efficiency, Lbs Serviced Per Person	2.6 Times Better
Speed to Launch	3 to 4 Times Faster
Number of New Product Launches	13 New Launches
Sales from Products Less than 5 Years Old	4.3 Times More
Increased Capacity from Existing Plants	2.5 Times More
Job Creation	4.8 Times More
Increased Value, Net of R&D	Huge

SOURCE: Authors’ research

optimization, as well as incremental advances and innovations are hallmarks of Finisher job roles.

The match-up

In 1991 many individuals in PO&E R&D had personalities that were mismatched with the job roles they needed to perform. Management was able to determine this through observation and judgment. Management began a shift to move individuals into more appropriate job roles: Starter personalities were moved into Starter job roles, and Finisher personalities into Finisher job roles.

Management watched closely to determine whether the job changes were working. Usually mismatches could be identified within six months or less. For example, if an individual was having great difficulty in a Starter role, they were reassigned quickly to a Finisher role, and vice-versa. In short, there was some trial and error involved.

Scarcity of starters

The scarcest types of people to find were the Starters. Management wanted more Starters to increase the number of differentiated new products. They sought out creative scientists and managers, or “mavericks” to fulfill these functions. These people were typically found in other parts of The Dow Chemical Company’s organization, where they were often out-of-favor and frustrated because

they did not fit the cultures of those organizations, and because they were often perceived as “difficult to manage.” These individuals would quickly find a home in Polyolefins R&D if they were creative and intelligent types, who were really trying to make positive changes for the company, (i.e. they had a positive-if-very-challenging attitude, vs. just being challenging trouble-makers).

“ In 1991 many individuals in PO&E R&D had personalities that were mismatched with the job roles they needed to perform. ”

Management made sure to reward these individuals well in their new roles, due to their scarcity, and due to the critical role they play in creating tomorrow’s new business.

Evaluating the changes

The positive results of this ten-year transformation were striking. In 2001, the authors set out to try to quantify these achievements—and better document how they had been achieved. This was done by measuring the personalities of all the key decision-makers above a certain job level in Dow—that is above 194 “Hay points,” or “Level 1,” on both the scientific and managerial ladders for PO&E R&D, for the organization as it existed in 1991, 1995

and 2001. The MBTI® instrument was used to measure individual personalities, and the MBTI®-based Creativity-Index was used to measure creativity.

In total, the personalities of 91 percent of all the key decision makers in PO&E R&D over that time period were measured, and most were interviewed in-depth as well. Various R&D performance metrics were also gathered over the same ten-year time period. The results are shown in Exhibit 1.

Exhibit 2 on page 9 shows that the degree of match of personality with job roles did indeed rise, from 29 percent in 1991, to 93 percent in 2001.

Raising the creativity of the entire organizational culture was also achieved, by quickly raising the level of creativity of the key decision makers—both scientists and managers—in the organization, as shown in the figure below. This was done by bringing in more creative individuals. Exhibit 3 on page 9 shows that the average Creativity-Index for the group of top managers and scientists rose from being substantially below the national average, to substantially above the average in less than four years. We believe that this is one of the most rapid cultural transformations ever documented. Such a deliberate and rapid cultural shift has never been documented before, to the best of these authors’ knowledge. By comparison, it took Jack Welch over 20 years by his own reckoning to get GE 50-60 per-

Starters vs. Finishers— Measuring personality can help NPDP

- Personality type is of importance in innovation.
- The top third of MBTI® based “Rain-maker” personality types can out-earn the bottom third by 9,500 percent.
- Personality, including creativity, is determined to a large extent by nature, or genetics, as determined from the long-term study of identical twins raised apart.
- Cultures have a distinct personality, which is the average personality of the key decision makers within the group.⁵
- It is very difficult to change organizational cultures without changing not just the people, but the kinds of people within those organizations.
- Creative people or Starters need to be in job roles requiring them to innovate, or start new business development concepts and not to implement or commercialize them.
- Finisher personality types need to be in roles requiring them to implement new business development concepts and not start them.
- The mix of Starters and Finishers in a group needs to be continuously adjusted depending on what needs to be accomplished at that point in time.
- The group mindset or culture of an R&D group chartered with creating discontinuous-radical-break-through types of innovations should be more on the Starter side than the Finisher side, while recognizing that both types are needed, in varying proportions, for any group to function well.
- New business development training and coaching is needed, particularly for the often difficult-to-manage Starters, to ensure they work on opportunities with value to customers.

These are some of the principles and research used in transformation of culture in Dow PO&E business 1991-2002

cent of the way towards being more innovative and agile.

The Polyolefin and Elastomers Business is also extraordinarily focused in its approach towards innovating between 1991 and 2001. This was not a case of "unleashing the creative child within." They focused their creativity on understanding key customer requirements, and the cost-performance that they would need to achieve so that their customers would receive outstanding value. In short, the efforts of the creative yet often difficult-to-manage Rainmakers, or Starters, were directed and focused on key money-making projects, by top management. When needed, this direction was provided autocratically: Starters were not allowed to work in an out-of-control manner, on whatever felt good at the time to them. Kurt Swogger and others in his organization have written numerous articles on their approach, referred to as Speed-Based-Management.

The results in organizational effectiveness resulting from these changes are impressive. Various R&D performance metrics were measured for 1991, 1995 and 2001. Since 1991 the number of patents has increased four times. The overall efficiency of pilot plants has increased 18 fold. The efficiency of personnel handling tech-

nical service has increased 2.6 times, freeing up a small army of 133 individuals for more productive roles, including innovation (See Exhibit 1).

Since 1991 there have been 13 major new product-line launches, where there had been none for many years prior. Further, the NPD portfolio is now full, with three more launches of major new products scheduled for 2003 alone. A steady stream of new product launches is planned thereafter, including not only major product innovations in polyethylene, but also in polypropylene, PET, elastomers and fibers. The percent of sales from products less than five years old has increased from 2.5 percent to 14 percent a remarkable transformation in a business that today produces over 20 billion pounds of product. Even the capacity of existing plants has been increased by a factor of two-and-a-half times (See Exhibit 1). Sales of new products have also helped to boost sales of existing products in the portfolio.

PO&E R&D is now defined by external auditors (PRTM) as "best in class" in the chemical industry for speed-to-market, and as being far faster than the rest of Dow.

The successful innovation efforts from PO&E R&D have created extraordinary value, which has been quantified from three separate categories. The combined result of

Dow PO&E R&D Improved Results: Three Separate Categories

- Increased margins from more valuable products.
- Gains from shareholder equity from JV's (such as the DuPont-Dow Elastomers JV shown below, providing \$0.5 Billion in shareholder value in 1996 per The Dow Chemical Co. annual report).
- Increased plant efficiency, up 2.5 times since 1991 due to these innovations, which has saved hundreds of millions of dollars that otherwise would have been needed for new production plants.

all three is shown in Exhibit 4 on page 10 and the Box on this page.

Once again, a crown jewel

The first large increase in value from the breakthrough innovations from PO&E R&D came from the equity gained by Dow

Exhibit 2: Percent of Match of Personalities with Job Roles Starters in Starter Roles, and "Finishers" in Finisher Roles

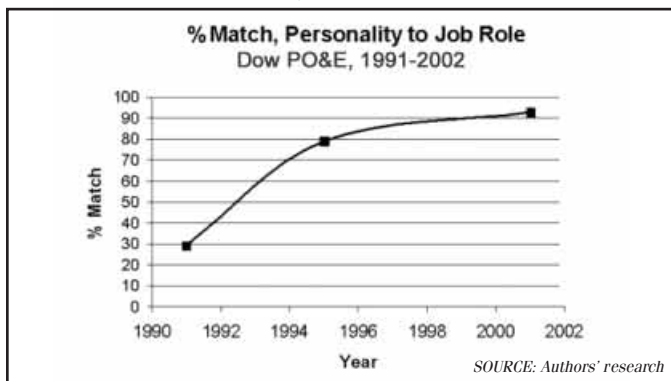
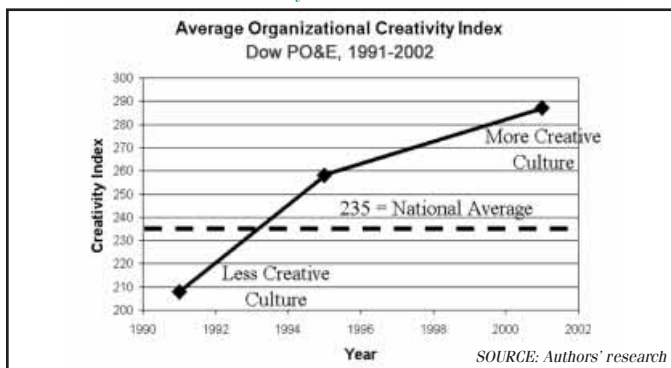


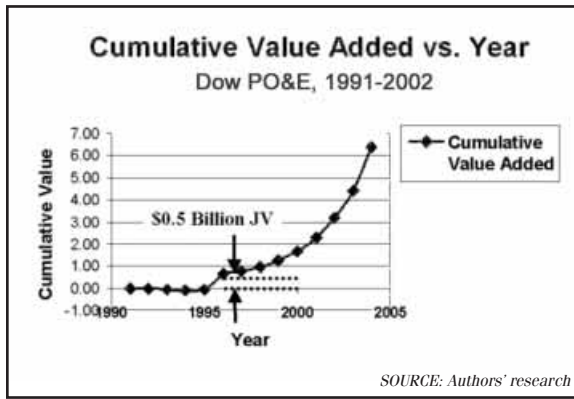
Exhibit 3: Increase in R&D Group's Creativity As Measure by MBTI®-Based Index



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issue, page 9

Exhibit 4: Value Created by the Cultural Innovation-Transformation



Chemical in 1996 as a result the DuPont-Dow JV in elastomers, which added over \$0.5 billion to the shareholder equity of Dow Chemical per their annual report. By 2003, over six times the \$0.5 billion in value from the DuPont-Dow Joint Venture in elastomers has already been created. The value created is conservatively projected to more than double again within the next three years. The Polyolefins and Elastomers Business now represents a significant percentage of the total value of The Dow Chemical Company, and is once again a crown jewel.

well documented. It is now more scientific and actionable. It is relatively simple, and—as the exhibits in this article show—it is highly effective. This approach could help many organizations—as it did Dow's Polyolefins and Elastomers Business—reinvigorate their new product development efforts and thus, strengthen corporate profits and success.

Footnotes

¹ Cooper, Robert G. *Winning at New Products: Accelerating the Process from Idea to Launch*, 2nd Edition. Reading, MA: Addison Wesley Publishing Co. 1993.

That's not too bad, coming from a commodity business which prior to 1991 was being considered for divestiture, and which itself believed there was little that could be done to create value from new products in polyethylene and elastomers.

Helpful for other corporations

The breakthrough approach that the Dow Polyolefin's and Elastomers Business developed over the last 10 years has been

² Stevens, Greg and James Burley. Piloting the rocket of radical innovation – selecting the right people for the right roles dramatically improves the effectiveness of new business development. *Research Technology Management*. 16-25. March-April, 2003.

³ Bouchard, Thomas J. et al. Sources of human psychological differences: the Minnesota study of twins reared apart. *Science*. 223-229. 12 October, 1990

⁴ Stevens, Greg, James Burley and Kurt Swogger. Creating an Effective Culture: How Dow Chemical's Polyolefins and Elastomer R&D Group Transformed Its Culture in *Under Four Years*, Leading to Even Greater Business Success. IIR-PDMA (Product Development and Management Association) Portfolio Management Conference, Feb. 28, 2003, Clearwater Beach, FL

⁵ Bridges, William. *The Character of Organizations: Using Jungian Type in Organizational Development*. Consulting Psychologists Press, Inc. 1992. 📌

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