Technology Program Evaluation:
Methodologies from the
Advanced Technology Program

Status Reports: Measuring against Mission

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Status Report Project
Defining the Mission

ATP's interim goals were defined as:

- (1) creating knowledge,
- (2) disseminating knowledge, and
- (3) commercializing results.
- The long-term goal was (4) achieving broad-based national benefits

Status Reports were individual assessments of funded research projects with an aim to objectively measure against mission, gathering project data to compare with the goals.

Status Reports Overview

What are they?

- The full story of one project in lay language, 5-10 pages
- Description of short-, mid-, long-term outputs, outcomes, impacts

How are they written?

- Team of technology writers review documents, interview companies, search for accurate information about the technology, company, and industry

How are they used?

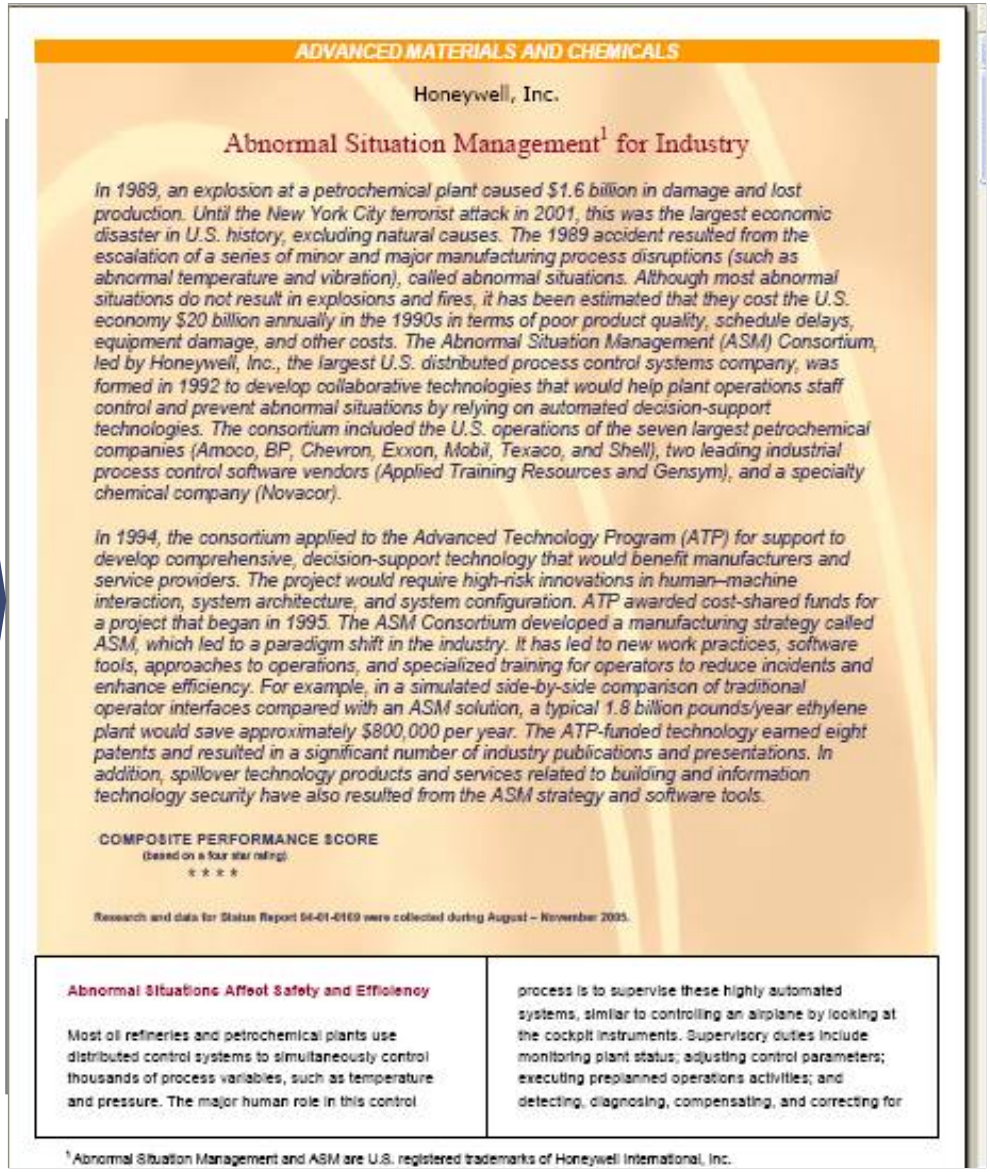
- To understand the company perspective
- To put the technology in context of state-of-the-art trends
- To consider the context of industry and market trends

Collecting the Data

Status Report Evaluation Process

Evaluated research projects' preliminary impact and assessed potential broad-based national benefits. Status reports assessed projects at least three to five years after the end of the project, telling the story of the data.

Evaluated projects regardless of outcomes, that is, without an emphasis on successes.



ADVANCED MATERIALS AND CHEMICALS

Honeywell, Inc.

Abnormal Situation Management[1] for Industry

In 1989, an explosion at a petrochemical plant caused $1.6 billion in damage and lost production. Until the New York City terrorist attack in 2001, this was the largest economic disaster in U.S. history, excluding natural causes. The 1989 accident resulted from the escalation of a series of minor and major manufacturing process disruptions (such as abnormal temperature and vibration), called abnormal situations. Although most abnormal situations do not result in explosions and fires, it has been estimated that they cost the U.S. economy $20 billion annually in the 1990s in terms of poor product quality, schedule delays, equipment damage, and other costs. The Abnormal Situation Management (ASM) Consortium, led by Honeywell, Inc., the largest U.S. distributed process control systems company, was formed in 1992 to develop collaborative technologies that would help plant operations staff control and prevent abnormal situations by relying on automated decision-support technologies. The consortium included the U.S. operations of the seven largest petrochemical companies (Amoco, BP, Chevron, Exxon, Mobil, Texaco, and Shell), two leading industrial process control software vendors (Applied Training Resources and Gensym), and a specialty chemical company (Novacor).

In 1994, the consortium applied to the Advanced Technology Program (ATP) for support to develop comprehensive, decision-support technology that would benefit manufacturers and service providers. The project would require high-risk innovations in human–machine interaction, system architecture, and system configuration. ATP awarded cost-shared funds for a project that began in 1995. The ASM Consortium developed a manufacturing strategy called ASM, which led to a paradigm shift in the industry. It has led to new work practices, software tools, approaches to operations, and specialized training for operators to reduce incidents and enhance efficiency. For example, in a simulated side-by-side comparison of traditional operator interfaces compared with an ASM solution, a typical 1.8 billion pounds/year ethylene plant would save approximately $800,000 per year. The ATP-funded technology earned eight patents and resulted in a significant number of industry publications and presentations. In addition, spillover technology products and services related to building and information technology security have also resulted from the ASM strategy and software tools.

COMPOSITE PERFORMANCE SCORE
(based on a four star rating)
★★★★

Research and data for Status Report 96-01-0169 were collected during August – November 2005.

Abnormal Situations Affect Safety and Efficiency

Most oil refineries and petrochemical plants use distributed control systems to simultaneously control thousands of process variables, such as temperature and pressure. The major human role in this control process is to supervise these highly automated systems, similar to controlling an airplane by looking at the cockpit instruments. Supervisory duties include monitoring plant status; adjusting control parameters; executing preplanned operations activities; and detecting, diagnosing, compensating, and correcting for

[1] Abnormal Situation Management and ASM are U.S. registered trademarks of Honeywell International, Inc.

Example Project
Abnormal Situation Management (ASM)

Project aimed to develop tools and processes to support a comprehensive, automated decision-support system.

Knowledge Creation: 8 patents

Knowledge Dissemination: Consortium of 13 companies; 21 publications, 15 presentations

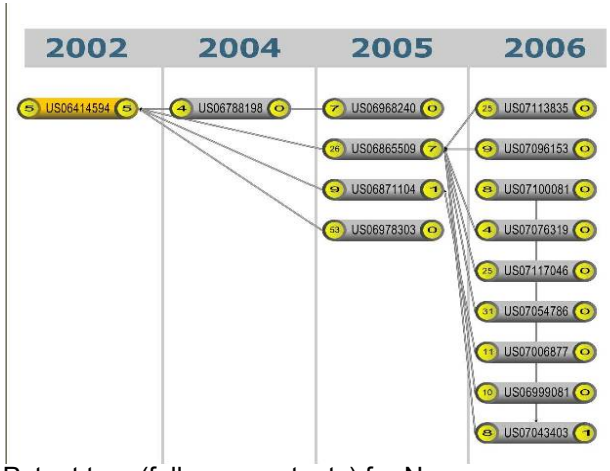
Commercialization Progress: 20+ commercial products and services around security, training, architecture, etc.

Abnormal situations range from suboptimal performance to production delays to costly fires and explosions.

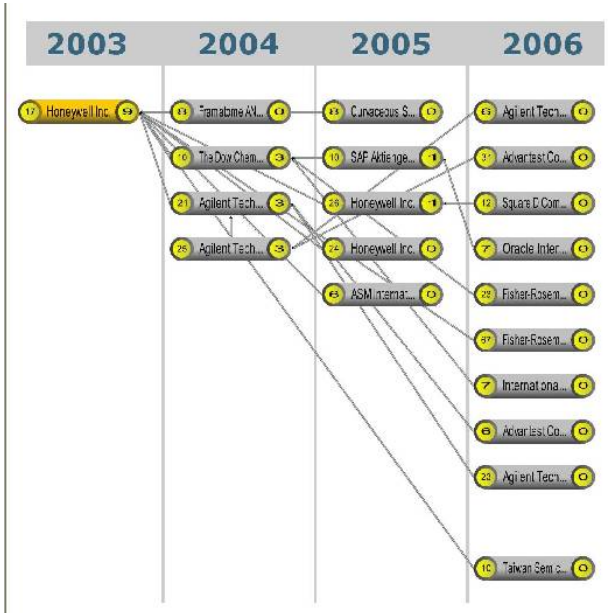
Example Project, ASM cont.

Knowledge Creation: Patent Tree

A Patent Tree for each patent visually demonstrates knowledge spillover. A patent tree is a graphical display of knowledge dissemination from patented technological advances

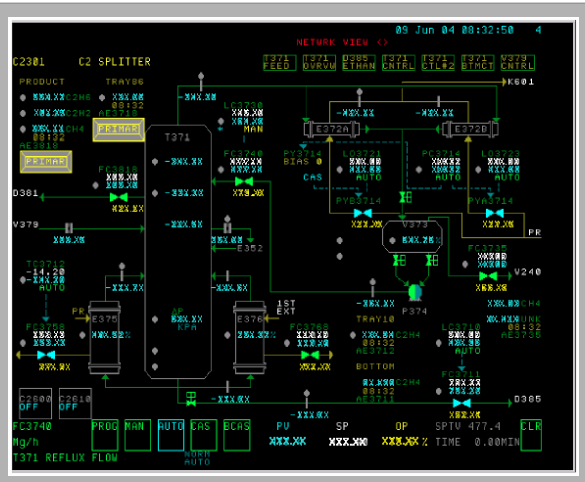


Patent tree (follow-on patents) for No. 6,414,594, labeled by patent number



Patent tree for No. 6,587,108, labeled by Assignee Name

Example Project, ASM cont.



Control Room -- Before

Control Room -- After

Status Reports: Measuring against Mission

Role of the CPRS – Why?

A portfolio approach based on objective criteria facilitates cross-project analysis.

- One project has publications but no commercial progress.
- Another has extensive collaboration but a dismal outlook due to changes in market forces.
- Another has products on the market, but no publications or patents, because the company wants to keep IP secret.

ATP asked itself how to measure project results objectively.

The system must measure quantifiable data and allow multiple paths to success.

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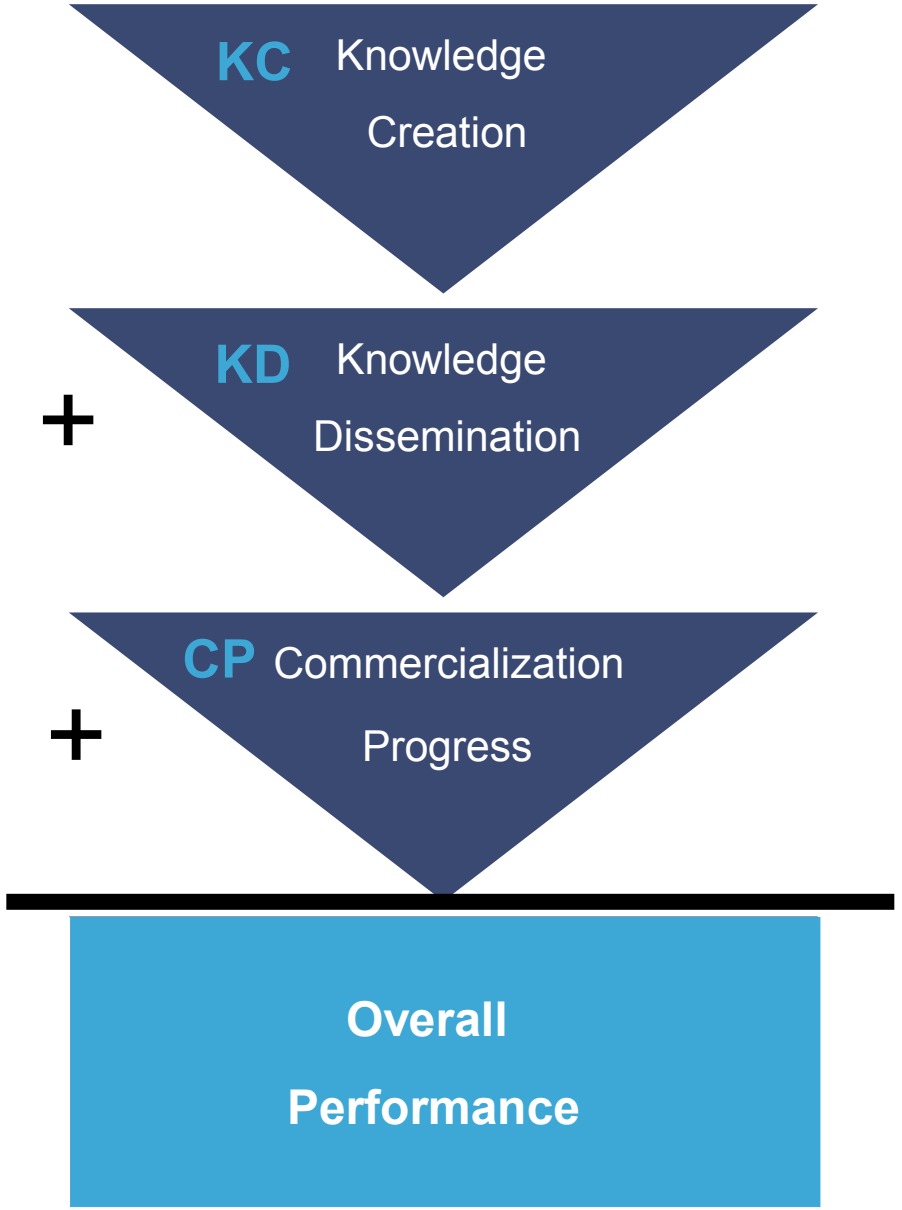
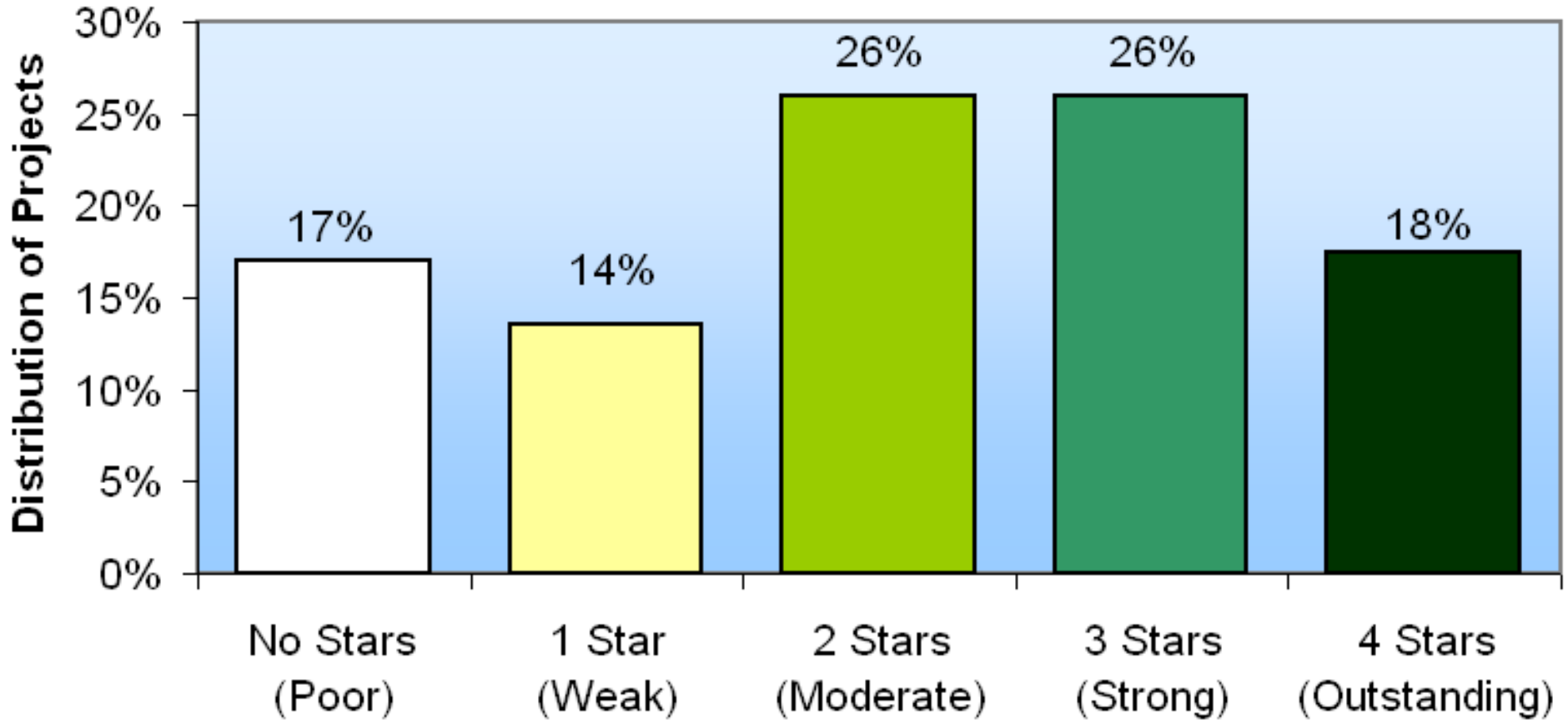
Rating the Project

Components from ATP's Mission include:

- Scientific and technical knowledge creation
- Collaboration and knowledge dissemination
- Technology commercialization progress and diffusion of benefits



Distribution of CPRS Ratings



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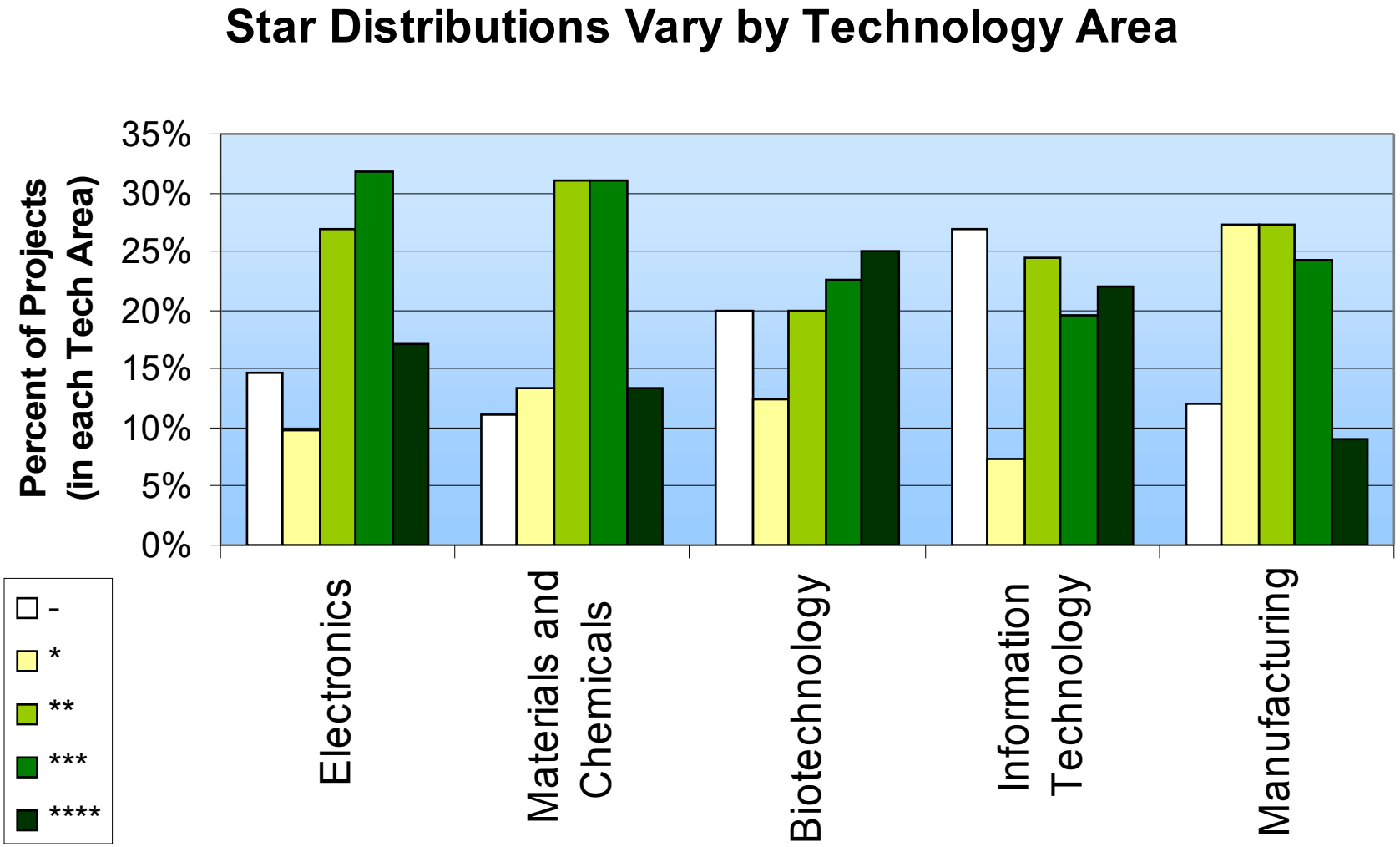
Sample Projects

Examples from the Information Technology Group

	LOTS Technology	L3 Communications	Cigital, Inc.
	Optical tape storage technology with up to 180 tracks for rapid data storage, retrieval and transfer.	Tools for debugging applications built from component software to increase reliability.	New Process for assuring the security of software components, enabling technology for e-commerce.
Overall Performance Score	**0 Star**	**2 Stars**	**4 Stars**
Technical awards	0	0	0
Publications	1	0	6
Presentations	0	0	10
Types of Collaborations	2	1	1
New products/processes	No	Yes (1)	Yes (2)
Attract capital	No	Yes	Yes
Employment gains	-100%	N/A	180%+
Business awards	0	0	4
Outlook (+4=optimistic)	-4	+4	+4

Aggregate Data

Profile Comparison of Star Ratings



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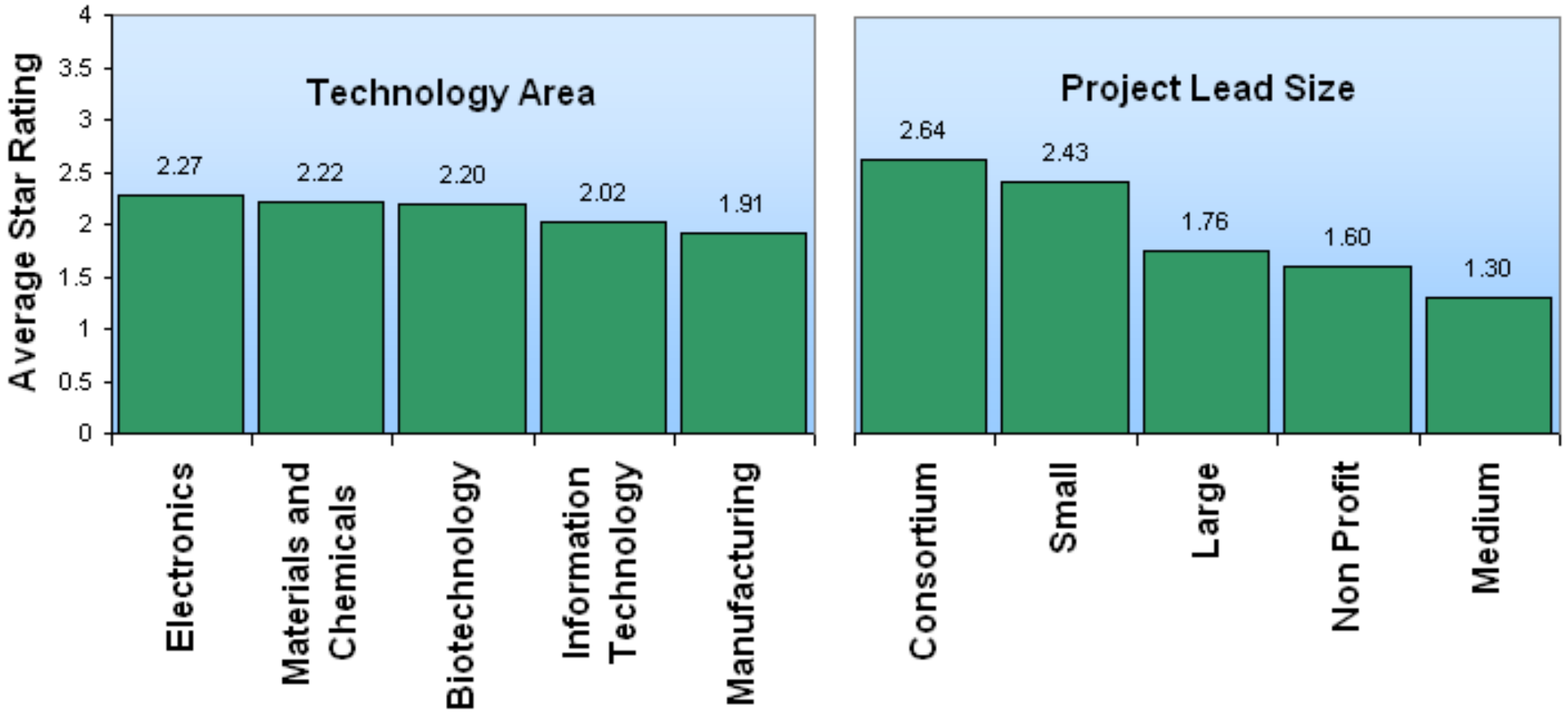
Aggregate Data, cont.

Profile Comparison of Star Ratings

How Star Rating Averages Differ among Project Attributes



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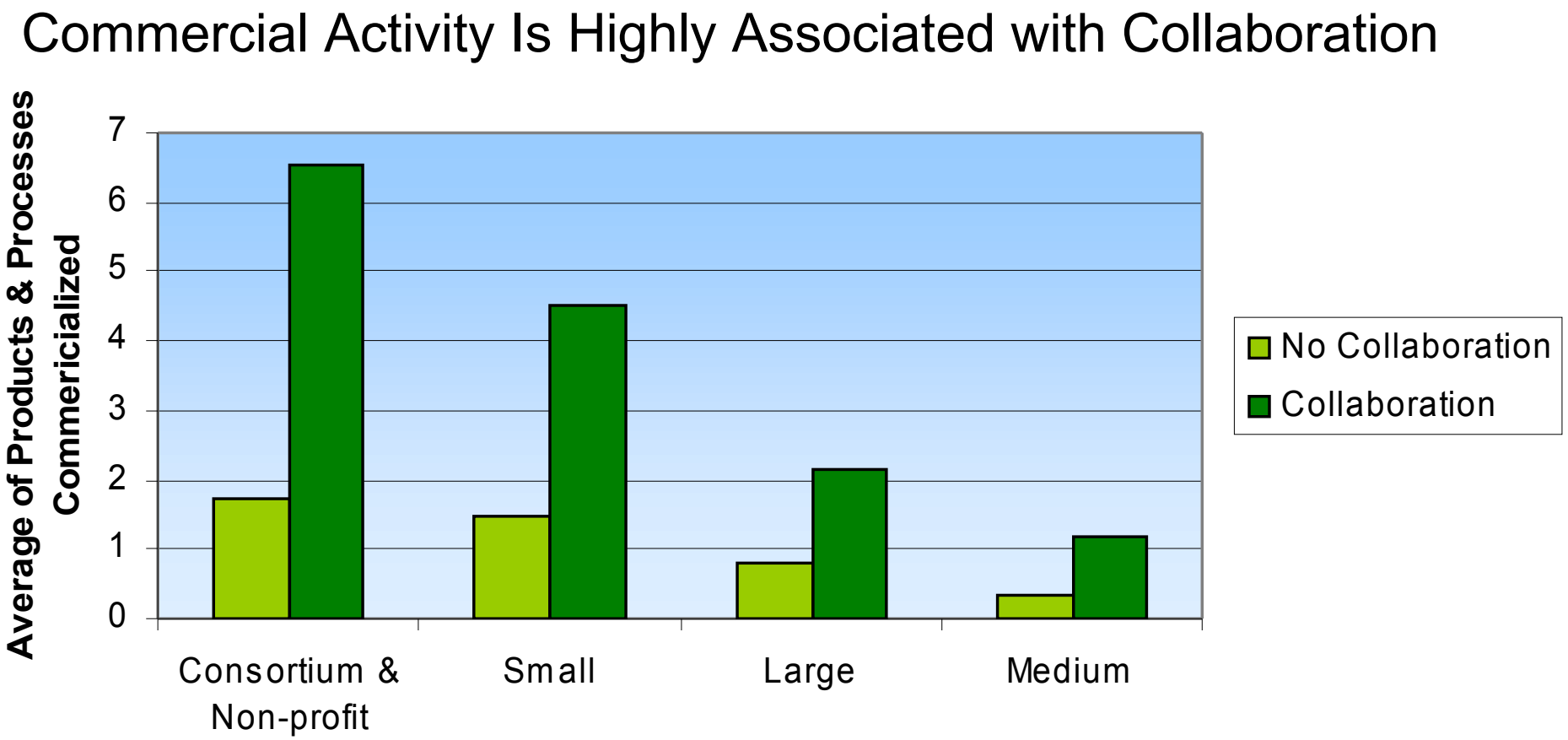
Aggregate Data, cont.

Profile Comparison of Star Ratings



Conclusion

Status reports are stories that:

- Convey the outputs, products, and long-term impacts of project development
- Gather and document outcome data for cross-project analysis

Discussion and questions