

# Industrial Physics Careers: A Large Company Perspective

**Stefan Zollner**

Adjunct Professor of Physics  
Department of Physics  
Arizona State University  
Tempe, AZ

FIAP Councillor

## Biography

Physics Ph.D., ~150 papers  
5 years at Iowa State University  
12 years in semiconductor industry

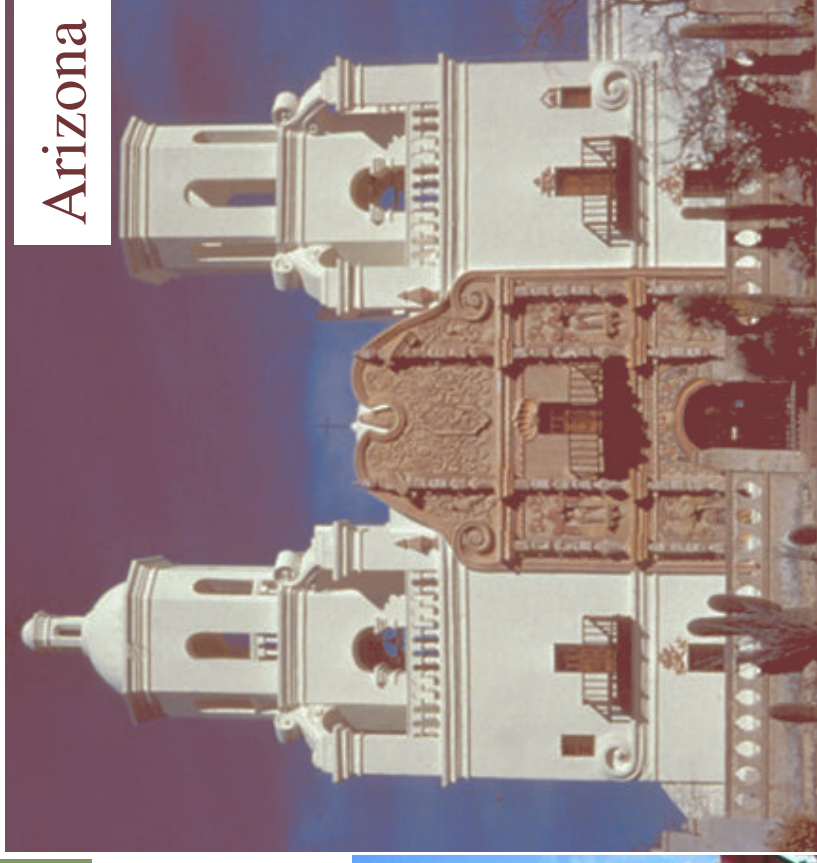


Regensburg, Germany

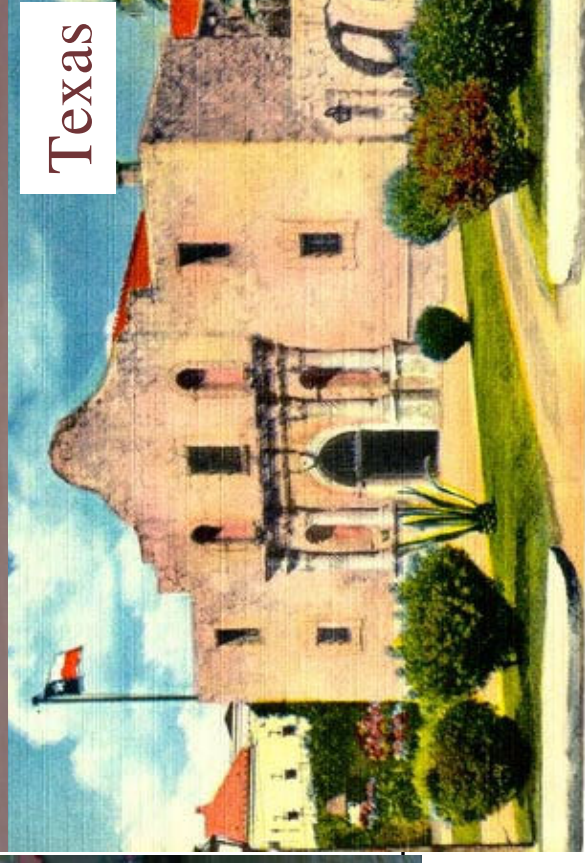
Stefan Zollner, 03/17/09  
APS March Meeting, Session J8, Room 414/415

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Arizona

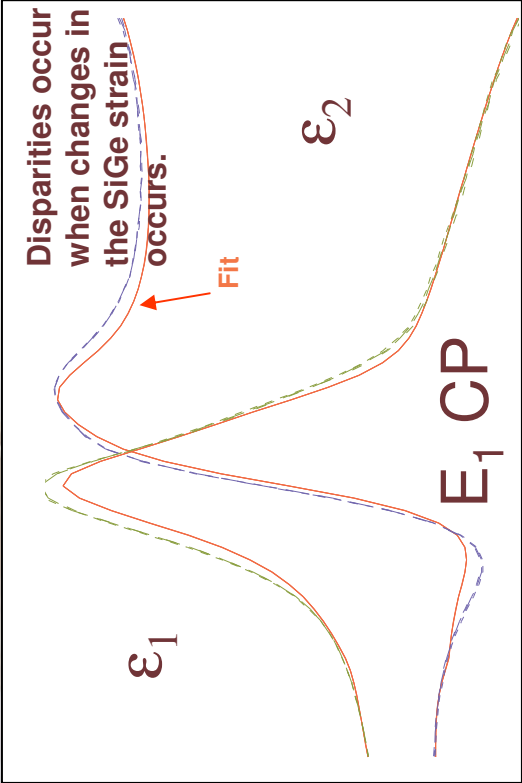
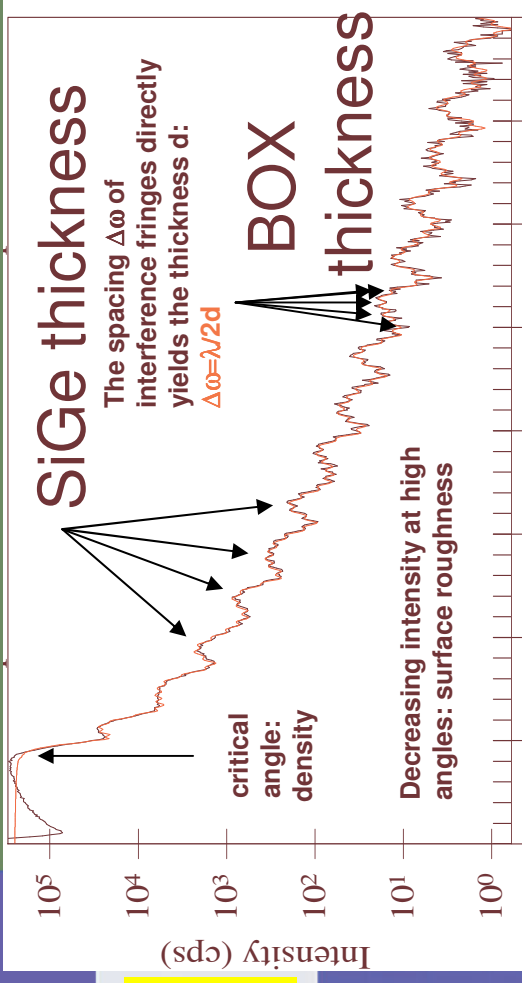


Texas

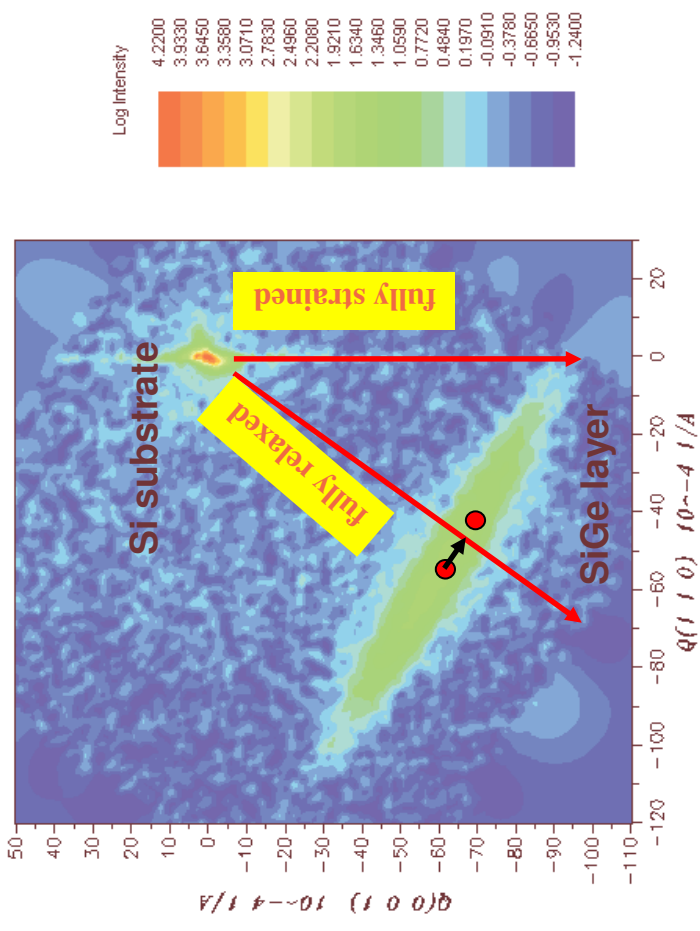


# Academic Research Interests: Measurements in the Semiconductor Industry

X-ray reflectivity  
X-ray diffraction



Ellipsometry: SiGe on Si





## Lessons Learnt: On the road again ...

To 1984 Regensburg (Germany)  
1984/85 Arizona (Fulbright)  
1985/86 Regensburg  
1986/91 Stuttgart (Ph.D.)  
1991/92 New York (IBM postdoc)  
1992/97 Iowa State (Physics)  
1997/2005 Arizona (Motorola)  
2005/07 Austin, TX (Freescale)  
2007/08 New York (Freescale)  
2008/09 New York (IBM)

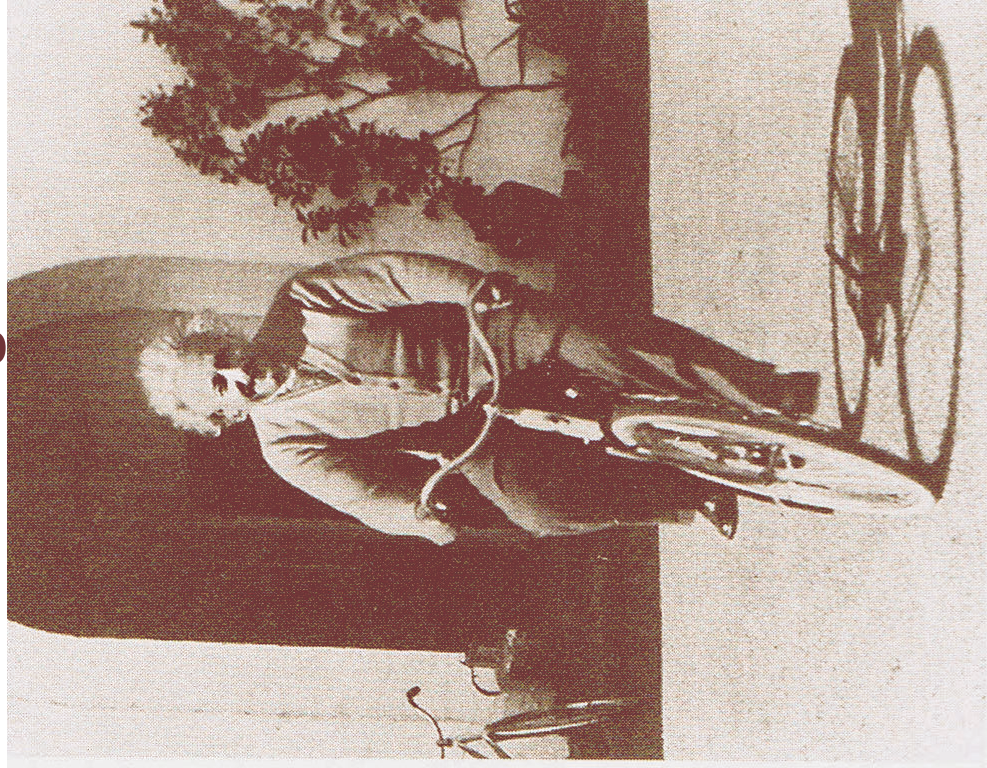
### Projects:

Spectroscopic Ellipsometry, XRD, XRR  
SiGe, Si:C, SiC, GaN, GaAs  
High-k ( $\text{HfO}_2$ ), low-k dielectrics  
Nickel Silicide  
Semiconductor Metrology (automated)  
**Semiconductor Process Integration**  
Device Physics

Manager (3 years)  
Business Cycles (88, 03, 08/09)

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In Santa Barbara, 1933

Life is like riding a bicycle.

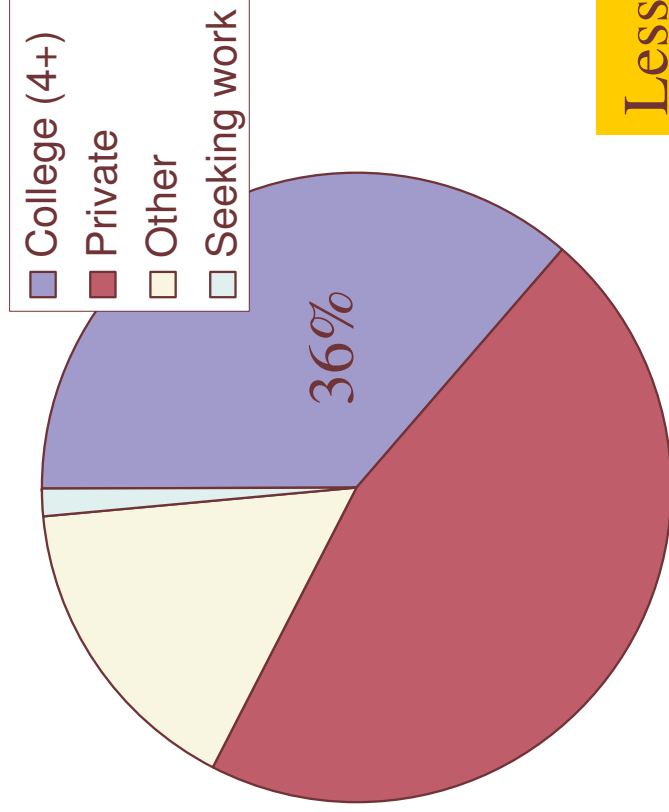
To keep your balance you must keep moving.

—ALBERT EINSTEIN, IN A LETTER TO HIS SON EDUARD, FEBRUARY 5, 1930<sup>1</sup>

# Industrial Physics Careers: A Large Company Perspective

- **Statistical Employment Data**
  - Where are **you** going to work after you graduate?
- **Measuring Organizational Performance**
  - Performance Excellence (Baldrige Criteria)
  - Balanced Scorecard
- **Measuring Individual Performance**
  - Linkage to Balanced Scorecard
  - Performance Planning
  - Performance = Results + Behaviors
  - Performance Management
- **Rewards for Performance**
  - Differential Investment

# Statistical Employment Data (NSF 2006)



## Primary or secondary activity:

27% Basic research

24% Teaching

24% IT

32% Mgmt, Sales, Admin.

36% Design & Development

Also other categories

Less than 50% list “physicist” as occupation

36% of ~35000 Ph.D. physicists at colleges (4+)  
Also 1170 postdocs

- **Sources:**
- AIP Statistics  
<http://www.aip.org/statistics/trends/emptrends.html>
- Characteristics of Doctoral Scientists & Engineers in the US, NSF, June 2006  
<http://www.nsf.gov/statistics/nso6320/>, Tables 13, 16
- APS Industrial Member Survey (2006)  
<http://www.aps.org/about/governance/committees/commemb/index.cfm>

## Statistical Employment Data (NSF 2006)

### Median Ph.D. Physicist Salaries:

94,000	Physics Ph.D. overall
49,000	Teachers (High school, community college)
75,000	Colleges and universities (4+)
103,000	Private sector
104,000	Other (mostly government)

- **Source:**
  - Characteristics of Doctoral Scientists & Engineers in the US, NSF, June 2006  
<http://www.nsf.gov/statistics/nsf06320/>, Table 54
-

## 2006 Industrial APS Membership Survey

- 2006 APS industrial member survey:
  - ~ 45,000 total APS members (including 10,000 students, ~5000 retirees)
  - ~ 2600 APS members reside in US, work in private sector (compare 16,000 in NSF survey)
  - ~ 1200 responded to survey.
- ~50% of industrial members responded (1000 answers)
- Footnotes:
  - Less than 20% of US industrial Ph.D. physicists are APS members.
  - About 10% of regular APS members work in industry.



## Where do industrial physicists work ?

- 50% of industrial APS members are in large companies (>500 employees).

**Table 2. Major product or service of the respondents' employer**

	Number of employees				Overall %
	<10 %	10 to 99 %	100 to 499 %	500 + %	
Information technology	9	5	10	18	13
Aeronautics or aerospace	5	5	7	18	12
Semiconductors	8	9	6	10	9
Energy	7	6	12	8	8
Electronics	4	7	7	8	7
Contract research	21	20	9	6	11
Medical	4	5	6	5	5
Chemical	2	3	6	5	5
Automotive	2	1	4	2	3
Optics	5	7	2	1	3
Other	33	32	32	19	25
<b>Number of respondents</b>	<b>132</b>	<b>167</b>	<b>180</b>	<b>497</b>	<b>976</b>

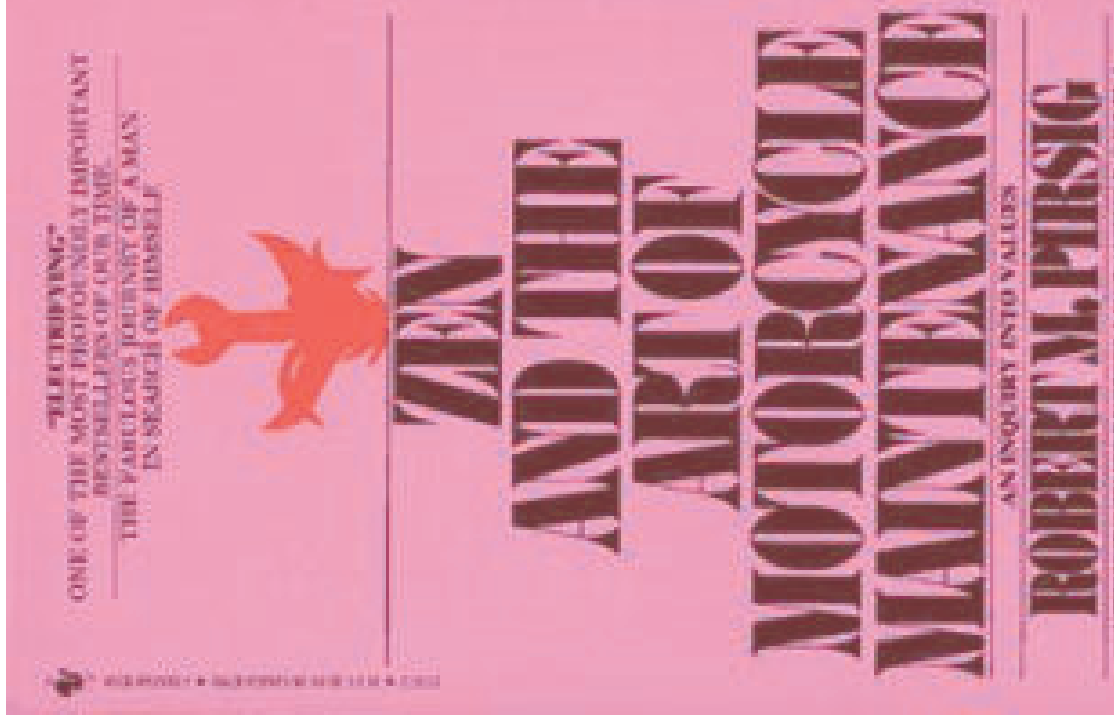


## How can universities prepare students for industrial careers ?

- Courses in other fields (electrical engineering, chemistry, IT, finance) Yes, but which one?
- Courses in accounting, management, law, etc?
- My opinion:
  - Careers take many twists and turns and are unpredictable. You may never need that organic chemistry class etc.
  - Companies usually have “onboarding class” for new employees and management “boot camps” for new managers.
  - Presentation skills to non-experts in the field are crucial.
  - **Core expertise: Collection, analysis, and presentation of data.**
  - Personally, I find the Baldrige Quality criteria of Performance Excellence very useful (<http://quality.nist.gov>).



# What is Quality ?





# What is Quality ?

## Dr. Cecilia Temponi

Assistant Professor

University of Zulia, Venezuela, South America Chemical Engineering

BS – 1977

Louisiana State University, Louisiana Industrial Engineering

MS – 1984

St. Mary's University, San Antonio, Texas Operations Management

MBA - 1987

The University of Texas, Arlington, Texas Industrial Engineering

PhD - 1992

Personal Web Page



Research Interests:

- Supply Chain Management
- Enterprise Modeling
- System Dynamics
- Quality in Global Organizations

[www.txstate.edu](http://www.txstate.edu)

**Dilbert's Guide to**

# **Quality in Global Corporations**

**A view from the Cubicle**

## Rewards for Performance: Outline

- **What are Rewards?**
- **Measuring Organizational Performance**
  - Performance Excellence (Baldrige Criteria)
  - Balanced Scorecard
- **Measuring Individual Performance**
  - Linkage to Balanced Scorecard
  - Performance Planning
  - Performance = Results + Behaviors
  - Performance Management
- **Rewards for Performance**
  - Differential Investment

# What are Rewards ?





## Why Rewards? How should they be designed?

- Rewards have a positive impact on results and behaviors:
  - **Contingent on achieving desired performance levels**
  - **Meaningful and valuable to the individual**
  - Based on objective and attainable goals
  - Open to all, **not based on a competitive struggle among employees**
  - Balanced between conditions in the workplace (economy?) and fulfillment of individual needs
- Reward systems need to focus efforts on serving the customer.
- Reward systems need to enhance collaboration within the workplace.
- SPICS: Specific, personalized, immediate, contingent, sincere

Source: <http://www.p-management.com/reward.html>

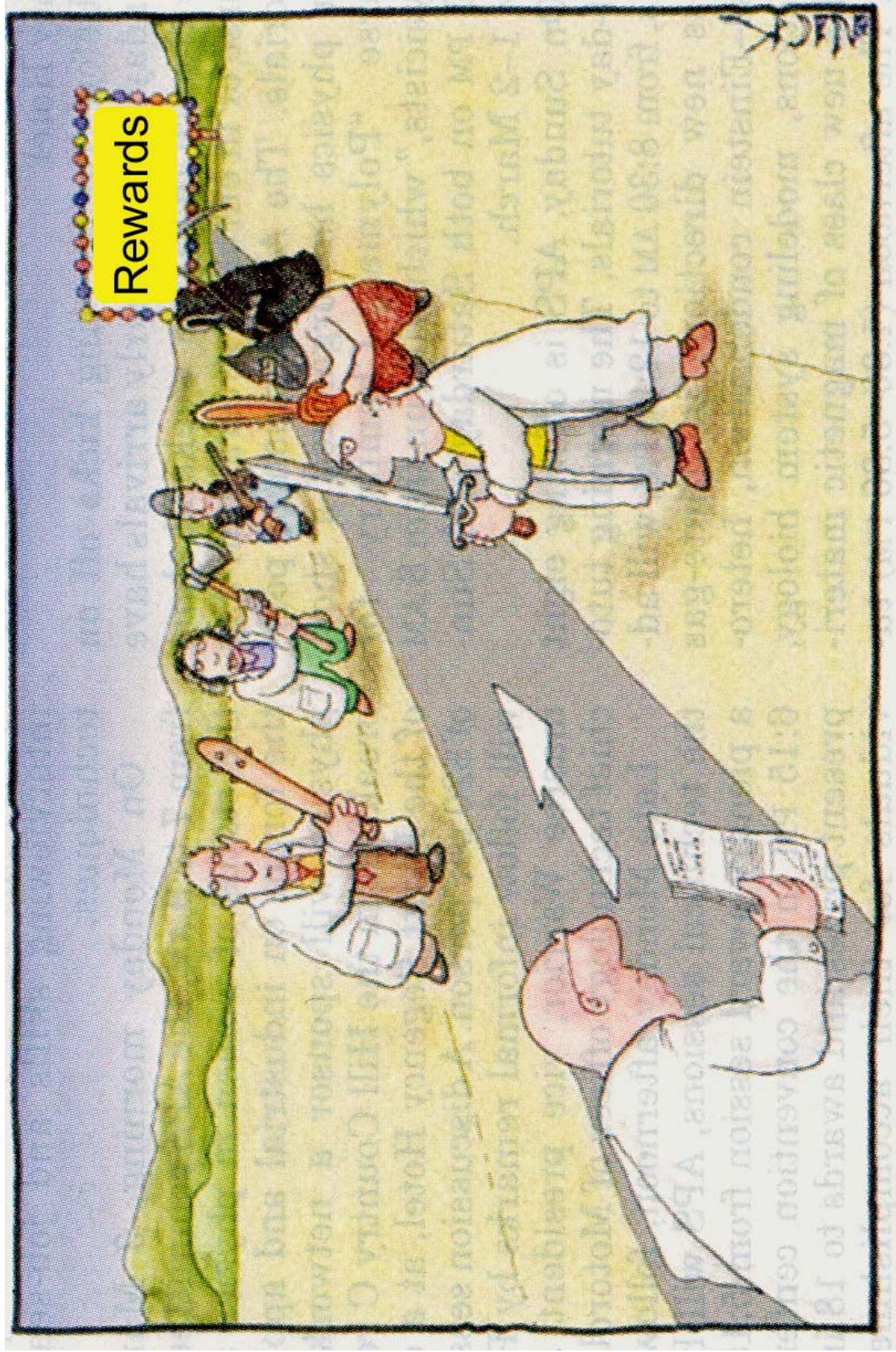
## Rewards in Industrial Setting

- Base pay (usually benchmarked within industry sector), at-risk pay for managers
- Incentive pay (bonus), stock options, discounted stock purchases
- Pay raises, promotions (technical ladder)
- 401(k) plan (company match?), pension plan (large companies)
- Medical (vision? drugs?), dental, disability, life insurance; HRA, DCA
- Vacation, holidays, sabbatical (rare), leave of absence (FMLA)
- Awards and Recognition program (celebrations, banquets, social events)
- Patent or publication bonus
- Supervising, directing, and managing the work of others
- **Development (training, experience), more work**
- Conference travel, publications, reviewing activities, university visits
- Tuition Reimbursement (linkage to present job needed? Approval?)
- Fitness centers, sports teams, cafeteria, employee assistance program
- Cube or office space, storage space, computer, lab and equipment

Source: <http://www.motorola.com>, McKinsey Study.

Industrial rewards are at first difficult to understand based on HR policies (**need manager's advice and support**), change often based on business conditions.





Our new and improved performance management system.

“At Company X, there were two kinds of people, managers and individual contributors”

- **Individual contributor:**
  - Does only technical work (no management)
  - Does not have support staff (no technicians, secretaries, students, etc)
- **Manager:**
  - Does not do any technical work (don't do anything ?)
  - Supports individual contributors by handling administrative details
  - Training and mentoring
  - Aligns goals of individual contributors with goals of the organization!
- **Typical ratio: 5 to 20 employees for each manager.**

Other companies may not be quite as strict (i.e., there may be technicians), but don't expect to have people that support you.

Some companies have more micro-managing than others.



## Rewards for Performance

- Rewards have a positive impact on results and behavior:
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## Focus on the Customer: Performance Excellence

- *“Basic research is like shooting an arrow into the air and, where it lands, paint a target. Historically, university physics programs have done an outstanding job of teaching physicists to shoot, but not necessarily to aim.”*
- Federal funding agencies (like NSF) promote this culture of academic excellence.
- Industry is full of targets: *“Business plans, product performance specifications, project cost and timing goals, etc.”*
- Industrial physicists need to *“focus their efforts and creative skills to support known needs and existing commercialization plans. Directing arrows towards targets generally requires much greater breadth, persistence, and teamwork than shooting a new arrow in whatever direction one chooses.”*
- Sometimes, one needs to advance a certain subfield of physics to meet predefined goals (**innovation**), sometimes one needs a detailed understanding of a field developed many years ago (**reuse**).
- **Performance Excellence** is a formal process that describes how to paint, aim, and hit targets while making money in the process.

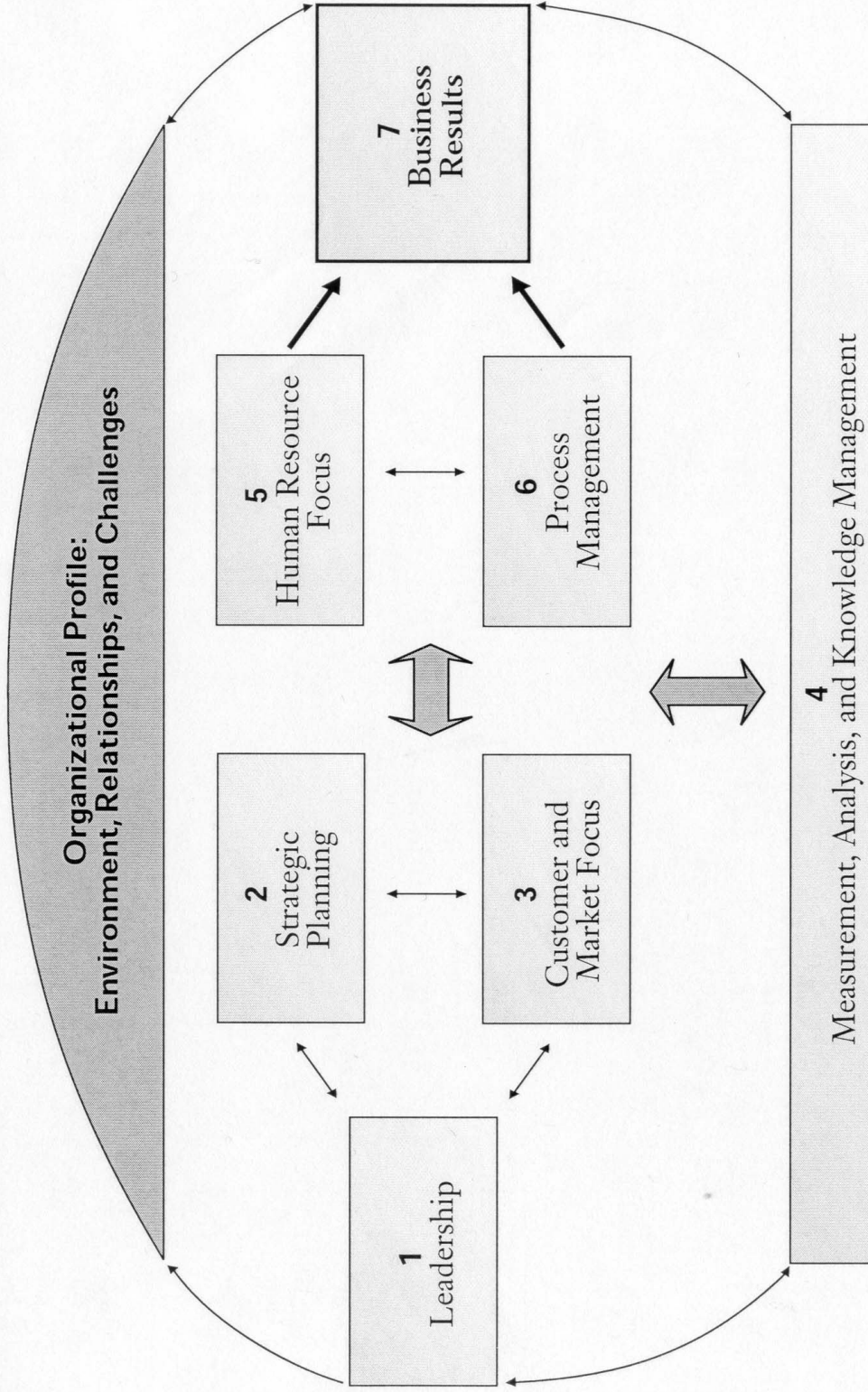
Source: Ken Hass, *Educating Physics for Industry*, Physics Today, December 2002.

## NIST Baldrige Award Criteria for Performance Excellence

- What are your organization's main **products and services**?
  - How are they delivered to **customers**?
  - What is your organization's culture (purpose, vision, mission, values)?
  - What is your employee profile (education levels, workforce, diversity, bargaining units, use of contract employees, safety requirements)?
  - What are your **major technologies, equipment, and facilities**?
  - What is the **regulatory environment** under which your organization operates (occupational health and safety, accreditation requirements, environmental, financial, and product regulations)?
  - What are your key customer groups and market segments?
  - What are the key requirements for your products and services? How do these requirements differ among customer groups and market segments?
  - What are your most important types of suppliers and dealers? Supply chain requirements?
  - What are your key supplier and customer partnering relationships and communication mechanisms?
  - What is your competitive position? What is your relative size and growth in your industry?
  - How many competitors and what types of competitors do you have?
  - **What are the principal factors that determine your success relative to your competitors?**
  - What changes are taking place that affect your competitive situation?
  - What are your key **strategic challenges** (operational, human resources, business, and global challenges)?
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# NIST Baldrige Criteria

## Baldrige Criteria for Performance Excellence Framework: A Systems Perspective



See <http://quality.nist.gov>



## **Performance Excellence**

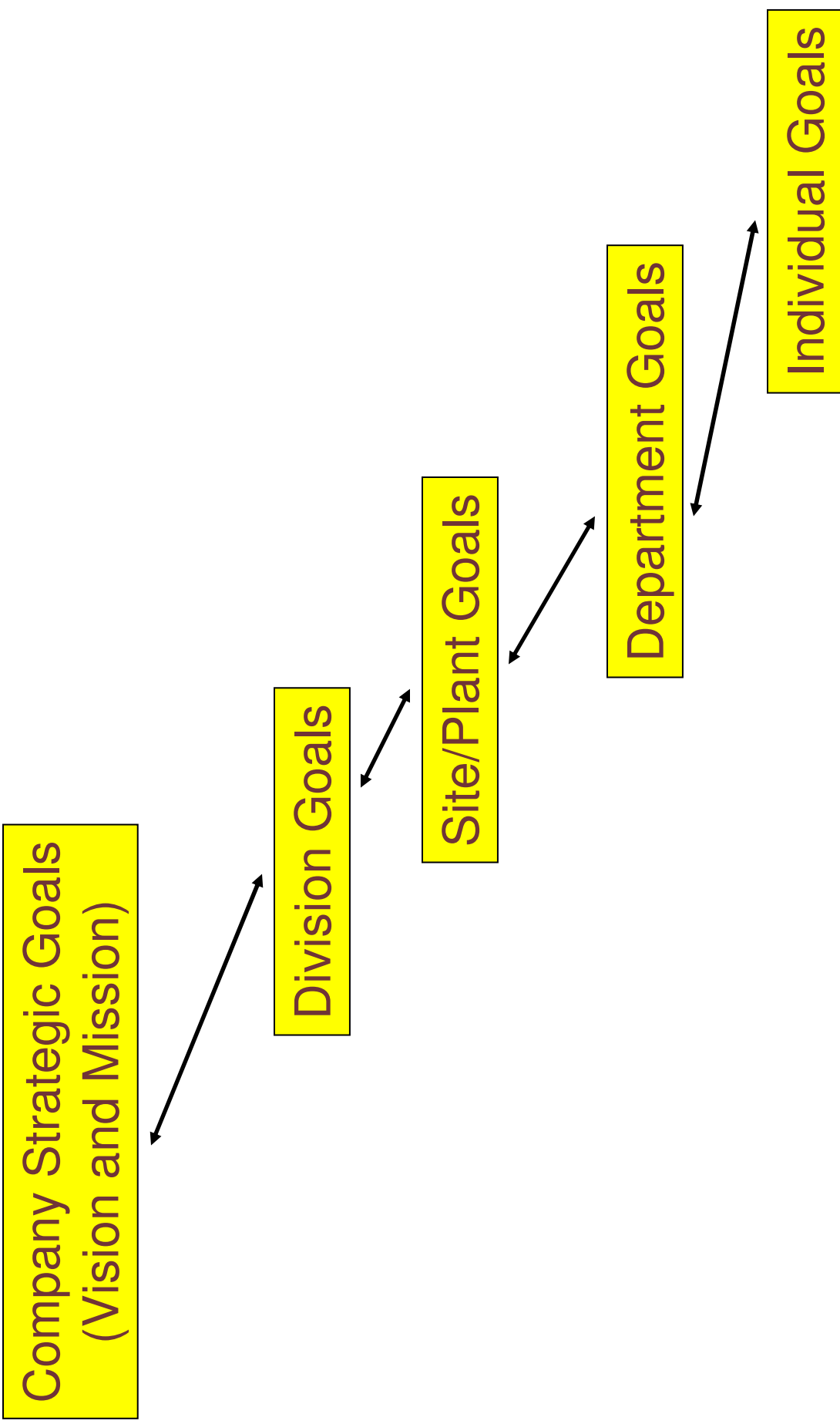
- Thinking about the answers to these questions (NIST Baldrige survey) makes you understand the purpose of your job.
- Why do we care?
- Understanding what our companies are supposed to do (make money) is a requirement for planning individual goals.
- Personal goals are closely aligned with goals of the organization.
- My main responsibility as a manager is to align the skills and interests of the individual contributors with the goals of the organization.

## The Balanced Scorecard

- The **Balanced Scorecard** is a tool that allows an organization to define goals and measure performance.
- Balanced Scorecard has four parts:
  - **Vision and Mission**
  - **Initiatives (Projects):** Tactical and Strategic
  - **Business Processes:** How do we achieve goals?
  - **Business Results:** How do we measure success?
- Vision and mission are derived from the larger organization.
- Clear ownership defined for all projects, processes, and results.
- Key considerations:
  - Financial Success
  - Customer Focus
  - Continuous Improvement of the organization.

Reference: R.S. Kaplan and D.P. Norton, *The Balanced Scorecard*, Harvard Business School Press, 1996.

## Alignment of goals and objectives



## Rewards for Performance

- Rewards have a positive impact on results and behavior:
  - **Contingent on achieving desired performance levels**
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Source: <http://www.p-management.com/reward.html>



## Performance = Results + Behaviors

- **Results**
  - Describe the employee's contributions to the goals of the organization.
  - Based on SMART goals
- **Behaviors** (also called competencies)
  - Describe HOW the results were obtained

*If I meet my goals, why does it matter if I'm in a good mood or not?*

Baldrige winner states:

Our leaders are held accountable for both results and behaviors and we are driving this mental framework down through the rest of our population.

# SMART Goals

- **Specific and clear:**  
What to accomplish? Identify requirements and constrains.  
Who is involved? Where? When? With whom and for whom?  
*Join a health club and work out three days a week for an hour.*
- **Measurable:**  
Concrete criteria for measuring progress toward attainment of goals.  
Some goals or standards can be measured through **qualitative** means.  
The reader can tell that the results sought can be measured.  
Numbers or specific words to indicate success. Describe result, not activity.
- **Achievable:**  
Is it reasonable to expect meeting this goal? Do I have the skills and resources needed?
- **Relevant and result-focused:**  
What are we hoping to gain? Why am I doing this? What do we accomplish?  
Linkage to the goals of the organization (**balanced scorecard**)
- **Time-Bound:**  
Milestones with target dates (requires **project management**).

**Example:**

**We will develop an InGaP-based heterojunction bipolar transistor with the following electrical characteristics (insert here), ready for customer sampling by (insert date).**

**Obtain feedback on performance from internal and external work partners (Surveys).**

Source: M. Brounstein, Coaching and Mentoring for Dummies, IDG Books, Foster City, CA, 2000.

## Leadership Behaviors (Competencies)

- **Decisiveness:** Takes responsibility for actions and decisions required
- **Conviction:** Demonstrates perseverance, displaying confidence
- **Knowledge:** Effectively uses the power that comes from understanding
- **Discipline:** Consistently executes as promised
- **Approachability:** Has integrity, and easily adapts to the styles of others
- **Clarity:** Communicates simply, clearly, and memorably
- **Direction:** Has, and expresses, clear goals and vision
- **Humility:** The ego is under control
- **Competence:** Demonstrates skill
- **Personal Energy (age discrimination?)**
- **Charisma: Likeable (measurable?)**

**Not all behaviors (competencies) contribute to the success of an organization. Behaviors are chosen and defined carefully to be meaningful and measurable.**

Source: [http://www.eaglesflight.com/leadership/10\\_qualities.html](http://www.eaglesflight.com/leadership/10_qualities.html).

See also Ken Hass, *Educating Physics for Industry*, Physics Today, December 2002.  
Also: Pennsylvania State System of Higher Education.

## 5 E's of success (adopted from General Electric)

- **Envision:**  
Creates the future, imagines what's next.  
Thinks in terms of the big picture and how the pieces fit together.  
Comes up with the vision, strategies, and viable plans that turn a dream into reality.  
Questions assumptions and challenges conventional thinking.  
Generates breakthrough ideas that improve the way the organization operates.
- **Energize:**  
Creates energy among employees to work on projects.  
Excites coworkers around activities, projects, and events.  
Creates an atmosphere where everyone has passion to excel and opportunity to contribute.  
Sustains a positive attitude in the face of difficult challenges or adversity.
- **Edge:**  
Makes tough decisions when needed to achieve goals. Takes responsibility for problems.  
Convinces people to collaborate. Challenges people to do their best.  
Holds people accountable, takes action when their performance does not meet expectations.
- **Execute:**  
Completes projects on time and on budget. Meets commitments and keeps promises.  
Follows tasks/projects through to successful completion. Communicates about projects to ensure completion. Has strong problem-solving skills.
- **Ethics:**  
Professional integrity while working on projects. Is honest at all times.  
Builds personal credibility. Treats all people with respect and dignity (diversity)

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Source: ~~Chris Galvin Interview, Business Week Online, 17 April 2000.~~

See also ~~<https://www.public.asu.edu/~tbaxley/DistrictPresident/AppendixC.htm>~~ (KKΨ/TBΣ), 2/10/03.

APS March Meeting, Session JB, Room 414/415



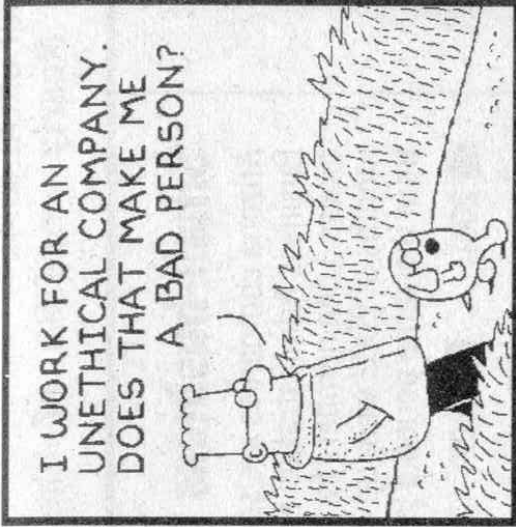
# Ethics

# DILBERT®

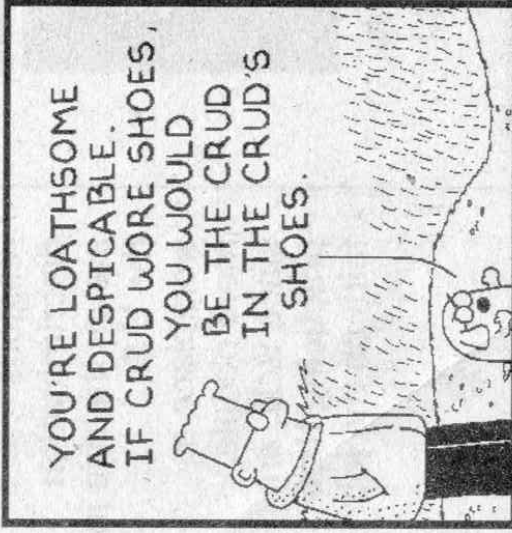


BY  
SCOTT ADAMS

www.dilbert.com scottadams@aol.com



I WORK FOR AN  
UNETHICAL COMPANY.  
DOES THAT MAKE ME  
A BAD PERSON?



YOU'RE LOATHSOME  
AND DESPICABLE.  
IF CRUD WORE SHOES,  
YOU WOULD  
BE THE CRUD  
IN THE CRUD'S  
SHOES.



WHY DID THAT  
SEEM REHEARSED?  
THAT'S ALL I  
THINK ABOUT  
WHEN WE GO  
FOR WALKS.

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## Ethics as a Competitive Advantage

The APS and many companies have an “Ethics Statement” or Code of Conduct.

### APS Guidelines for Professional Conduct:

- General statement with some specific considerations.
- **Research Results:**  
Keeping and maintaining adequate records. Admit errors!  
Sharing with collaborators (except to preserve intellectual property).  
Fabrication, selective reporting, or theft of data (plagiarism) not tolerated.
- **Authorship:**  
Significant contributors (and only those) should be coauthors.  
Other contributions and financial support should be acknowledged.  
All coauthors have some responsibility for the paper.
- **Peer review:**  
Fair, objective, and timely peer review is an obligation for every physicist!
- **Conflicts of interest:**  
Professional or personal relationships, financial conflicts.  
Applies mostly to reviewing. Disclose! Avoid when possible.  
Discontinue activity (review etc) when conflict not avoidable.

## Business code of conduct of large company

- **Uncompromising integrity:**  
Honesty, fairness, “doing the right thing” without compromise, even when circumstances make it difficult.
- **Constant respect for people:**  
Treat others with dignity, as we would like to be treated ourselves. This applies to every individual we interact with around the world.
- **Responsibility and Accountability:**  
Each employee has personal responsibility to know the code of conduct and to abide by it and the laws about our work. Report concerns to management or Ethics Office.
- **Managers** are expected to lead based on our code of conduct. Managers must look for indications that unethical or illegal activity has occurred.
- Product quality and safety, sales and marketing, customer information, government customers, governments (import/export), competitors (antitrust, anticorruption laws).
- Responsibility to business partners and the public community (environment, volunteering)
- Purchasing/travel practices, communication with external audiences
- **Responsibility to shareholders:**  
Protect company assets (guard from theft or misuse)  
Protect proprietary information (trade secrets)  
Inside information and securities trading  
Accuracy of company records  
Record-keeping and retention of records.
- **No lobbying, political contribution on behalf of the company (OK as individual).**
- **Avoid conflicts of interest (outside employment, family members, competing with company).**

## Performance = Results + Behaviors

- **Results**
  - Describe the employee's contributions to the goals of the organization.
  - Based on SMART goals
- **Behaviors** (also called competencies)
  - Describe HOW the results were obtained

*If I meet my goals, why does it matter if I'm in a good mood or not?*

Baldrige winner states:

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## Rewards for Strong Performance (Top 20%)

- **Financial Incentives** (already discussed):
  - Incentive pay, Stock Options, Pay Raises
  - Promotion in current job (technical ladder)
- **Development Opportunities:**
  - Training (classroom or experience)
  - Move into management
  - Fast track for top performers
- **Non-financial incentives:**
  - Make work content fun and stimulating
  - **More work (more challenging goals)**
  - New Toys (new state-of-the art instrument)
  - Autonomy: give employees autonomy and flexibility  
(Food company: 100 US zone managers with CEO-like jobs, 50M\$ each)

Promotions are becoming rare (Downsizing, Flattening), other rewards more important.

Source: McKinsey Study of High-Performing Companies  
Kathy Buckner, Developing and Maintaining a Competitive Career, B.T. Novations.

## Consequences for poor performers (bottom 5-10%)

- **Successful companies:**
  - Fire underperformers (2-3 years, 5-10% per year): **Up or Out**
  - Peer pressure (underperformers are forced to self-select out)
  - **Many companies enforce distributions (forced ranking)**
  - Critics: Subjective, unfair, discriminatory, discourages collaboration
- **Underperforming companies:**
  - Second chance for underperformers (demotion or downgrade, lateral move, department transfer)
  - Counseling or Coaching in place (minimize employee turnover at all costs)
- **Coaching:**
  - Criticism of individual's performance does not usually result in improvement.
  - Better: Reinforcing individual's strength, encourage to use those more.

Source: McKinsey Study of High-Performing Companies, Performance Appraisal (Dick Grote, AMACOM Books)

## Summary

- Performance Excellence
  - Planning and measuring goals of the organization
  - Balanced Scorecard
- Personal Commitment
  - Planning goals for individuals based on balanced scorecard
  - Performance consists of results (meeting goals) and behaviors
- Relative Performance Assessment (RPA)
  - Evaluate employees on their performance to goals and behaviors as compared to others in similar jobs and grade levels.
- Differential Investment
  - **Rewards for Performance**

Source: 2003 Baldrige Winner Motorola CGISS Best Practices, <http://www.motorola.com>

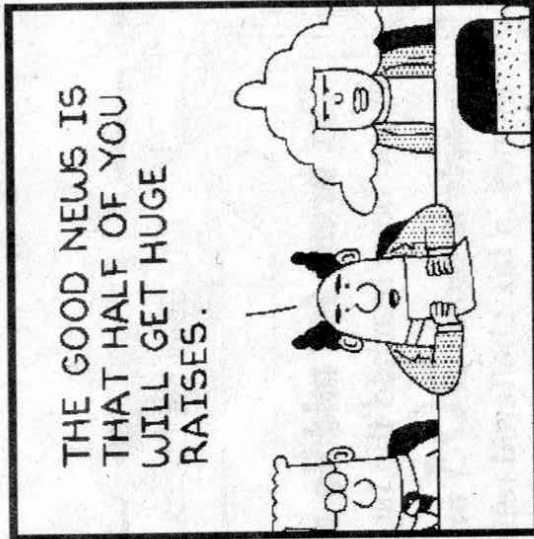
# Differential Investment

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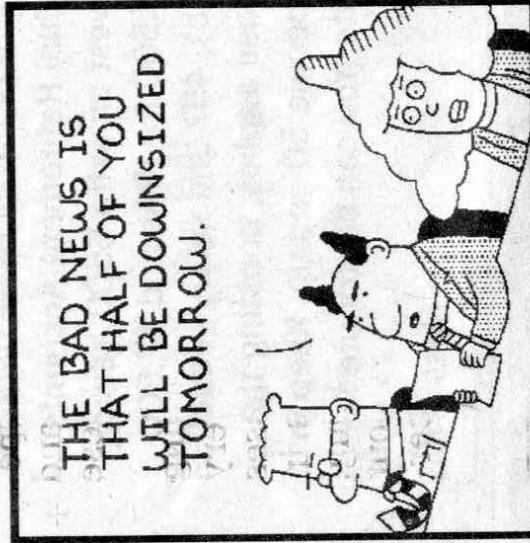
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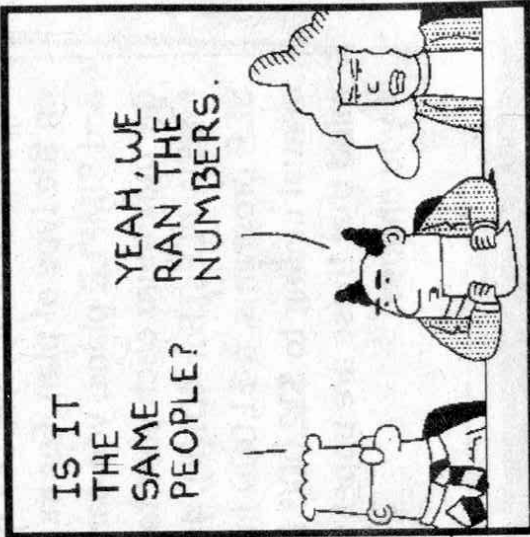
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THE GOOD NEWS IS  
THAT HALF OF YOU  
WILL GET HUGE  
RAISES.



THE BAD NEWS IS  
THAT HALF OF YOU  
WILL BE DOWNSIZED  
TOMORROW.



IS IT  
THE  
SAME  
PEOPLE?

YEAH, WE  
RAN THE  
NUMBERS.

## Additional Reading

- <http://www.quality.nist.gov>: Baldrige National Quality Program. Baldrige Award winner information (profile, application summary).
- R.S. Kaplan and D.P. Norton, *The Balanced Scorecard*, Harvard Business School Press, 1996.
- M. Brounstein, *Coaching and Mentoring for Dummies*, IDG Books, Foster City, CA, 2000.
- D. Grote, *The Performance Appraisal Question and Answer Book*, American Management Association, New York, 2000.
- Ken Hass, *Educating Physics for Industry*, Physics Today, December 2002.
- Chris Galvin Interview, Business Week Online, 17 April 2000.
- R.M. Pirsig, *Zen and the Art of Motorcycle Maintenance*, Bantam, 1974. (Don't forget that you are a physicist, not a bureaucrat!)





## Backup Slides



*Most scientists regarded the new streamlined peer-review process as 'quite an improvement.'*

February 2003 Physics Today

## Measuring Behavior 1: Communication as an Example

- **Less than expected:**  
Verbal and/or written communication does not achieve an understanding.  
Style of relating to others is inappropriate and creates problems with peers, employees, and customers.  
Does not consistently treat others with dignity and respect.
- **Meets expectations:**  
Consistently maintains good working relationships with peers, supervisors, customers, stake holders, etc.  
Always treats others with dignity and respect.  
Willingly shares information that will enhance the work effectiveness of others.  
Promotes positive public relations and public image of organization.  
Strong written and verbal communication.
- **Exceeds expectations:**  
Meets all criteria under “meets expectations”. PLUS  
Shows talent in such areas as persuasion and conflict resolution.

**Behaviors are chosen and defined carefully to be meaningful and measurable.**

Source: Nebraska Health and Human Services System (web site).



## Measuring Behavior 2: Demonstrates Flexibility and Adaptability (Cooperation)

- **Less than expected:**  
Resistant to implementation of new approaches. Insufficient sensitivity to and does not show concern about impact of change on peers, employees, and customers. Indifferent to the effects of his/her behavior on others.
- **Meets expectations:**  
Takes proactive role in managing change. Sensitive to and shows concern about impact of change on others. Encourages trust and cooperation. Demonstrates flexibility in accepting additional responsibilities.
- **Exceeds expectations:**  
Meets all criteria under “meets expectations”. PLUS  
Viewed as a change agent. Personally works with others to implement change. Demonstrates flexibility in accepting additional responsibilities while maintaining current workload.

## Measuring Behavior 3: Fosters Diversity (Collaboration)

- **Less than expected:**  
Does not always recognize value of positive relationships with others. Does not value different opinions, experiences, backgrounds and/or cultures. Does not encourage diversity in composition of work teams. Withholds information and assistance.
- **Meets expectations:**  
Demonstrates a willingness and ability to work with others as team players in the pursuit of common goals. Encourages shared objectives with other workgroups. Values diverse opinions, experiences, backgrounds, and cultural styles. Encourages an environment of openness, trust and acceptance. Builds a participative environment.
- **Exceeds expectations:**  
Meets all criteria under “meets expectations”. PLUS  
Assures appropriate linkages between own work plans and organization goals. Facilitates a positive environment. Maintains a high level of morale.

## The Four Stages of Career Growth (Industrial Environment)

- **Stage 1: Depending on Others** (junior engineer, technician)
  - Willingly accepts supervision
  - Demonstrates success on a portion of larger project or task
  - Masters basic and routine tasks
  - Shows “directed” creativity and initiative
  - Performs well under time and budget pressure
  - Learns how “we” do things
- **Stage 2: Contributing Independently** (individual contributor, senior engineer)
  - Assumes responsibility for definable projects
  - Relies less on supervision; works independently and produces significant results
  - Increases in technical expertise and ability
  - Develops credibility and a reputation
  - Builds a strong internal network of relationships
- **Stage 3: Contributing through Others** (section manager, project leader)
  - Increases in technical breadth
  - Develops broad business perspective
  - Stimulates others through ideas and knowledge
  - Involved as a manager, mentor, or idea leader in developing others
  - Represents the organization effectively to clients and external groups
  - Builds a strong internal and external network
- **Stage 4: Organizational Leadership** (department manager, director, VP)

Source: <http://www.btweb.com/FourStagesOfCareerGrowth.asp>



## Measuring Behavior 4: Maintains Focus on Customer Service

- **Less than expected:**  
Not fully attuned to importance of customer. Does not appropriately participate in identifying customers' needs.
- **Meets expectations:**  
Values customers. Consistently meets customers' needs. Takes appropriate action to solve customer concerns effectively and efficiently.
- **Exceeds expectations:**  
Meets all criteria under "meets expectations". PLUS  
Assists others in developing the skills to provide quality customer service.

## Measuring Behavior 5: Job Knowledge and Productivity (Confidence)

- **Less than expected:**  
Focuses on responsibilities of others more often than own responsibilities. Sometimes fails to follow through on commitments. Demonstrates little or no initiative to acquire skills and knowledge necessary to meet requirements of position. Is not always completely honest or forthright. Work is not completed efficiently or of consistent high quality.
- **Meets expectations:**  
Takes responsibility for own actions and actions of workgroups. Works to solve problems. Shows initiative to increase job knowledge. Demonstrates honesty, integrity, and fairness. Effectively manages and maximizes talent of all employees; maintains a high morale within organization. Work output consistently meets quality and quantity standards for the position. Actively incorporates quality approaches to work.
- **Exceeds expectations:**  
Meets all criteria under "meets expectations". PLUS  
Demonstrates critically important knowledge that positively impacts results. Establishes a system of continuous improvement focused on improving work performance. Demonstrates very high levels of honesty, integrity, and fairness.

## Behaviors depend on Career Stage

- **Stage 1: Depending on Others** (junior engineer, technician)
  - Willingly accepts supervision and direction
  - Demonstrates success and competence on a portion of larger project or task
  - Masters detailed and routine tasks
  - Shows “directed” creativity and initiative
  - Performs well under time and budget pressure
  - Learns how “we” do things
- **Stage 2: Contributing Independently** (individual contributor, senior engineer)
  - Assumes responsibility for a definable portion of a project, area, or clients
  - Relies less on supervision; works independently and produces significant results
  - Increases in technical expertise and ability; develops his/her own resources to solving problems.
  - Demonstrates technical competence, credibility and a reputation for good work
  - Builds a strong internal network of relationships (collegial relations with coworkers)
- **Stage 3: Contributing through Others** (section manager, project leader)
  - Demonstrates a breadth of business AND technical expertise, perspective, and insight
  - Stimulates others through ideas and knowledge
  - Involved as a manager, mentor, or idea leader in developing and influencing others
  - Represents the organization effectively to clients and external groups (other work groups, senior management, industry associations, universities, government, etc)
  - Builds a strong internal and external network
- **Stage 4: Organizational Leadership** (department manager, director, VP)

Source: <http://www.btweb.com/FourStagesOfCareerGrowth.asp>

## Behaviors can be overused

- **Personal Energy:**  
Creates stress for coworkers without clear purpose.  
Workaholic, does not take time for vacation or family.
- **Building Relationships:**  
Spends too much time and effort to build relationships with too many individuals and organizations that are not part of the work team.
- **Knowledge:**  
Is unable to communicate issues in simple terms to cross-disciplinary team.
- **Diversity:**  
Manages diversity of population based on quota, not on business needs.  
Overly concerned with personal differences, detrimental to team building.
- **Communication:**  
Sends five emails per day to the whole team about the status of the project.  
Unable to summarize, too much detail in reports.
- **Execution:**  
Plans every detail and never gets the work done.

## The Four Stages of Career Growth (Academic Environment)

- **Stage 1: Depending on Others** (graduate student)
  - Willingly accepts supervision
  - Demonstrates success on a portion of larger project or task
  - Masters basic and routine tasks
  - Shows “directed” creativity and initiative
  - Performs well under time and budget pressure
  - Learns how “we” do things
- **Stage 2: Contributing Independently** (postdoc)
  - Assumes responsibility for definable projects
  - Relies less on supervision; works independently and produces significant results
  - Increases in technical expertise and ability
  - Develops credibility and a reputation
  - Builds a strong internal network of relationships
- **Stage 3: Contributing through Others** (professor)
  - Increases in technical breadth
  - Develops broad business perspective
  - Stimulates others through ideas and knowledge
  - Involved as a manager, mentor, or idea leader in developing others
  - Represents the organization effectively to clients and external groups
  - Builds a strong internal and external network
- **Stage 4: Organizational Leadership** (department chair, dean, funding agent)

Source: <http://www.btweb.com/FourStagesOfCareerGrowth.asp>