

# Creating More Effective R&D Cultures for Innovation

Part 1: Bottom-Line Business Success from Creating a More  
Innovative & Effective Research Culture

*Greg Stevens, WinOvations, Inc.*

Part 2: Implementation in Dow Automotive

*Steve Swartzmiller, Dow Automotive & Greg Stevens, WinOvations, Inc.*

## ECMSA & AIQS

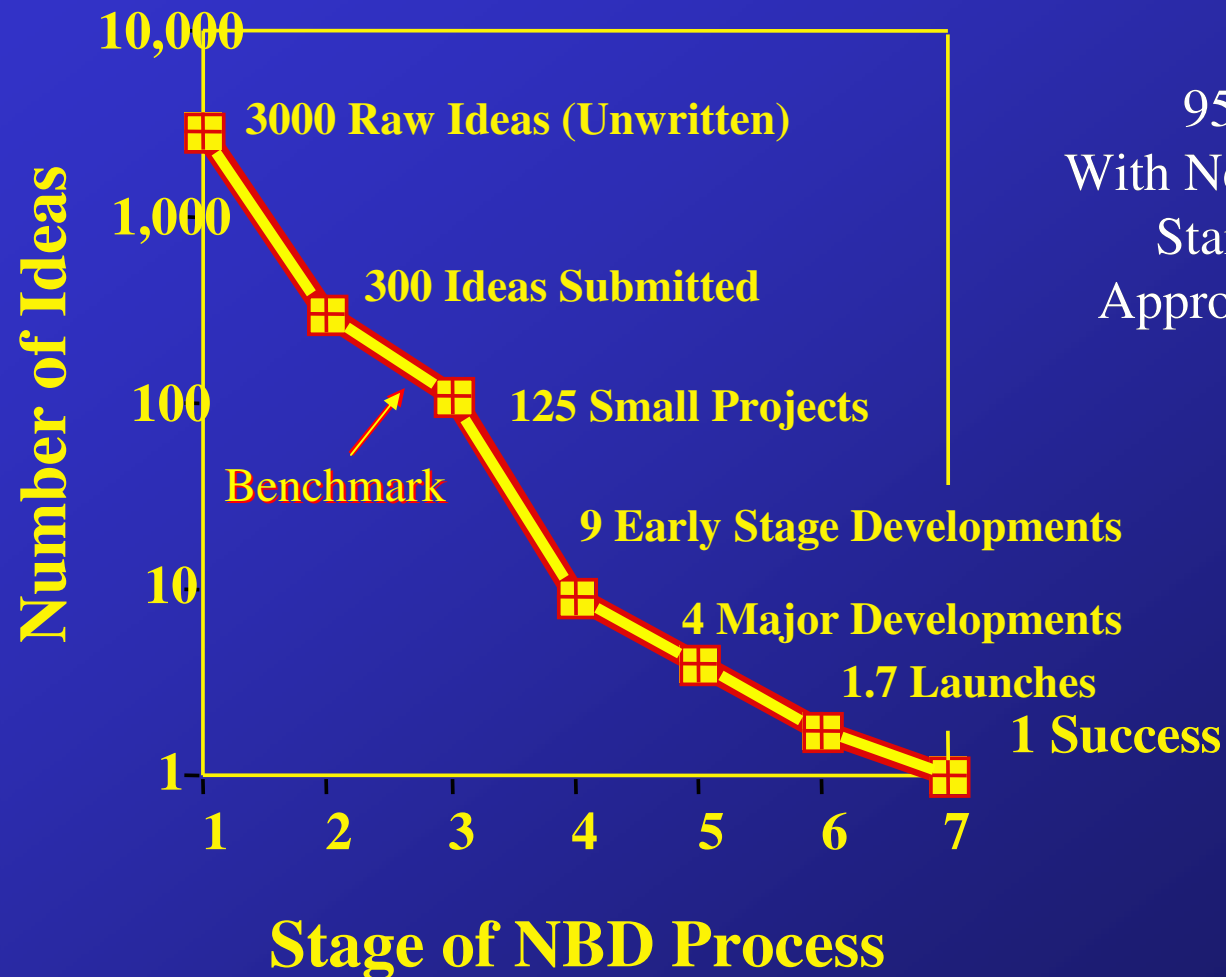
Profiting From Innovation –

Providing a Competitive Edge to the Chemical Industry

February 2, 2006

Barcelona, Spain

***Low Odds on Universal Success Curve Define “The NBD Problem.”***  
***Removing Multiple Barriers to NBD Provides More Than a Nine Fold Improvement***  
***In Yield and Speed, Vs. Universal NBD Success Curve***



95% Success Rates  
With New Tools vs. 11% with  
Standard Staged-Gate  
Approaches, From Stage 4.

Ref's: 1. Stevens & Burley, May-June 1997, *Research•Technology Management*

2. Stevens & Burley, Piloting the Rocket of Radical Innovation, March-April 2003, *Research•Technology Management*

# Agenda

## ❖ Part 1: Bottom Line Business Results from Creating a More Innovative & Effective Research Culture : *Greg Stevens, WinOvations, Inc.*

- Organizational Culture Definitions
- Dow PO&E R&D Experience 1991-2005
  - Model for Increasing R&D Effectiveness
  - *Starters & Finishers, & Fit with Job Roles*
- Metrics to Measure
  - Dow PO&E Chosen Outstanding Corporate Innovator, 2003
- Speed-Based-Development: Spreading Across Dow

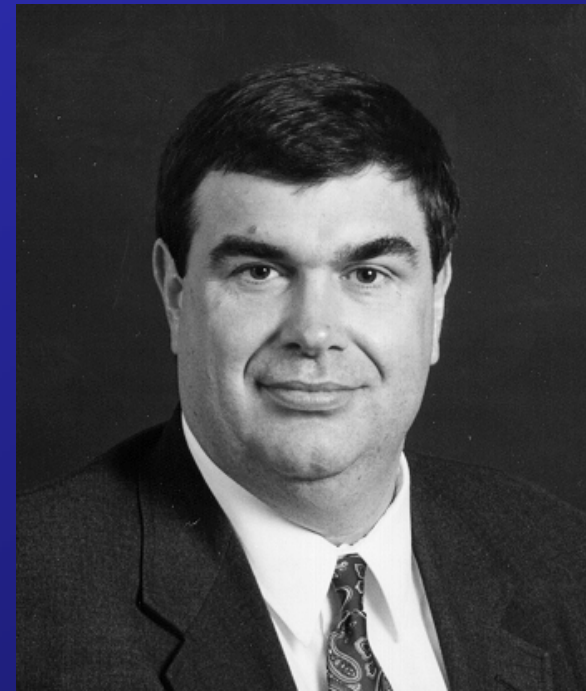
## ❖ Part 2: Implementation In Automotive R&D: *Steve Swartzmiller, Dow Chemical, & Greg Stevens, WinOvations, Inc.*

- Review Leadership Group MBTI® Data
- Identified Potential Opportunity Analyst Group
  - *With High Rainmaker-Index's*
- Show % of Fit of Personality vs Job Role for Five Leadership Groups
  - Mgmt. View of Job Roles
  - MBTI® view of Personality vs. Job Role
- Considerations for Non-Leadership Professionals
- Summary & Recommendations

## Real Example

# 1991: An Entire R&D Organization Needed Cultural Change

- ❖ Dow Chemical, Polyolefins and Elastomers Business, Pre-1991:
  - Portfolio Mature
  - Low Growth, Commodity Business
  - Little Belief Even In *Possibility* of Innovation
  
- ❖ 1991 Charter To Kurt Swogger, R&D:
  - Innovate & Differentiate
    - Or Else - Be Sold



# New Understanding of the *Genetic Nature of Personality* Key to Making Improvements

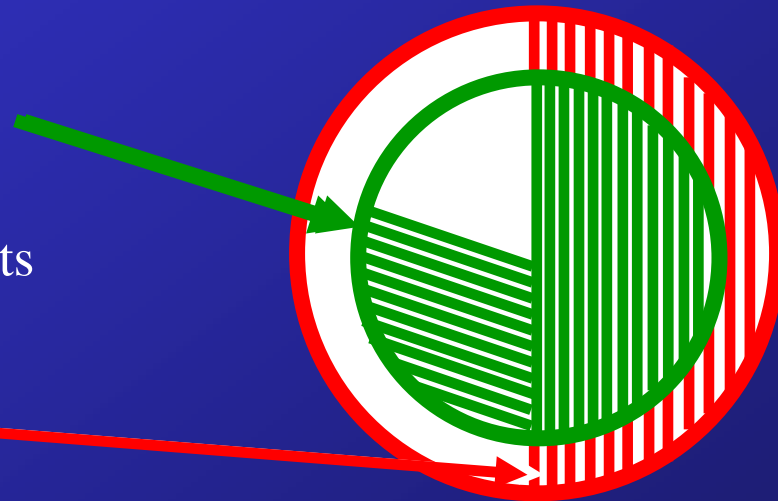
## ❖ ~80% Core Adult Personality Genetic\*

- When Correct For Test-Retest Variability in Psychological Instruments
  - Including the MBTI®

## ❖ Minimum of 50% Due to Genetics

- When Do Not Correct

## ❖ Video: Giggle Twins



# *Organizational Culture Is Defined Here* *As the Average Personality* *of The Organizations' Leadership*

- ❖ *Organizational Cultures: Also Largely Genetic*
  - Because They Consist of Individual *Genetic* Personalities
  - Genetic Nature of Organizational Cultures Explains Why Most Resist Change
    - Cultures of Organizations Become “**Hard Wired**” Over Time
  - Organizational Culture Also Determines Inherent Innovativeness of Organizations
- ❖ *For R&D:*
  - Organizational Culture Includes *Both* Managerial and Scientific Leadership

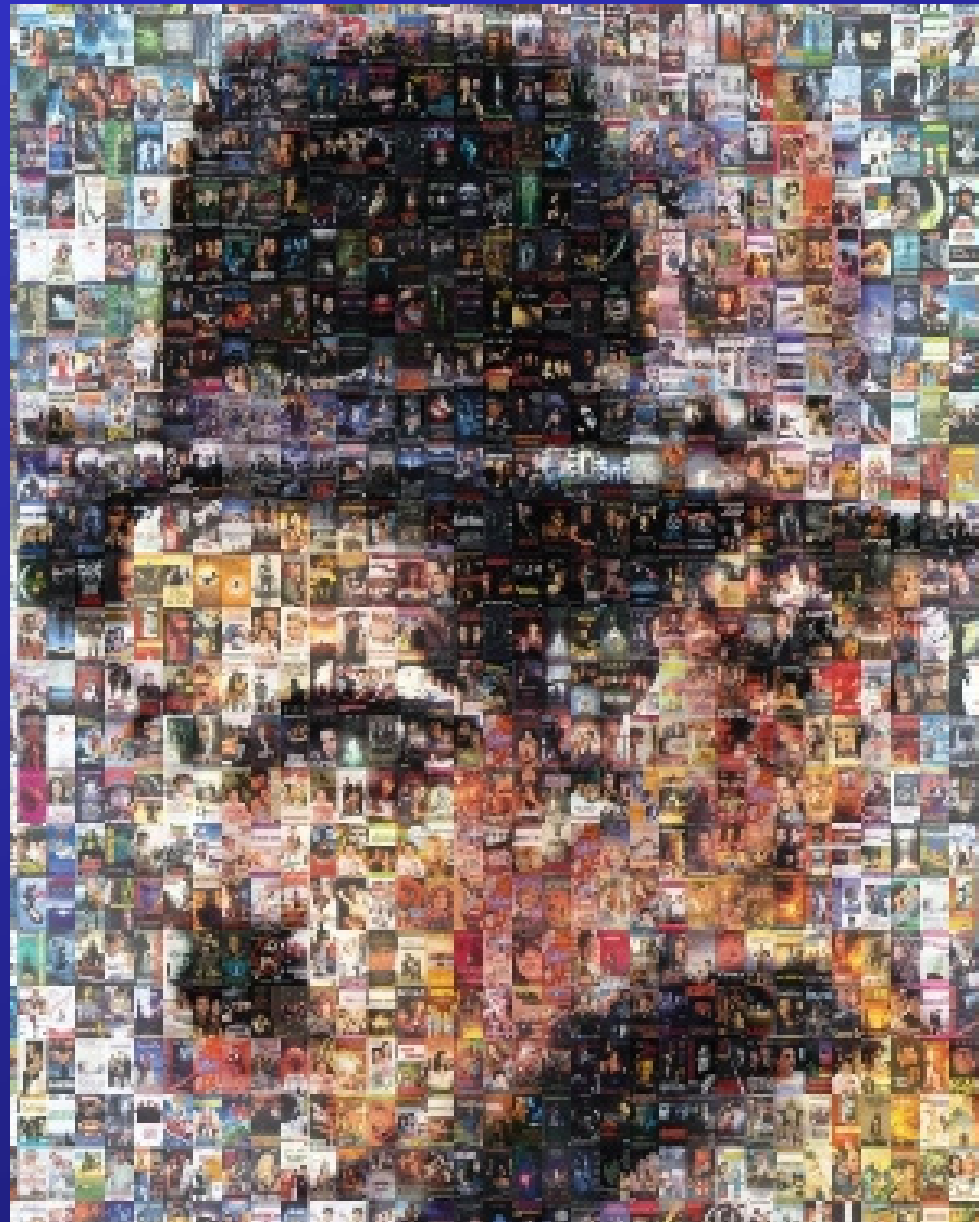
*Organizational Culture:*  
Like a Composite Face (Photo-Mosaic)  
**Made Up of Individual Leader's Faces/Minds**

- ❖ The Personality or Culture of Organization
- ❖ Can Be Highly Appropriate...
  - Abe Lincoln



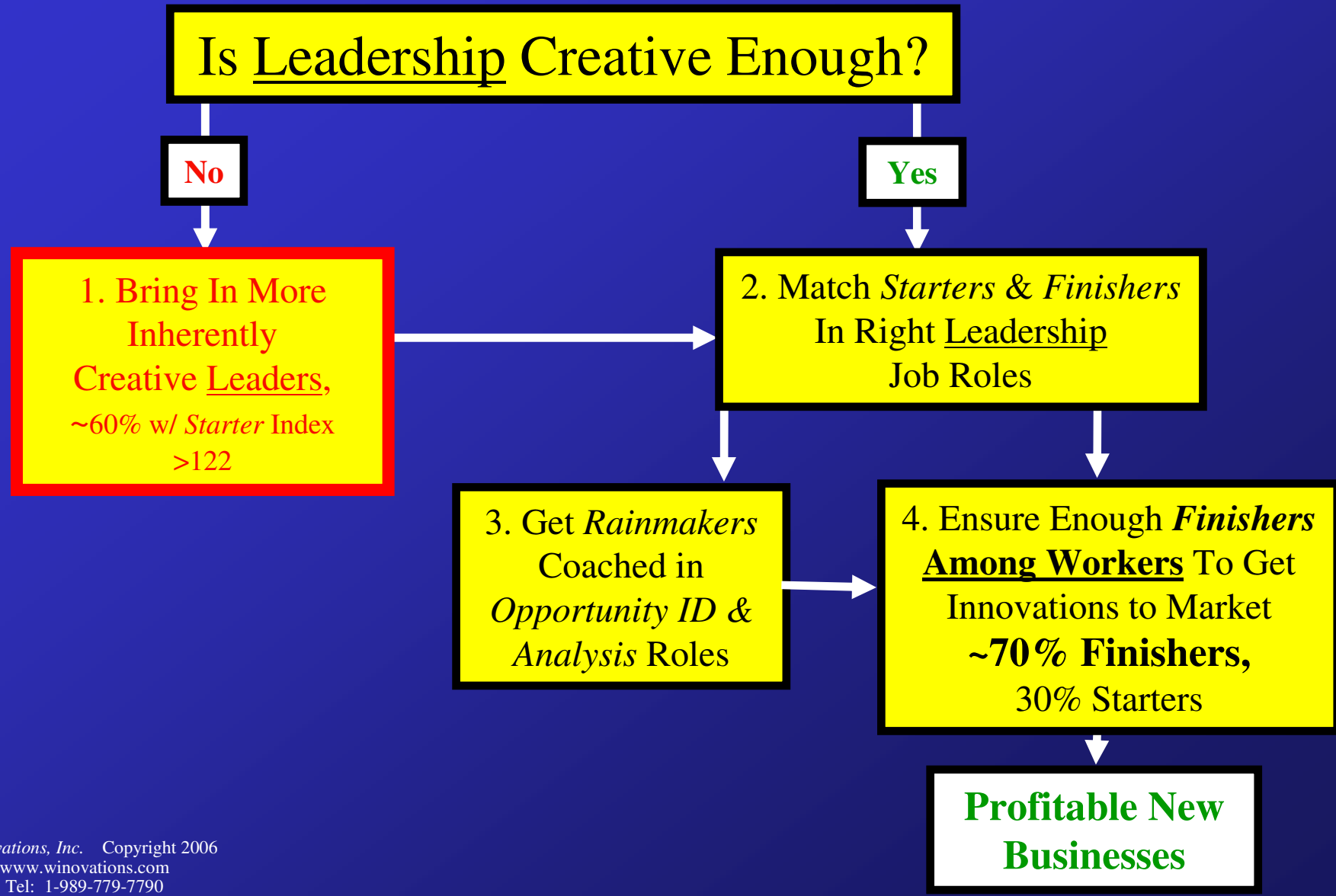
# Or Inappropriate...

- ❖ **Charlie Chaplin**
- ❖ **Depending on The  
Job Function  
Required!**
- ❖ **Both Were Masters at  
Their Jobs**
  - Their Personalities  
Suited Their Jobs
  - & Neither Could Do  
What the Other Did
- ❖ **Whatever the Case....  
Organizational Culture Is**
  - Largely Genetic
  - & Measurable
  - The “Hive Mind”





# Step 1: of Four-Step Model for Increasing R&D Group Effectiveness



# Two Main Personality Types Can be Identified By Standard Psychological Instruments, Including the MBTI®

## ❖ “Starter” Personality Type:

- Intuitive, Thinking, Perceiving Preferences
- Like Challenge of “You Can’t Do That”
- Define New Opportunities

## ❖ “Finisher” Personality Type:

- Sensory, Thinking, Judging Preferences, Practical
- Deliver the Opportunities to the Marketplace

# How Top Management Can Identify “*Starter*” and “*Finisher*” Personality Types

## ❖ “*Starter*” Personality Types:

- $\geq 122$  on “*Starter-Index.*”<sup>9,10</sup>
  - Often “NTP” MBTI® Type Preferences;
  - Continually Challenge Status Quo, & Ask “Why Not?”
  - Creative, Risk Takers, Usually Hard to Manage, Often Unfocused
  - Tend to Dislike Detail, Often Impractical, Procrastinators

## ❖ “*Finisher*” Personality Types:

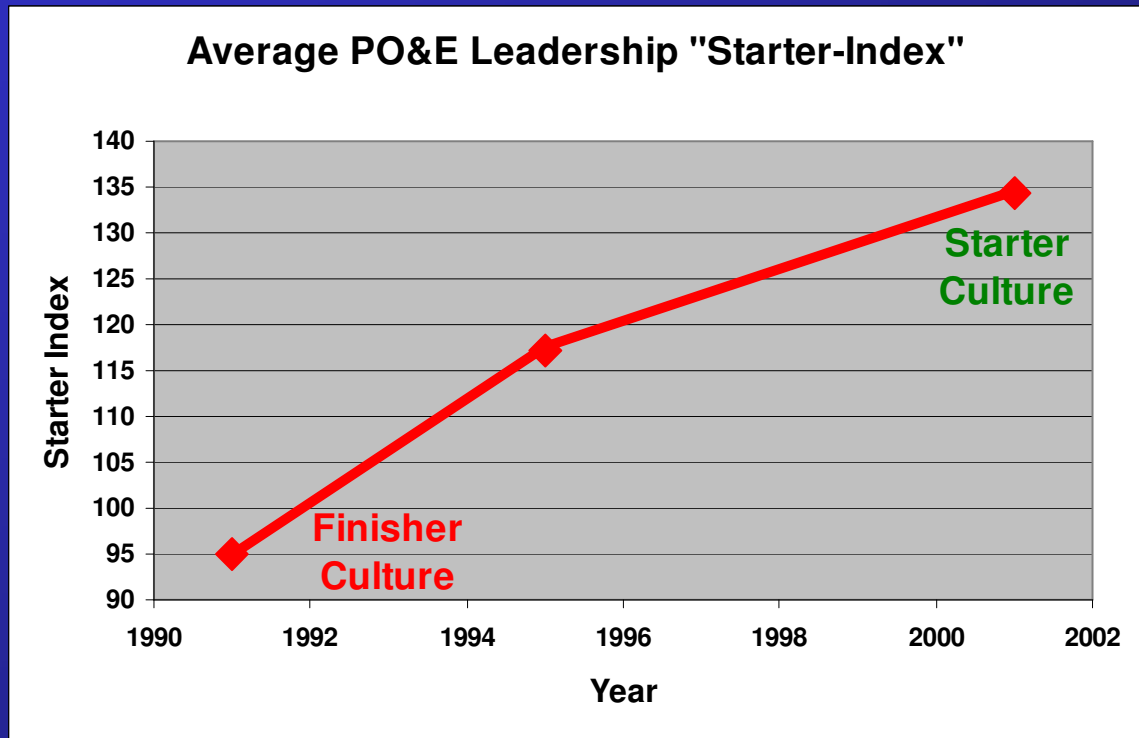
- $< 122$  On “*Starter-Index*”
  - Often “STJ” MBTI® Types
  - Respectful of Authority and Rules. Fraternal.
  - Well Focused & Task Oriented. Manage Time Well. Steady Workers

## ❖ Subsequent Trial & Error (But *Far Less Error* Than Before)

- Make Assessment, Assign to Job Accordingly.
  - **Quickly** Reassign if Needed (In 6-12 Weeks)

Earlier PO&E Results - Cultural Assessment:  
**Group *Starter Index* Was Increased  
Substantially from 1991 to 1995-2001**

- ❖ MBTI® Based  
“NTP,” or  
“*Starter Index*”
- ❖ *Highly  
Correlated to  
Creativity*

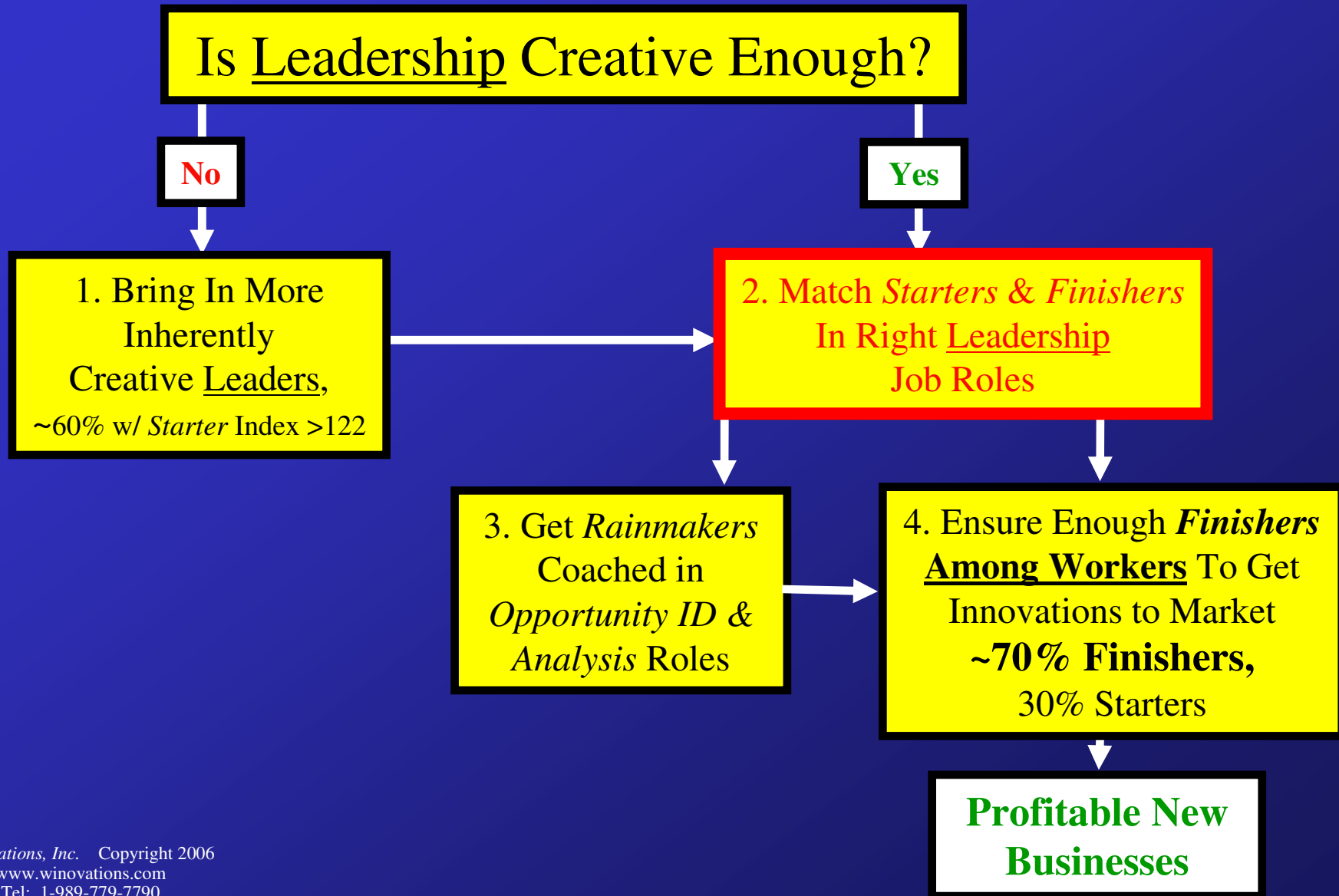


For R&D Leaders Over 10 Year Period

# R&D Leadership Group Needs Much Higher Percentage of “Starters” Than In Overall Business Leadership

- ❖ R&D Leadership Typically Needs ~60% “Starters”
  - MBTI®-Based *Starter-Index* >>122
  - And Enough “Finishers” Per Project Area to Get It Done
    - *& Make Money*
  - *Probably Need ~60% Starters In Marketing Leadership Too*
    - *Analogous Role to R&D, on the Commercial Side*
- ❖ However, Business Leadership Overall (Including R&D & All Other Functions):
  - Needs 20-30% Starters In Leadership Roles, & 70%+ Finishers
    - **Key Business “Finisher” Roles Include:**
      - Sales, Production, Customer Service, Technical Service, Patent Management, Accounting, Clerical, Pilots...etc.

## Step 2: of Four-Step Model for Increasing R&D Group Effectiveness



# Choose the Right People for the Right Job Roles

2 Personalities:

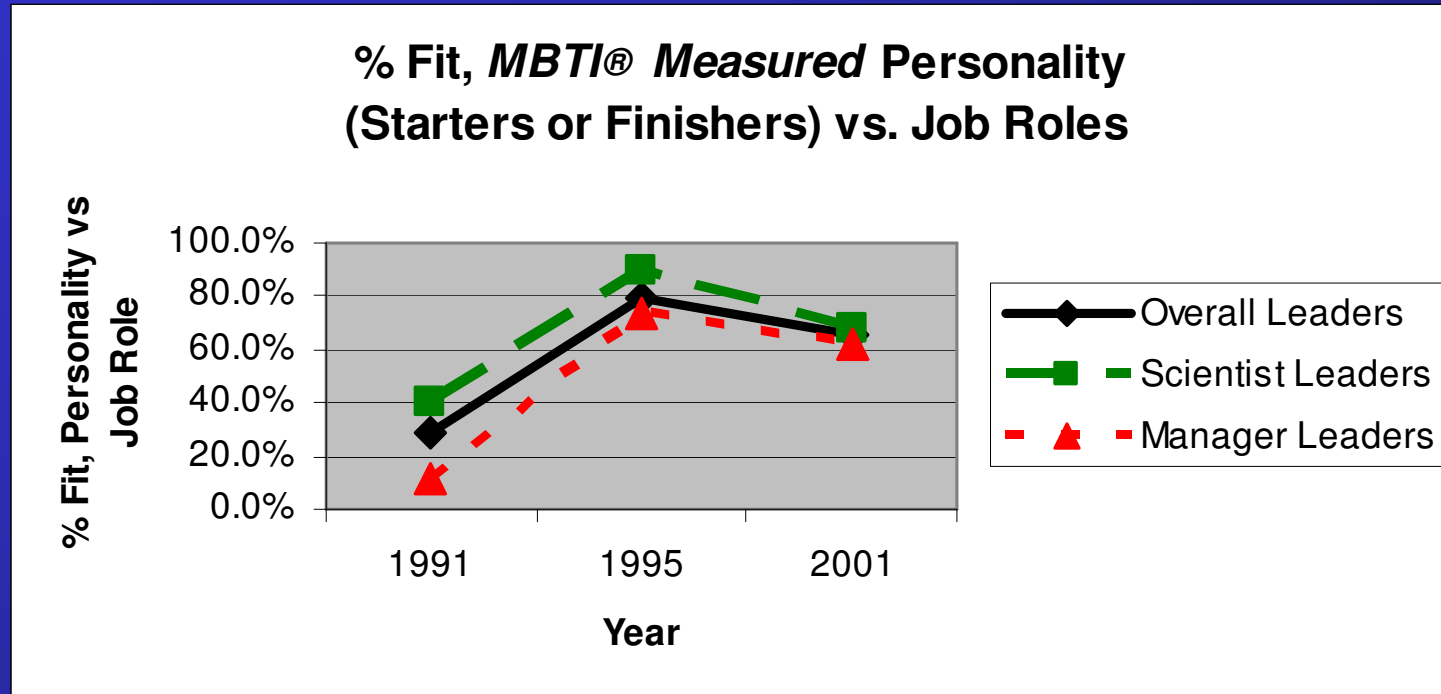
4 Job Roles:



- ❖ Also Choose People With The Right Skill Sets
  - Polymer Chemist, or Engineer, etc.
- ❖ & Choose Highly Driven People Who Want Their Projects And Themselves to Succeed

## Earlier PO&E Results – Assessment of Personality Measures: Match of Personality to Job Role Was Increased Substantially from 1991 to 1995, & 2001

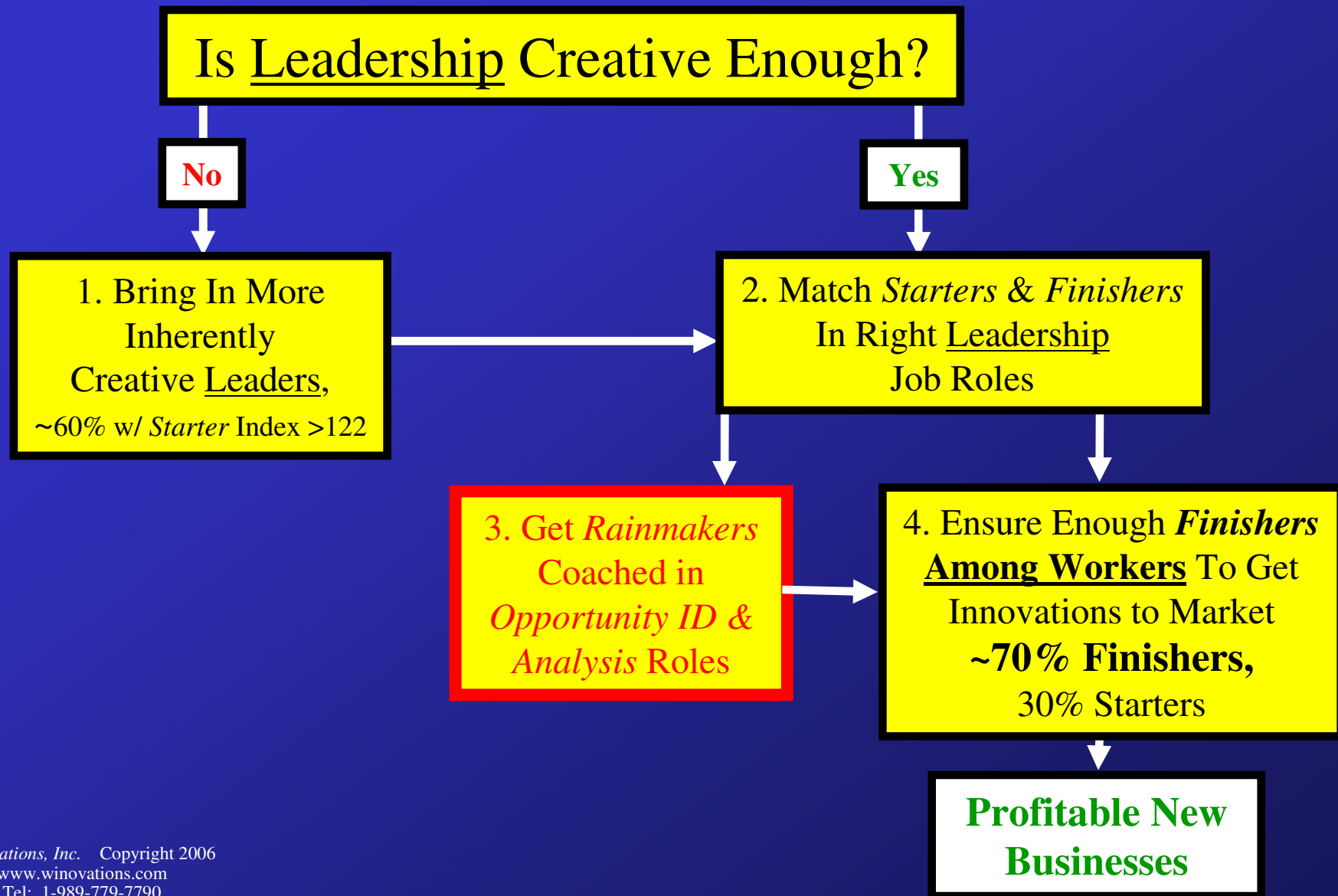
- ❖ For PO&E Leadership Group, Matched Intuitively Without MBTI®,
  - & Later Measured via MBTI®



- ❖ Leadership Group Size:
  - 1991 = 14; 1995 = 29; 2001 = 86 (Harder to Do Well Without MBTI)



## Step 3: of Four-Step Model for Increasing R&D Group Effectiveness



Earlier Key Discovery:

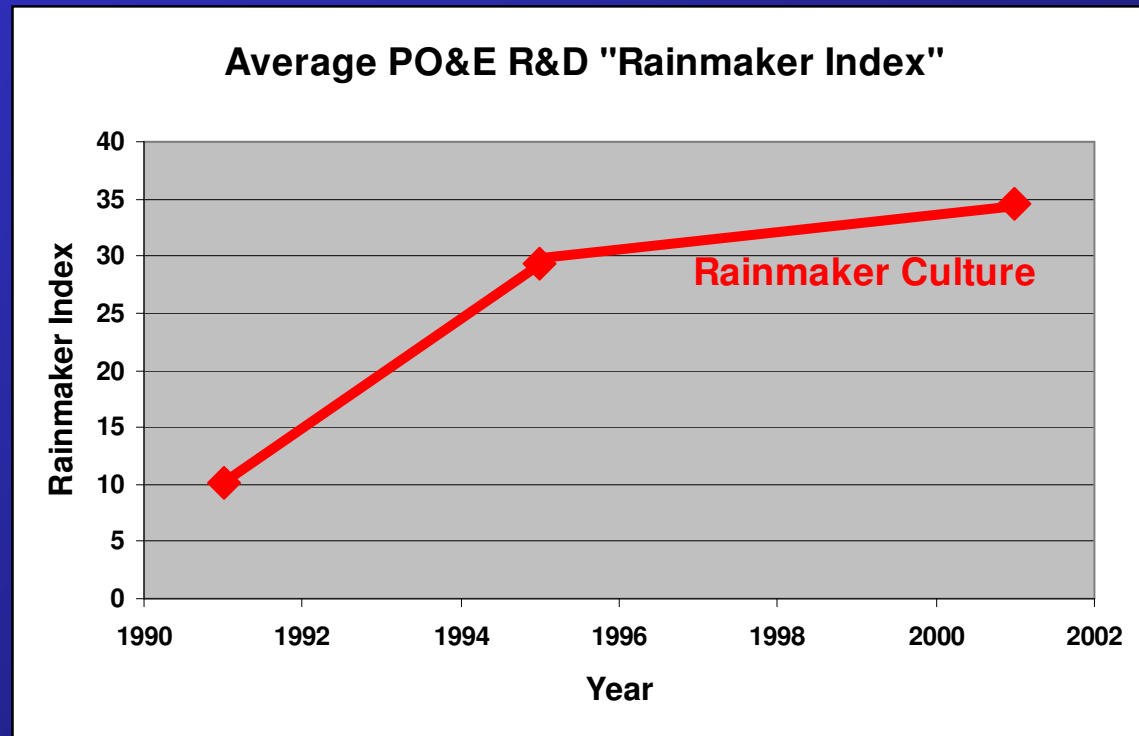
## *Rainmaker Genetic Personality Types Outperform in *Early-Stages of NBD**

- ❖ Top-Third on *Rainmaker-Index*<sup>SM</sup> Personality Profile Out-Earns Bottom-Third by 9,500%.<sup>9</sup>
  - \$8.0 Million vs. \$0.09 Million: 1991-2001
    - Per *Opportunity-Analyst*
      - In Roles An Average of Just ~2 Years
        - » (Longer Assignments Recommended Now: 5+ Years)
        - » Tracked Results Over Ten Years
      - With Identical New Business Development Process Training and Coaching
    - Gone On to Be >>\$20 MM Profit Per *Rainmaker*

9. Stevens, Greg & James Burley, Piloting the Rocket of Radical Innovation, March-April 2003, *Research\*Technology Management*, pps. 16-25.

Earlier PO&E Results - Cultural Assessment:  
**Group *Rainmaker Index* Increased  
Substantially from 1991 to 1995-2001**

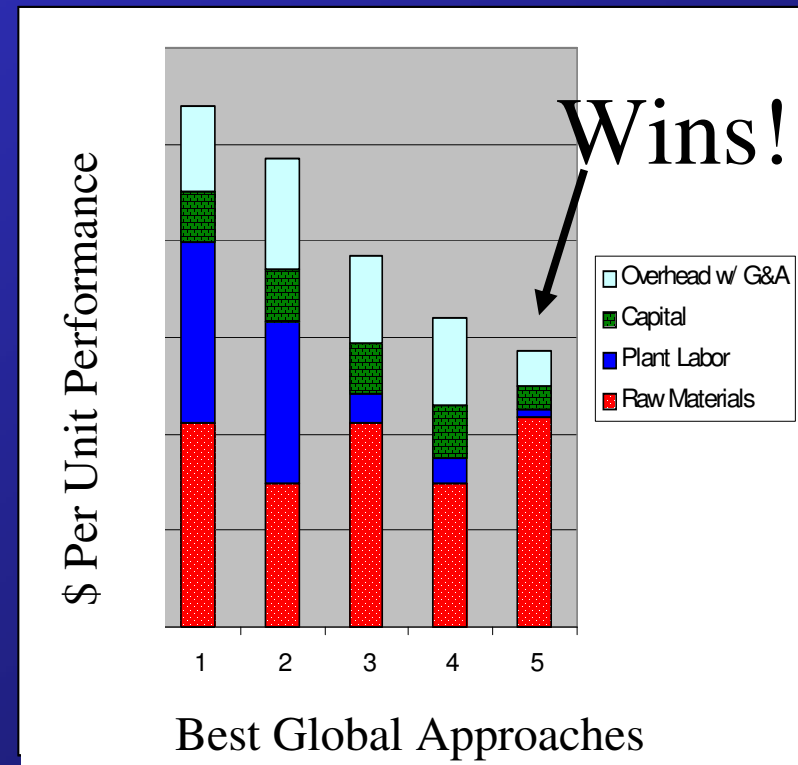
- ❖ MBTI® Based  
“NT,” or  
“*Rainmaker  
Index*”
- ❖ Many Coached  
and Trained in  
*Opportunity-  
Analysis* Roles



For R&D Top Decision Makers Over 10 Year Period

## *Rainmaker Opportunity-Analyst Job-Roles:*

- ❖ Compare “Fit” of Starting Ideas vs. Top Managements *Gut-Level-Screen*
  - To Prioritize Quickly
- ❖ Prepare Draft Propositions (or Hypotheses) to Test With Customers
- ❖ Analyze Customers’ Unspoken Needs
  - Many Direct Interviews & Plant Visits
  - Building **System-Cost-Performance Models** from Customers’ View, for New Ideas vs. Best Alternatives Globally
- ❖ **“Morph” Starting Ideas Into Winners**
  - Based on Real Needs, & Real Value
  - Showing How to Win vs. Best in Class
  - **Requires Creativity, & Analysis**
- ❖ Present to Business Management
  - Only After Learn How to Win!
  - For Later Commercialization by Business



**Key: Determining Customer's Functional Requirements,  
& Competitor's Costs of Meeting Them vs. Dow's.**

**Many *Opportunity-Analyses* Were Conducted *Early* In  
the Revised PO&E Business**

❖ **Insite® Metallocene Chemistry**

- Packaging Opportunities
  - Meat Wrap & Many Other Applications
- Durables
  - Elastomers for EPDM Replacement
    - Led to DuPont-Dow Joint Venture
  - Wire & Cable Compounds
- Automotive
  - TPO's
- Many Others
  - Shoe Soles

*Real  
Targets*



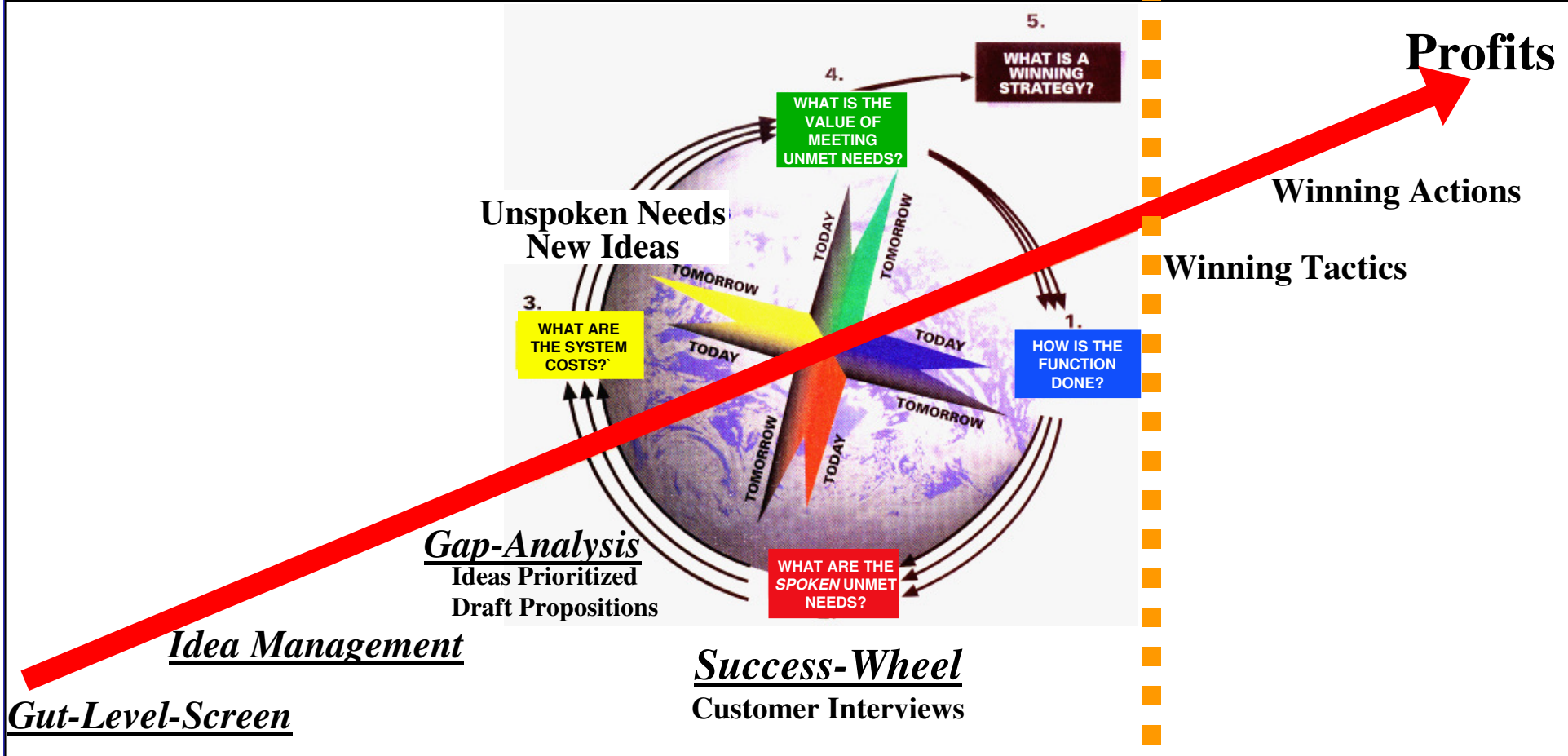
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## Rule of Thumb: ~\$50 Million New Revenue Per Year, Per *Rainmaker* in *Opportunity-Analysis* Roles

- ❖ Need 5 *Opportunity-Analysts* Completing 20 Studies in Two Years To Provide ~\$500 Million in New Business Opportunities
  - Typical Size of Opportunities Found ~\$50 Million/yr.
    - Range from \$5 Million - \$500 Million and Up.
  - For \$500 Million Sales Potential in New Business
    - Need 10 Positive *Opportunity-Analyses*
      - Most - But Not All – Positive, & Businesses Will Not Act on Every Positive Finding
    - So Need **20** *Opportunity-Analyses* In Total
      - Two OA's Per Year, Per Fully Coached *Opportunity-Analyst*  
→10 OA's/Year by 5 *Opportunity-Analysts* with \$500 Million Sales Potential, Half of Which is Likely to Be Acted Upon, = \$250 MM/yr. Real Potential
      - **Group of 5 *Opportunity-Analysts* Provides ~\$500 Million Opportunities In Just Two Years**

# Early-Stages of NBD Process Summary

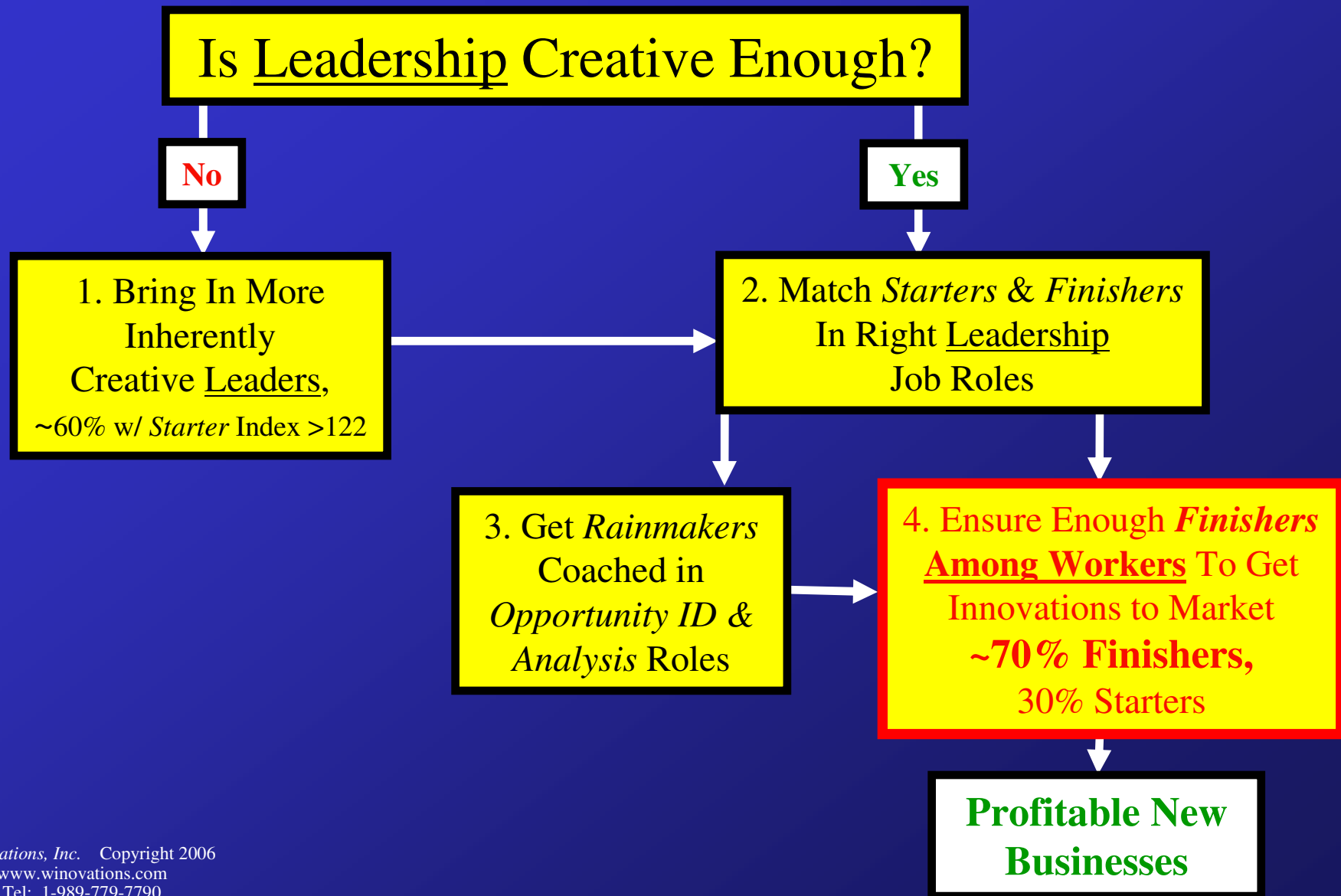
End of Early Stages



Stages:	Ideation	Shaping	Analysis	Validation	Develop & Implement
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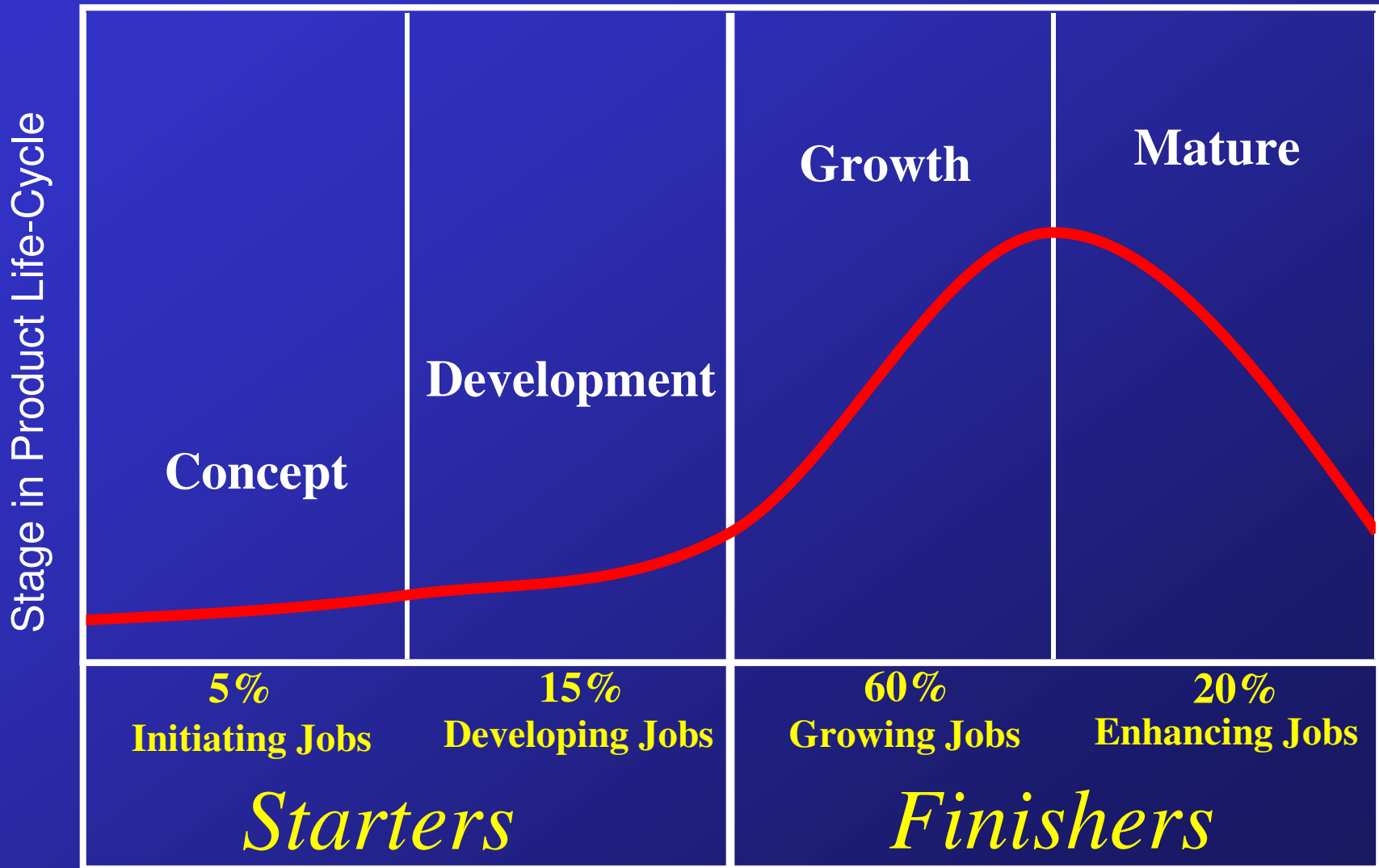
*Individual Opportunity-Analyst Predominates (Or Small Teams)* | *Teams Predominate with Project Leaders*

## Step 4: of Four-Step Model for Increasing R&D Group Effectiveness





# Need To Balance “Human Portfolio” With Business Portfolio



## Makeup of Entire R&D Organization Needs Much Higher % of Finishers than In Leadership Group

- ❖ Right Balance in R&D *Non-Leadership* Professionals Believed to Be ~20-30% “*Starters*”, 70%+ “*Finishers*”
  - Groups of All “*Starters*” Usually a Disaster
    - No One Gets The Work Done!
  - Percentages Being More Closely Determined Via Additional Research
    - Ongoing Now, Reported in Future

# Initiating – Job Roles

- ❖ Requires Innovating, iterative thinking, “morphing” concepts, exploring opportunities and capabilities, and discovering matches that have value. Have self confidence to face many “No Go” opportunities prior to finding the successful ones. **Good at creatively analyzing & “Morphing” starting-point opportunities**, & taking calculated risks.
- ❖ Example:
  - ***Opportunity-Analysis*** Job Role,
    - > 40 on MBTI® Based *Rainmaker-Index*

# Developing - Job Roles

- ❖ Creative concept developing. Takes identified and shaped ideas, validating performance, and reducing them to practice. Using science and past learnings to develop solutions to real customer needs in the shortest possible time.
  
- ❖ Example:
  - **Project Leader for Major R&D Initiative,**
    - New Product for New Market,
      - > \$500/Yr. Million Revenue Potential
    - “Starter” (*Starter-Index* = 201, which is >122)

# Growing – Job Roles

- ❖ Requires enthusiastic implementation, proliferating developed solutions to build value. Improving upon known products or processes while expanding our capabilities. Line extensions. Proliferating product lines with additional customers and geographies. Requires more political skills.
- ❖ Example:
  - Project Leader for Already Developed Breakthrough Concept *Needing Ramp Up & Implementing*
    - “Finisher” (*Starter-Index* = 89, which is <122)

# Enhancing – Job Roles

- ❖ Tenacious, detail minded pursuit of excellence. Maximizing performance and minimizing costs to create enhanced value for our products and services
- ❖ Example:
  - IP Manager, or Operations Manager – Very Detail Oriented Job Roles
    - “Finisher” (*Starter-Index* = 113, which is <122)
      - Probably “Herding Cats” (Inventors) All Day Long!
      - & Managing Hundreds of Details

# “Dashboard” of Personnel Requirements for Job Roles in an Organization

Personalities →	<i>Starters</i>		<i>Finishers</i>	
Job Roles →	Initiating Roles	Developing Roles	Growing Roles	Enhancing Roles
<b>Functional Capability</b>	Able to define scope and initiate project. Continuously looks for opportunities.	Defines technical hurdles and value of opportunity. Able to synthesize capabilities.	Able to focus and implement while controlling cost.	Continuously improves process and reduces cost through incremental advances.
<b>Personality Attributes</b>	Visionary risk taker who anticipates and is willing to continuously learn. <i>&gt;122 Starter-Index</i>	Driver who is a good organizer, wants to learn and is a good communicator and team builder. <i>&gt;122 Starter-Index</i>	Detail minded driver who enjoys reducing challenges to practice. <i>&lt;122 Starter-Index</i>	Patient. Comfortable with boundaries and rules. Likes to deal with details. <i>&lt;122 Starter-Index</i>
<b>Network Capability</b>	Broad, lateral thinker throughout company as well as industry.	Broad within organization.	Focused internally / externally.	Focused on function and business.
<b>Skill Set</b>	Very broad and multi-disciplinary. Uses history so not to repeat past mistakes. Broad experience.	Broad skill set with the ability to exploit with historical practice.	Able to focus on task-at-hand and apply specific skill sets. Adds to historical knowledge. Depth of knowledge in an area.	Detailed by nature and a specialist in a specified area. Leverages specific historical perspective.
<b>Experience</b>	Must understand and continuously learn from “the system”. Sees the big picture. Able to synthesize from experience and present (articulate).	High experience requirements. Focuses and develops the new and applies it.	Medium breadth and moderate depth of experience requirements. Generates and captures information which adds to history.	More depth than breadth of experience. Must know the specific “use history”. Works within the system.
<b>Organizational Requirements</b>	Requires support from key individuals.	Requires individual and organizational support.	Uses organization for support with some individual assistance.	Uses the organization for support.

# Optimum % of *Starters & Finishers* Varies Across the Business:

## ❖ R&D :

- Leadership: ~60% *Starters*/40% *Finishers* Works Extremely Well
  - If Significantly Lower % *Starters*, Typically Lack the Will to Innovate
  - If A Minority, “*Starters*” Will Get Run Over by “*Finishers*”
- Non-Leadership Professionals: ~30% *Starters*/70% *Finishers* Believed to Be Optimum
  - Being Further Measured Empirically

## ❖ Business Overall:

- Leadership: ~30% *Starters*/70% *Finishers* Believed Optimum
- Non-Leadership Professionals ~20% *Starters*/80% *Finishers* Believed Optimum
  - Similar to Percentages Expected in New Hires from Universities

## ❖ Marketing: *Should Probably Be Similar to R&D Leadership*

- Analogous Commercial Group to R&D:
- Both Try to *Understand & Create Value*



# R&D Metrics Measured: PO&E R&D ('91-'01), & Dow Automotive In 2005 (Prior to Changes) *and Annually Thereafter*

## ❖ *Backward Looking Metrics*

- When Positive, Profits Lag R&D Spending By Several Years
- No Speculation About It!
  - *Assuming Well Measured Metrics*

## ❖ *Forward Looking Metrics*

- Traditional Financial & Numeric Metrics (NPV<sub>10</sub>, Speed, etc.)
- Leading Indicators, Predictive of Future Profits
  - *& Somewhat Speculative By Nature*
  - *Can Adjust Forward Looking Metrics Iteratively*
    - As Gain Backward-Looking Results
    - Which Led to HR Metrics

- ***New Human Resource R&D Metrics*** *Especially Needed*
  - *& What's Unique Here*

# *Common Backward Looking R&D Performance Metrics*

A Combination of Metrics Prevents “Gaming the System”

- ❖ Sales Revenue, Gross Margin, and EBIT
  - Linked to Specific Projects Via Portfolio Database
    - New Products into New Markets (Doing *Opportunity-Analyses*)
    - New Products into Existing Markets (& vice versa)
    - Line Extensions
    - Six Sigma R&D Projects & Process Improvements
  - And for Total Business
- ❖ % Sales From Products Less Than 5 Years Old
- ❖ # of Value Creating Patents & Other Key Proprietary IP
  - Sales & EBIT from Key IP
  - % of EBIT from Key Patents & Proprietary IP

## Additional Common *Backward Looking* R&D Performance Metrics, From R&D Initiatives

### ❖ Speed to Launch for New Products vs. Project Complexity

- Low Complexity
- Medium Complexity
- High Complexity

### ❖ # of Patent Applications Filed/Yr.

- & Percent of Applications Granted/Year
- # of Total Patents Maintained/Year

### ❖ # of Key Industry Awards for R&D Initiatives

# Common *Forward Looking* R&D Performance Metrics, From R&D Initiatives

## ❖ Portfolio Value ( $NPV_{10}$ )

- Along With Annual Sums of Projected Cash Flows
- Licensing Revenue Projections Included
- Use With Caution!
  - $NPV_{10}$  Numbers Are Only Meaningful If Full *Opportunity-Analyses* Have Been Completed!
  - Otherwise: GIGO Exercises (Garbage In Garbage Out)

## ❖ Success Rate Through Stages of NBD Process

# New *Forward Looking* R&D Performance Metrics From R&D Initiatives Related to Human Resources

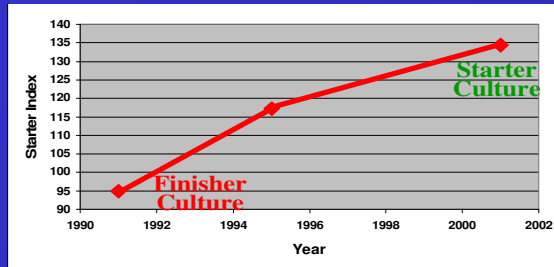
- ❖ R&D Leadership: ~60% *Starters*
- ❖ Degree of Match In Right Job Roles: ~75-80% Match Desired
  - Starter Personalities
    - Initiating & Developing Job Roles
  - Finisher Personalities
    - Growing & Enhancing Job Roles
  - Room for Exceptions, Depending on Individuals
    - But Exceptions Are Exceptional
- ❖ With Right Mix of *Finishers* Among Non-Leadership Professionals
  - ~30% *Starters* (*Half That of Leadership Group*),  
~70% *Finishers*
    - Someone Has to Carry Out the Vision, Get the Work DONE!
    - Non-Leadership Professional Percentages Currently Being Better Defined
      - %*Starters* & %*Finishers*, via Additional Research

# New *Forward Looking* R&D Performance Metrics Related to Quality of New Product Initiatives

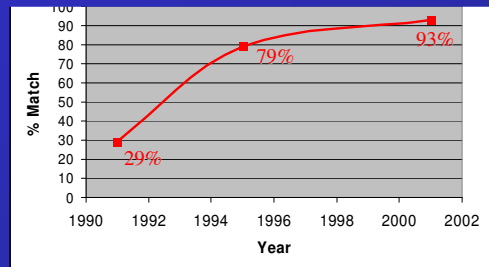
- ❖ % of Significant New Product Initiatives With Certified *Opportunity-Analyses* Completed
  - Key Metric To Track *Because* 15 Years “Backward Looking” Measurement *Shows* Well Analyzed Projects Are Profitable 95% of Time
    - Vs. 11% Typically from End of Early-Stages of Analysis
    - Accounts for Much of The Different Outcomes in A Failed High Temperature Thermoplastic, vs. Insite® Metallocene Catalyzed Polyolefins
  
- ❖ Metrics Measuring Quality of *Opportunity-Analyses (OA)*
  - % *Rainmaker* Personality-Types In Key *Opportunity-Analyst* Roles
    - Rainmaker-Index >40, Capable of “Morphing” Starting Ideas Into Winners
    - % Fully Coached Through Entire Process, *i.e.*:
      - *Gut-Level-Screen, Gap-Analysis, Draft-Propositions*
      - $\geq 2$  Customer Interviews Coached of 6-12 Total, Analysis, *Cost-Performance-Models*
      - & Final Report to Top Management
      - NPV10 Returns Projected
      - **Certified** After Fully ID & Analyze Positive Opportunities
        - » & Judged That The *Opportunity-Analyst* Can Repeat Process Independently
    - Especially for New Products for New Markets
      - And for *Significant* New Products for Existing Markets (& Vice Versa)

# “Forward Looking” PO&E Human Metrics Drove Financial Success in “Backward Looking” R&D Metrics

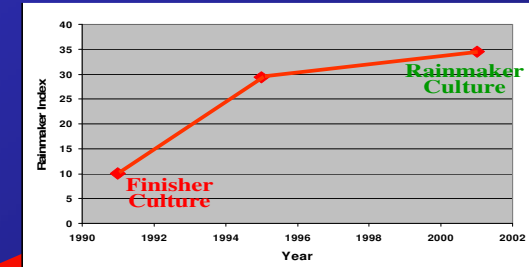
## More Visionary Leaders



## Better Fit Between Personality & Job

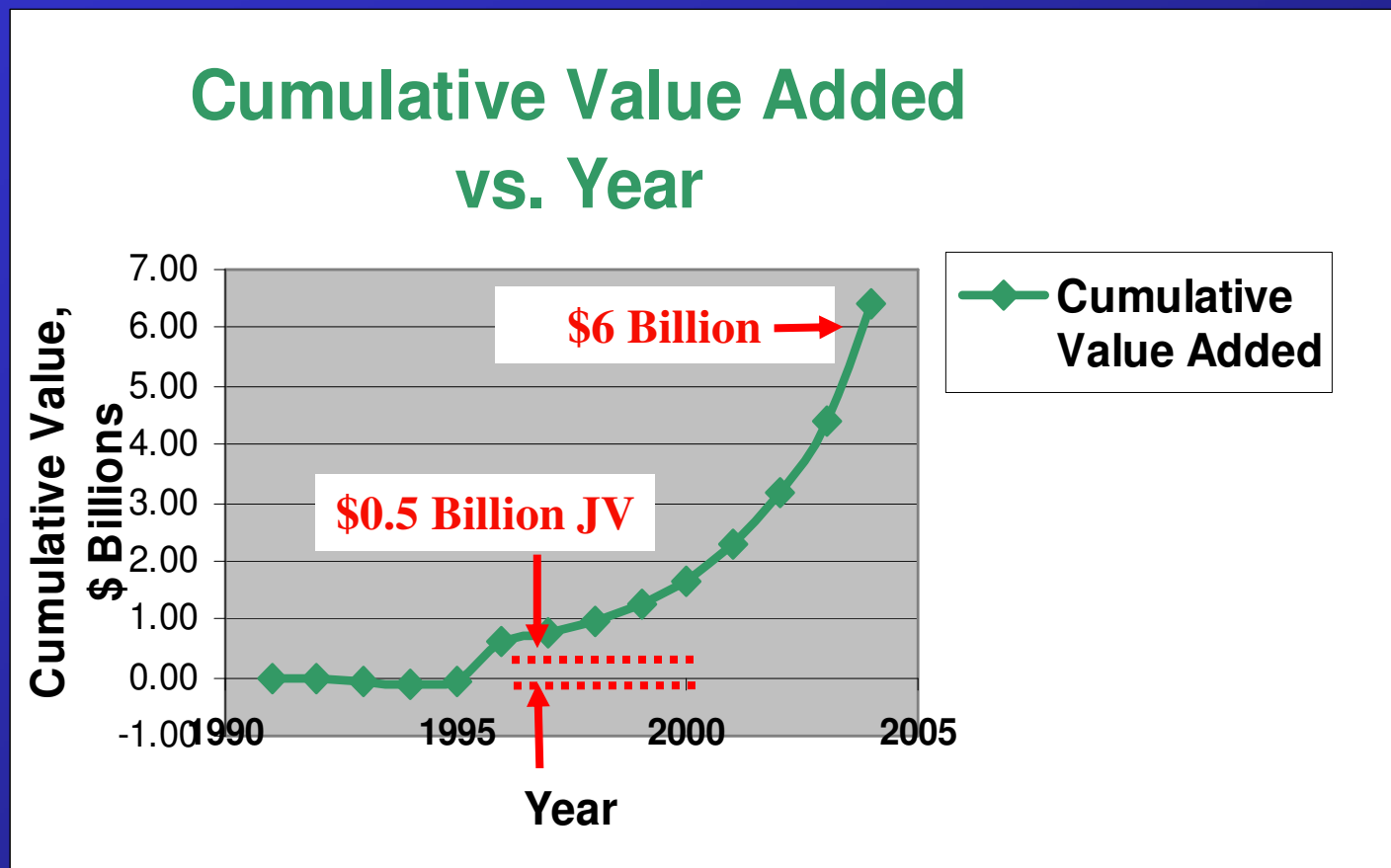


## Rainmakers Doing Quality Opportunity-Analyses



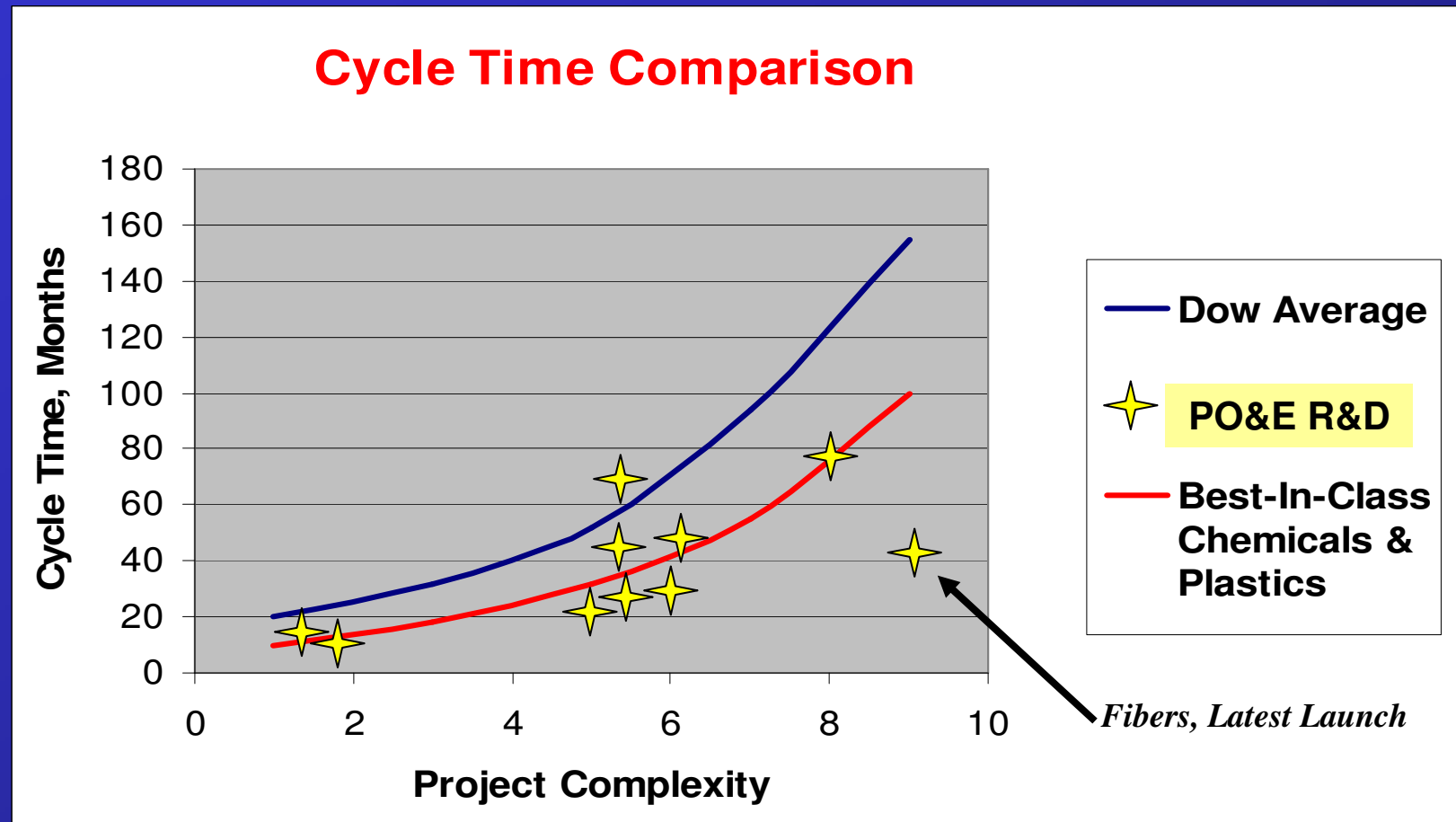
Performance Metric	Change	2001 vs. 1991
Intellectual Property, # of Patents	4	Times More
Pilot Plant Efficiency	18	Times Better
Technical Service Efficiency, Lbs Serviced Per Person	2.6	Times Better
Speed to Launch	3 to 4	Times Faster
Number of New Product Launches	13	New Launches
Sales from Products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

Results for Dow PO&E R&D:  
**Over \$6 Billion Cumulative Value Added From  
 New Product Innovation Since 1991**





# Dow PO&E “*Speed Based*” R&D: Cycle Time Performance\* Now Best-In-Class



# *Speed Based Development*

## *Now Spreading Rapidly Across Dow, Faster Yet - Supported By These Findings*

- ❖ “Management continues to support this approach by increasing the size of the businesses using the Speed Based Development philosophy across the company”
- ❖ “Recently Dow was realigned so that **virtually one hundred percent of Dow will use this philosophy.**”
- ❖ “We believe it is the People – not just the Process – that matters most”
  - **Kurt W. Swogger, VP** Performance Plastics and Chemicals R&D, Freeport, TX. Picking the Right People – Essential to Innovation, *Pacificchem 2005 Conference*, Area 4, Symposium 258, Symposium on the Pacific Basin Chemical Community: Chemical Business and Economics. Session 2. January 2006, Hawaii
- ❖ **PO&E Business: Selected By Product Development and Management Association (PDMA):**

**“Outstanding Corporate Innovator” in 2003**

# Part 2: Implementation in Dow Automotive R&D

Building on  
*Speed Based Development*  
Approach Used In  
Dow PO&E R&D/Business

Can We Do It In 2-3 Years, vs. 4-10 Years?

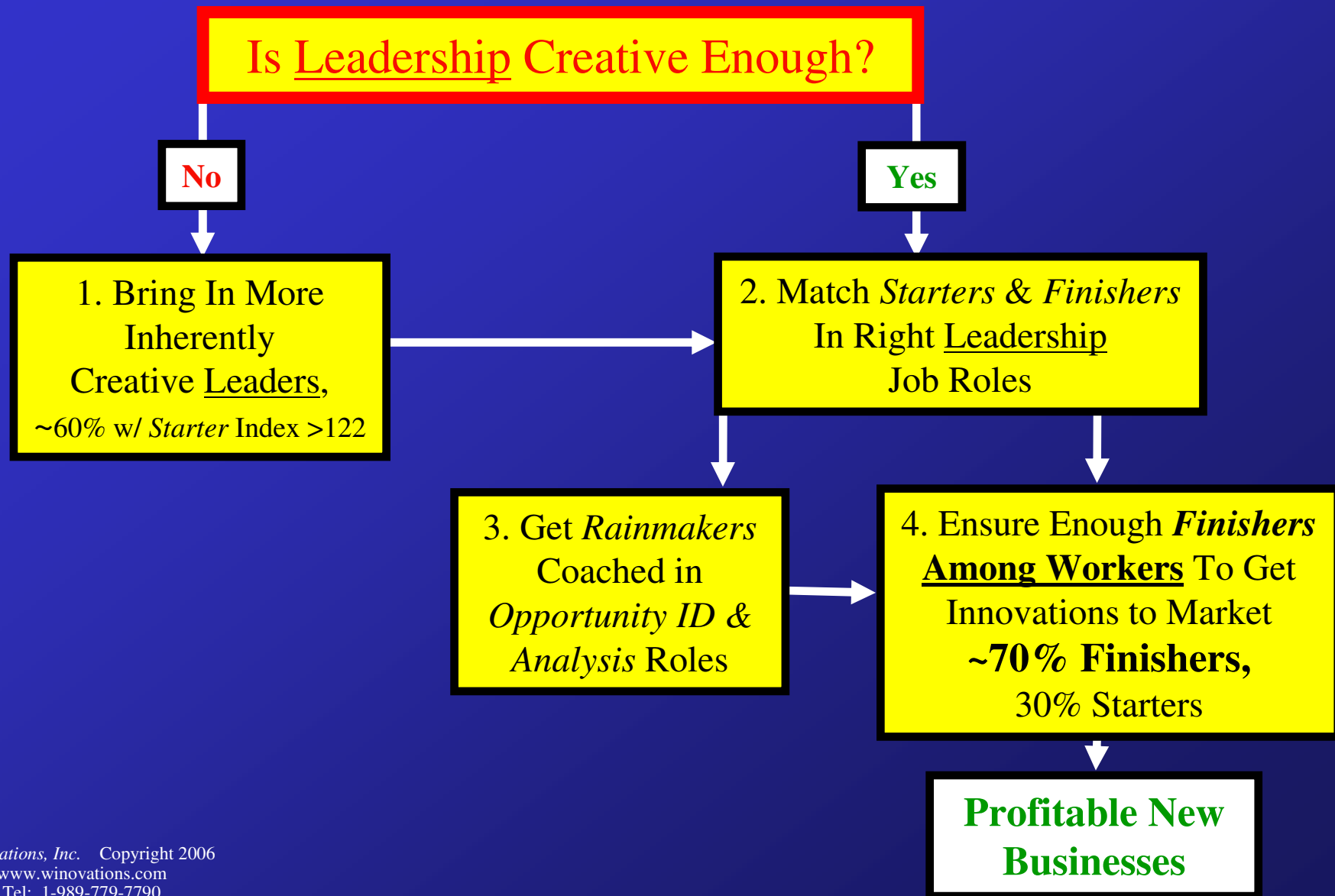
Steve Swartzmiller, Dow Automotive  
& Greg Stevens, *WinOvations, Inc.*

At Outset, Top Management Believed Was  
*Not Enough Creativity* In Dow Automotive R&D  
Leadership (Nor In Commercial Leadership)  
To Create *Breakthroughs* Needed for  
Ambitious Growth Goals:



*“More than Doubling the  
Dow Automotive Revenue  
& Profits By 2011”*

# Step 1: of Four-Step Model for Increasing R&D Group Effectiveness



# Dow Automotive R&D MBTI® Measured For Two Groups

1. For R&D Leadership Cultural Assessment  
Job Level “L1” and Up: 49 Individuals
  - ❖ Both Scientist-Leaders and Manager-Leaders
  - ❖ >98% Agreed to Participate
  - ❖ >98% of Participants Agreed to Share Results with Top Management
2. & For Potential Group of *Opportunity-Analysts*: 28 Individuals
  - ❖ 93% Agreed to Participate (26 of 28)
    - ❖ 100% of Participants Agreed to Share Results with Management

# MBTI® Instrument

## Measures 4 Personality Preferences, Determined to a Large Degree by Genetics

1. **E/I Scale**
  - E = Extroversion
  - I = Introversion
2. **S/N Scale**
  - S = Sensory, Practical
  - N = Intuitive
3. **T/F Scale**
  - T = Thinking
  - F = Feeling
4. **J/P Scale**
  - J = Judging, Getting to Closure
  - P = Perceiving, Open to Possibilities

## Automotive R&D Leadership Findings: Has an “NT” or **Starter** Culture

- ❖ E/I = E4 Barely on the Extroverted Side
- ❖ S/N = **N9** Intuitive (vs. Sensory/Practical)
- ❖ T/F = **T33** Far More Thinking than Feeling
- ❖ J/P = P1 In the Middle for Judging and Perceiving (i.e. J~P)



# Overall, Dow Automotive R&D *Leadership* Not Lacking In Creativity!

	2001 PO&E R&D	2005 Dow Automotive
Creativity Index (ENTP)	287	299
Rainmaker Index (NT)	34.5	42.4
Starter Index (NTP)	134	143
% Starters	57%	63%

**Slightly  
Higher Creativity**

# “Right” for 2005 Dow Automotive R&D Leaders To Be Slightly More Creative vs. PO&E (2001) Leaders

## ❖ Dow Automotive

- Market Facing
- More of a Specialty Business
- Innovation Even More Critical for Differentiation



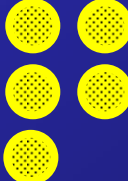


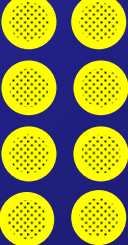



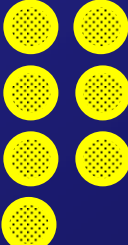
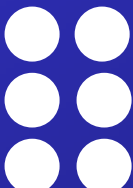


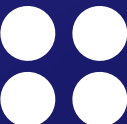

## ❖ In Some Specific Instances May Want to Adjust

- More “Finishers” – Where Need More Commercialization
- More “Starters” – Where Need More Innovation

## ❖ Overall: About Right Mix of “Starters” & “Finishers”

- In R&D Leadership Roles
- Unknown Related to Non-Leadership Professionals
  - Needs to Be Determined
  - May Be *Too Many “Starters”*

# MBTI® Type Table: Combined Key R&D Managers & Technical Leaders

<b>ISTJ</b> 	<b>ISFJ</b>	<b>INFJ</b>	<b>INTJ</b>  
<b>ISTP</b> 	<b>ISFP</b>	<b>INFP</b>	<b>INTP</b>  
<b>ESTP</b> 	<b>ESFP</b>	<b>ENFP</b> 	<b>ENTP</b>  
<b>ESTJ</b>  	<b>ESFJ</b>	<b>ENFJ</b> 	<b>ENTJ</b>  

# MBTI® Type Table: Combined R&D

## Group Averages for Key Managers & Technical Leaders: “OK”

ISTJ	ISFJ	INFJ	INTJ
ISTP	ISFP	INFP	INTP
ESTP	ESFP	ENFP	<b>ENTP = Scientists</b> E = 1 N = 15 T = 33 P = 8
<b>E <u>S</u>/N TJ = Managers</b> E = 10 S = 1 T = 34 J = 11	ESFJ	ENFJ	ENTJ

# Culture Vs. Individual Dow Automotive R&D Leadership Groups

❖ Overall Auto R&D Leadership      E-4    N-9    T-33    P-1

❖ R&D Sub-Group 1      E-4    N-6    T-24    P-7

❖ R&D Sub-Group 2      E-3    N-27    T-40    P-15

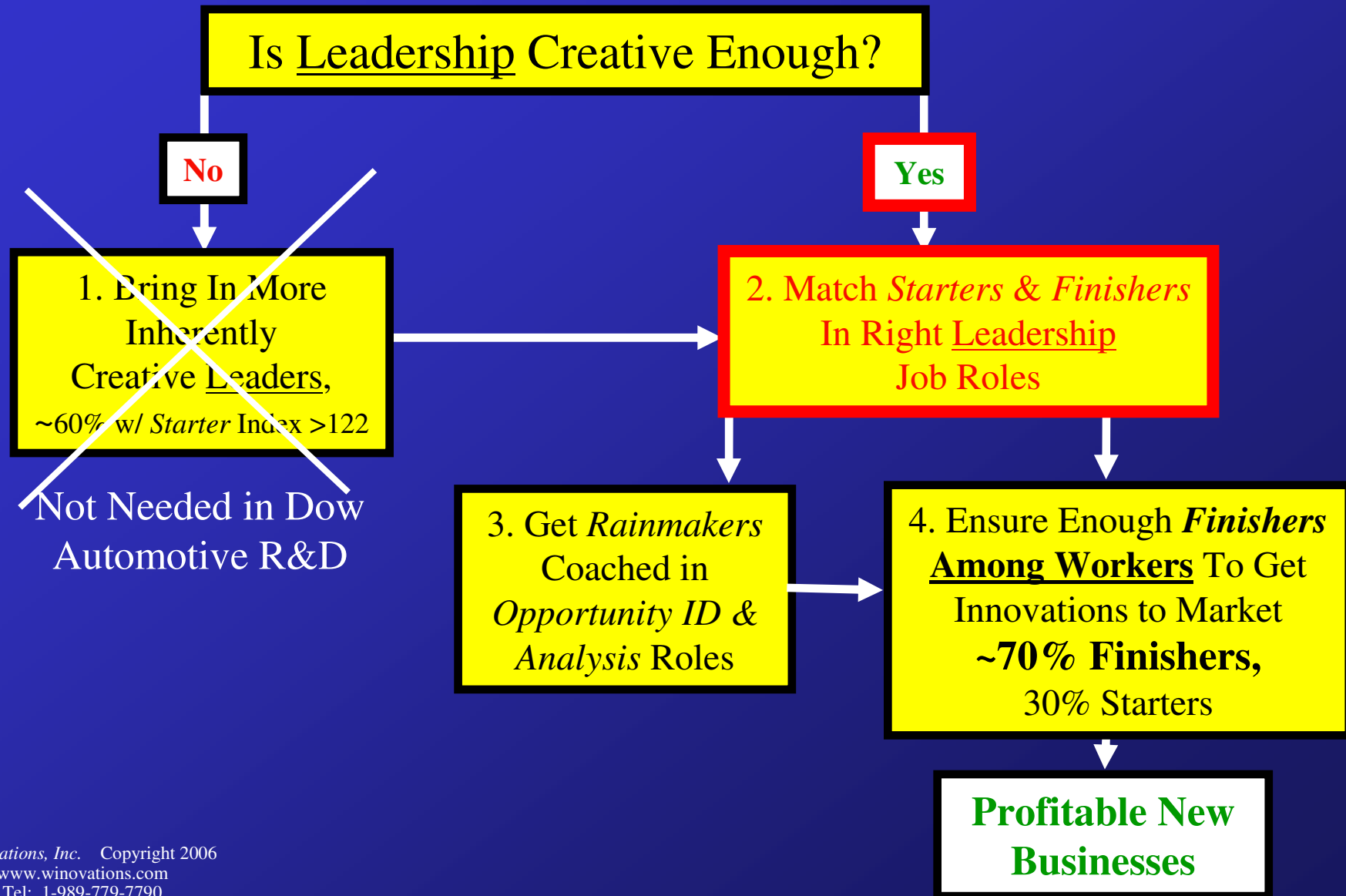
❖ R&D Sub-Group 3      I-6    N-23    T-37    P-10

❖ R&D Sub-Group 4      E-21    N-18    T-42    J-10

❖ R&D Sub-Group 5      E-1    S-12    T-37    J-23

- The Least Creative Leadership Group (*Finishers*) –Discussing If Change Is Needed. It May Be Warranted, Depending on Growth Goals

# Step 2: of Four-Step Model for Increasing R&D Group Effectiveness



# In General: No Lack of Creativity in Automotive R&D Leadership: Not the Main Bottleneck Limiting Innovation Success In Dow Automotive

- ❖ Real Bottleneck Is Managing & Directing High Degree of Existing Creative Energy
  - *Better Identifying What To Do That Matters to Customers*
  - *Grounded, Commercially Valuable Targets*
  - *i.e. Coached Rainmakers, & “Starters” Who Can Pick Real Winners*
- ❖ & Better Fitting of “Starters” & “Finishers” to Job Roles
  - Project By Project: Once Started, Need Finishing
    - One Mature Business:
      - May Want a Few More Leadership “Starters,” i.e. Creative Mavericks
    - Among Non-Leadership Professional Worker
      - May Need More Finishers?

# Example of Determining % Match of Personalities with Job Roles

- ❖ R&D Sub-Group #2: Leadership Job Role Assessments (Done By Steve Swartzmiller)
  - 1 Initiating Role
  - 3 Developing Roles
  - 1 Growing Role
  - 0 Enhancing Roles

}	4 MBTI® Based “ <i>Starters</i> ”
}	1 MBTI® Based “ <i>Finisher</i> ”
  
- ❖ 100% Fit Between *Starter/Finisher* Personalities & Job Roles
  - Outstanding
  - But Tasks Are Continually Changing!
    - Just Brought In A “Finisher” Leader for a *New Project Growth* Job Role
  
- ❖ Could There Be Too Many “Starters,” Especially in Non-Leadership Professionals?
  - Open Question, To Be Determined



# Conducted Similar Exercise for All Five Dow-Automotive R&D Leadership Groups

## ❖ R&D Directors:

- Assigned One of Four Job Roles to Each R&D Leader's Job
  - Initiating, Developing; Growing, Enhancing

## ❖ *WinOvations* Collected Leadership Job-Role Assessment Data

- & Compared vs. MBTI® Based *Starter/Finisher* Personality Assessments
- Determined % Fit of Job Role vs. Personality for All 5 R&D Sub-Groups

**Overall, 75% Match-up: Quite Good**  
**24.5% Mismatch of Leaders Personality vs. Job Role:**  
**12 of 49 Total Mismatched In Automotive R&D**

Leadership Groups Only	MBTI® Personalities		% Starters	# Mismatches		% Mismatch
	# Starters	# Finishers		Starters in Finisher Roles	Finishers in Starter Roles	
Automotive R&D	31	18	63.3%	6	6	24.5%
R&D Sub-Group 1	11	7	61.1%	2	3	27.8%
R&D Sub-Group 2	4	1	80.0%	0	0	0.0%
R&D Sub-Group 3	6	2	75.0%	1	1	25.0%
R&D Sub-Group 4	3	1	75.0%	1	1	50.0%
R&D Sub-Group 5	4	6	40.0%	2	1	30.0%

Probably Too Low

Probably Too High

**New Data: Optimization Now Being Considered**

Could Almost Swap 6 Each: Mismatched *Starters & Finishers*!

# Value of Right Personality, Right Job Role >> \$125,000/Person/Year Conservatively

- ❖ As With High *Rainmaker-Index* Personalities in **Opportunity-Analyst Job Roles**, In Most Job Roles 20% of the People Do 80% of the *Effective Work*.
- ❖ Better Matching the Right People to Job Roles Will Increase *Effectiveness* Conservatively 50% Per Mismatch (& More Likely 400%: 80%/20% = 4X More Effective)
  - Direct Savings of *At Least* Half of Total Salary + Overhead Cost/Person
    - \$250,000/2 = \$125,000 Per Person, If Better Matched
  - With *Much Greater Value Delivered From Previously Lost Opportunity Cost*
    - Not Counted in Above Exercise
- ❖ Good Reason to Consider “Fit” Exercise Across R&D Including Professions in Non-Leadership Roles

# Step 3: of Four-Step Model for Increasing R&D Group Effectiveness

Is Leadership Creative Enough?

No

~~1. Bring In More Inherently Creative Leaders, ~60% w/ Starter Index >122~~

Yes

~~2. Match Starters & Finishers In Right Leadership Job Roles~~

3. Get *Rainmakers* Coached in *Opportunity ID & Analysis* Roles

4. Ensure Enough *Finishers* Among Workers To Get Innovations to Market ~70% **Finishers**, 30% Starters

**Real Bottleneck!**

Profitable New Businesses

# 16 Potential *Opportunity-Analysts* (OA's) Identified

- ❖ Out of 26 Total Candidates Measured (i.e. 16 with *Rainmaker-Index*® ≥ 40)
  - 10 Potential OA's Out of 16 Commercial Candidates (62%)
  - 6 Potential OA's Out of 10 Research Candidates Suggested (60%)
  
- ❖ The MBTI® Instrument Is Needed to Help ID *Rainmakers* for OA's
  - Average *Rainmaker-Index* of Entire Candidate Group (39) Little Different Than for R&D Leadership (42):
    - *Commercial Candidates:*                      *Rainmaker Index Avg = 34*
    - *R&D Candidates:*                                      *Rainmaker Index Avg = 47*
  
- ❖ *Value of Each Properly Identified & Coached O.A. >\$20 Million Profit, Empirically Measured Over 10 Years*
  - *MBTI® Helps Raise Odds of Finding Right Candidate from ~30% to Over 95%, adding at Least \$13 Million Profit/Analyst If Coached*
    - *(65% Higher Probability x \$20 Million = \$13 Million)*
    - *Actual Incremental Value Depends on % Starters (and % Rainmakers) in Non-Leadership Professionals – Being Determined by Additional Research*

# Need to Establish Group of *Rainmakers* In *Opportunity-Analyst* Roles In Dow-Automotive Business

## ❖ With an Internal Coach/Manager

- Who Has Been Coached, and Certified in *Opportunity-Analysis*
  - & Helps Select Additional *Rainmakers* & Coaches Them in *Opportunity-Analysis*
  - Self Sustaining Group
  - Sized to Meet Internal Growth Goals
    - For Substantially New Business Development
  - Most In Commercial Organization
    - Plus a Few In R&D

## What Was *Not* Well Grounded in Recent Past?

- ❖ Was (Still Is?) Too Much A Culture of “Selling Projects” vs. Figuring Out What to Do, & How to Win
- ❖ Things to Improve:
  - Better Understanding of *Gut-Level-Screen*
    - Now In Place
  - Understanding *Functional-Requirements* & Customer Needs - *Critical*
  - Earlier Use of System *Cost-Performance-Models*
    - Vs. How Done Today & Tomorrow
      - Assessment of Value
  - Developing Means for Sustainable Competitive Advantage
    - For Winning Approach

## *Recent Bad Example Of Not Learning Key Functional Requirements & Cost-Performance Models*

- ❖ **A Novel High Temperature Thermoplastic**
  - Got “Sold” To Management *Without* Critical Analysis as an Engineering Plastic
  - Physical Properties Lacking
    - Actually Did Not Meet the Real Functional Requirements of Customers In the Marketplace
  - Manufacturing Process: *Too Expensive*
  
- ❖ **Sold Just a Few Million Lbs/Yr. From a Full Scale Production Plant**
  - Finally Shut Plant Down:
    - You Have Not Experienced Real Paralysis...  
Until You *Build a Plant* Without Analysis



# Better Understanding Functional Requirements: Key To Being Better Grounded

## ❖ Positive Example: Energy Absorbing Materials

- Learned Functional Requirements
- Oriented Structures Key
- Will Grow to Over \$100 Million

## ❖ Good Innovations:

- Much Simpler *After* Drill Down To Real Functional Requirements

## ❖ Got There By Entering Business & Continuing to Learn

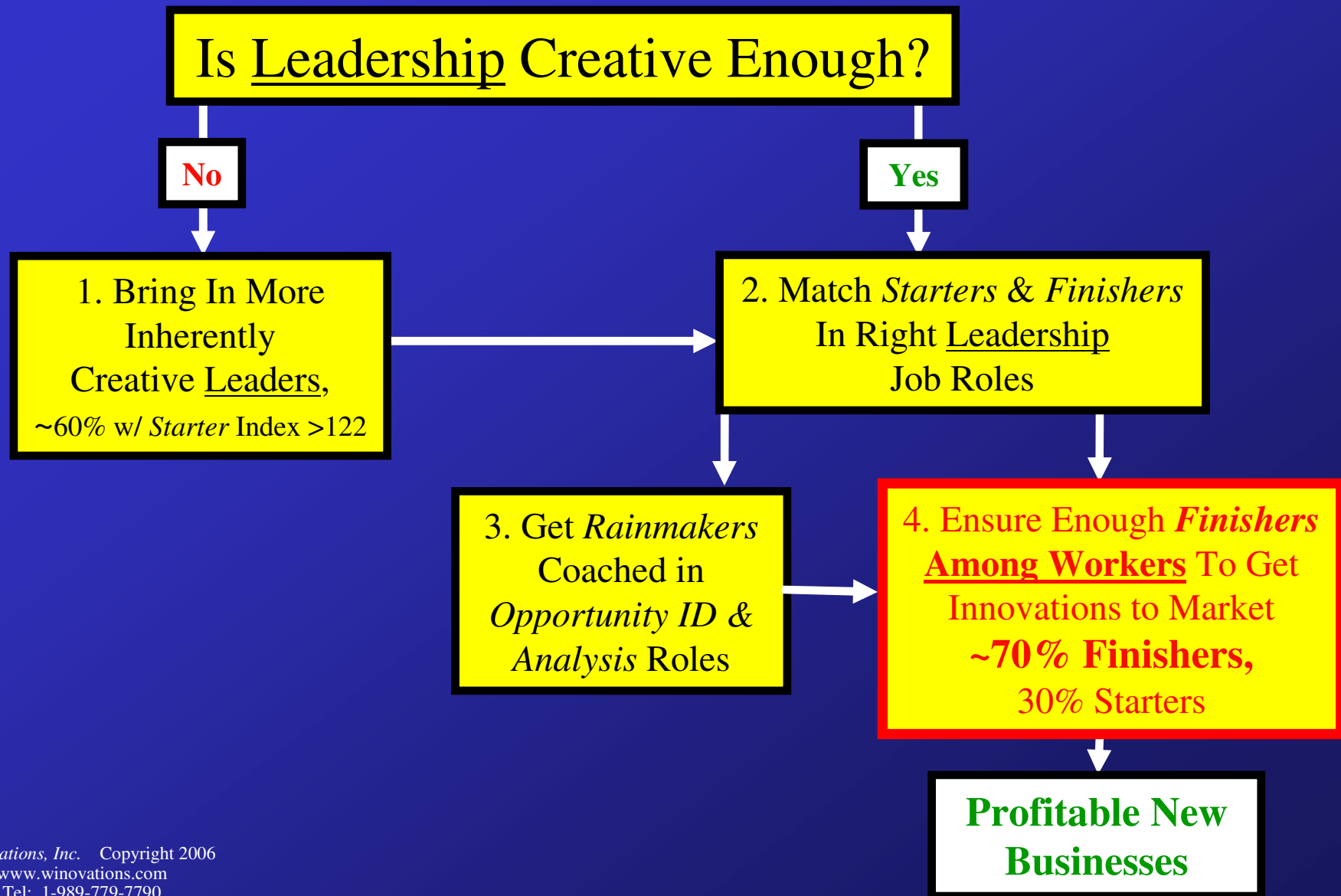
- But Slow - How Can We Get There Faster & Cheaper?
  - **Opportunity-Analysis** – One Approach To Better Ground Opportunities

# Emerging Example: Brake Materials

## ❖ Just Learning *Real* Customer Functional Requirements

- Through Leading Brake Manufacturers,
  - via *Opportunity-Analysis*
- Initial Concept Has Already *Morphed*
  - Through Creative *Rainmaker Opportunity-Analyst*
  - New, More Viable Solutions Are Emerging
  - **Identified >\$100 Million/Yr. Opportunity**
- Key: Learning Functional Requirements
  - Before Locking Into a Solution
  - Proceeding With Detailed Cost-Performance Modeling vs. Major Competitors
    - **In Customer's End Use Applications**

## Step 4: of Four-Step Model for Increasing R&D Group Effectiveness



Ensure Enough *Finishers* Among  
Workers To Get Innovations to Market  
~70% **Finishers**, 30% Starters

❖ Remains to Be Measured

- & Modified If Needed
- Work Is Ongoing

❖ Concern:

Not Enough *Finishers* Among  
Non-Leadership Professionals?

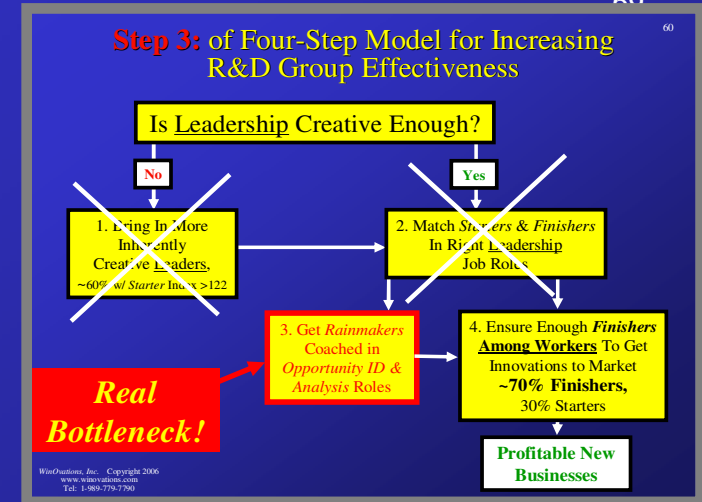
# Recommendations – Dow Automotive R&D

## ❖ Good News! Have Creativity Needed for Breakthrough Innovations in Dow Automotive R&D Leadership

- & Fit of Personalities to Job Roles: Pretty Good
  - Further Optimizing In Certain Leadership Sub-groups

## ❖ Complete Assessment of Personalities & Job Roles for Automotive R&D Professionals in Non-Leadership Roles

- Initiating Job Roles
- Developing Job Roles
- Growing Job Roles
- Enhancing Job Roles
- Determine % Match vs. *Starter & Finisher* Personalities
  - Make Needed Recommendations Regarding Fit
  - Ensure Enough *Finishers* in Non-Leadership Professional Workers



## Recommendations: Better Grounded Creative Thinking

- ❖ Lack of Activities In *Opportunity-Analysis* Is Main Bottleneck Limiting R&D Effectiveness
  - 16 Potential *Opportunity-Analysts* Identified Based on *Rainmaker-Index* >140
    - Reduced to ~6 Based on Availability, Other Factors
      - Interview Potential O.A.'s Prior to Selecting & Coaching
        - » Requires Ongoing Management Support
    - Get *Opportunity-Analysis* Group Established Internally In Dow Automotive
      - to Meet Growth Opportunities in Two Years
  
- ❖ Measure Dow Automotive R&D Performance Metrics
  - Continue Measuring 5-10 Years Out
  - Correlate With New Human Resource Metrics
    - Personality & Job Roles, Degree of *Opportunity-Analyst* Training
    - Key To Verifying Value From Anticipated Changes
    - Adjust System As Continue Learning

*Real*  
Targets



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Just One More Thing:

Lots of People Talk About It,  
*But You Have to Actually Do It*

*And We Didn't Say It Would Be Easy  
...Just Rewarding*

# Appendix 1: References

1. Stevens, Greg A. "Shattering Myths and Achieving Higher Profits Faster from Six Sigma Improvements in New Business Development." Technology Transfer and Innovation '99 Conference, September 29, 1999, Melbourne, Australia. Also at the Project Management Institute (PMI) 9-00, Houston, TX.
2. Stevens, Greg. A. 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 (March-April, 2003).
3. Stevens, Greg, James Burley, and Richard Divine. "Profits and Personalities: Relationships Between Profits from New Product Development and Analyst's Personalities." Product Development and Management Association (PDMA) 1998 Research Conference, October 5-7, Atlanta, GA. pps. 157-175.
4. Stevens, Greg. A. and James Burley, "3,000 Raw Ideas = 1 Commercial Success." Research • Technology Management 40(3), 16-27 (May-Jun, 1997).
5. "Innovation in Industry Survey." *The Economist*. Feb. 20, 1999. p. 15. [Shows the Universal Success Curve for New Business Development from Ref. #3.]
6. Bacon, Jr., Frank R. and Thomas W. Butler, Jr. *Achieving Planned Innovation®*, A Proven System for Creating Successful New Products and Services. The Free Press/Simon & Schuster, 1998.
7. Stevens, Greg, James Burley, and Richard Divine. "*Creativity + Business Discipline = Higher Profits Faster* from New Product Development." Journal of Product Innovation Management, 16: 455-468. 1999. [& Selected as "Outstanding Research Paper" from October, 1997 PDMA Research Conference.]
8. Stevens, Tim. "The Nature of Creativity." *Industry Week*, Viewpoint Archive. IndustryWeek.com. June 29, 1999. pps.1-4.
9. Stevens, Greg & James Burley, Piloting the Rocket of Radical Innovation, March-April 2003, *Research\*Technology Management*, pps. 16-25.
10. Stevens, Greg; James Burley & Kurt Swogger, Dow Chemical Achieves Major Transformation of PO&E R&D Group. Personality-Oriented Approach Improves NPD Results. PDMA *Visions*. July, 2003, Vo. XXVII No. 3, pps. 6-10
11. Others Listed in the Body of the Presentation



# Appendix 2:

## References from Dow Chemical Polyolefins and Elastomers

1. Pierce, James K. "The Art of Creating a Flexible R&D Organization." *Chemtech*, 28(2), 6-11, 1998
2. Pierce, James K. "Flexible Allocation of R&D Resources. An Organizational Approach to Enhancing Laboratory Innovation and Productivity." *Chemtech*, 1997
3. Swogger, K.W. "Dow's INSITE™ Technology Program – Inventing and Using the Speed Philosophy for Product and Process Innovation," Great Lakes Chapter PDMA Proceedings 3/19/01, Troy, MI.
4. Swogger, K.W. "Selection of Proper People: Key to Decreasing Development Cycle Time," Proceedings of Antec, 1996
5. Swogger, K.W. "Creating and Using a Vision to Reduce Development Time in the Insite® Technology Process," Proceedings of ANTEC 1998
6. Swogger, K.W. "Impact of Metallocene and Constrained Geometry Catalyst Technology on the Plastics Industry." American Chemical Society, 213<sup>th</sup> National Meeting and Exposition, San Francisco, April 13-17, 1997
7. Swogger, K.W. "A Speed-Based Development Process: Another Aspect of Implementing Insite® Constrained Geometry Catalyst Technology." from Proceedings of the SPE 54<sup>th</sup> Annual Technical Conference, "Plastics Racing Into the Future," 5/96
8. Swogger, K.W. "Learning from History: A Key Part of the Development Process for Insite® Technology," Proceedings of Antec, 1999
9. Torres, A. and G.M. Lancaster, C.D. Pappas, "Redefining the Management of Technology: Organizational Requirements for Speed Based Commercialization," SPE ANTEC Proceedings, 2953, 1996.
10. Swogger, Kurt W., VP Performance Plastics and Chemicals R&D, Freeport, TX. "Picking the Right People – Essential to Innovation," *Pacificchem 2005 Conference*, Area 4, Symposium 258, Symposium on the Pacific Basin Chemical Community: Chemical Business and Economics. Session 2. January 2006, Hawaii

# Minting Creative & Entrepreneurial MBA's

