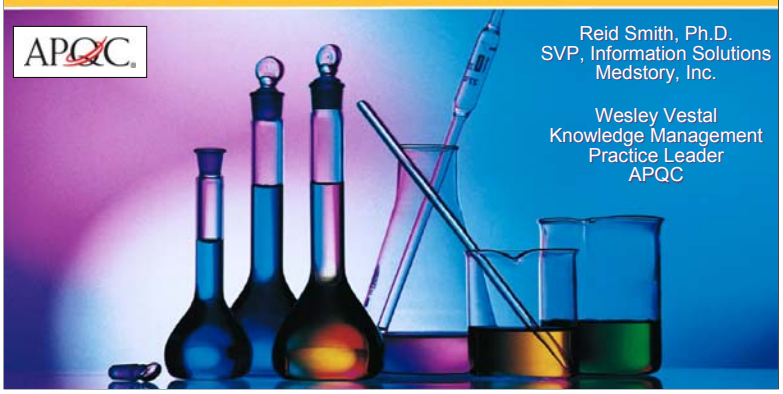
Exclusively for Individuals in the Pharmaceuticals and Biotechnology Sector

New Thinking and Tools for Improving Drug Industry Performance

A ONE-DAY WORKSHOP



Reid Smith, Ph.D.
SVP, Information Solutions
Medstory, Inc.

Wesley Vestal
Knowledge Management
Practice Leader
APQC

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Agenda

08:30 – 09:15	Welcome and overview
09:15 – 10:15	What keeps business managers awake at night?
10:15 – 10:30	Networking break
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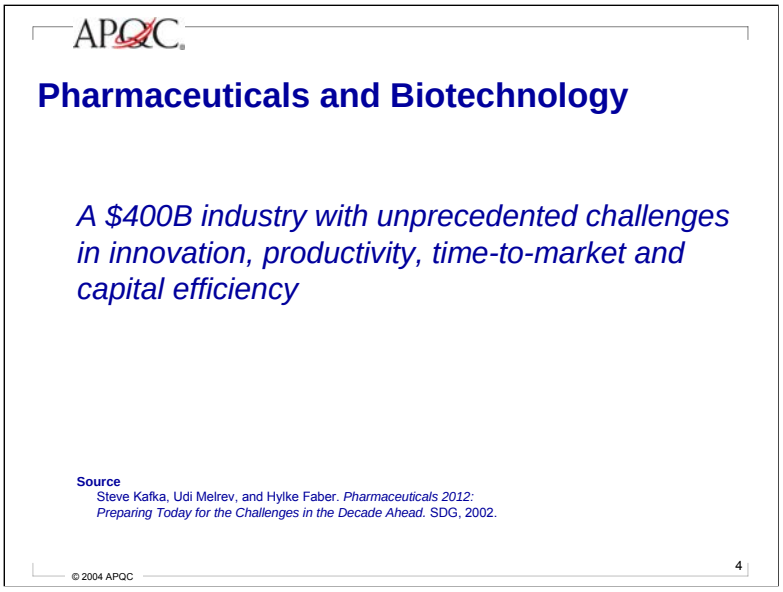
Welcome and overview

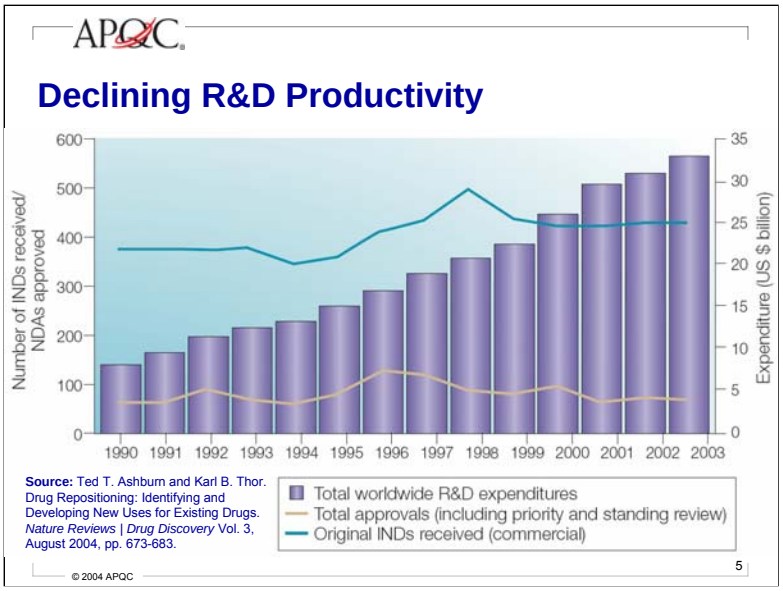
- Background
- What are we trying to accomplish?
- Who are we?
- Who are you?



From Old to New Thinking: An Industry Transformation

Pharmaceuticals and biotechnology is a $400 billion industry (IMS Health 2002 estimate of worldwide sales of prescription drugs) with unprecedented challenges in innovation, new product development, productivity, patent expirations, increasing R&D costs, branding and advertising, capital efficiency, and speed to market. The industry stands at a precipice. Several key factors are causing the industry to re-evaluate its way of thinking, including: economic issues, lack of technical or regulatory successes, increasingly complex drug targets, significant interdependencies among programs, increased importance of in-licensing compared to internal development, market segmentation driven by personalized medicine, and a business environment in which companies are increasingly virtual.

Due to these factors, a rapid and fundamental transformation is underway from vertical integration to networked ecosystems — **a shift from old to new thinking.**



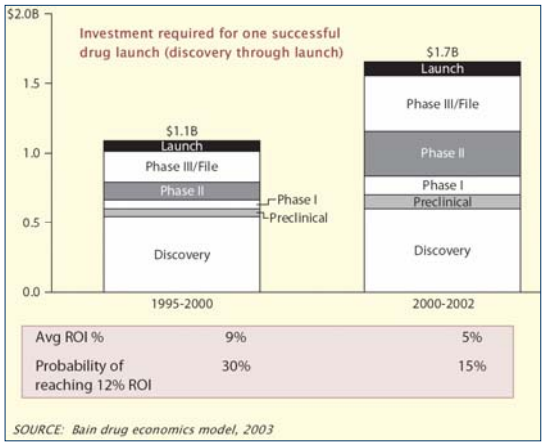
This despite the arsenal of new R&D tools

- Shotgun sequencing
- HT Protein sequencing
- HT Protein synthesis
- Tandem Mass Spectrometry
- Whole genome chips
- Single cell HTS
- Antibody combichem
- Fluorescence technologies
- *in silico* HTS
- Pathway predictive tools
- SNP analysis
- Genotyping
- Population genomics
- Genomic diagnostic arrays and biosensors

Technology Review 2004 R&D Scorecard

http://www.technologyreview.com/articles/04/12/scorecard1204.asp?p=1

Increasing Investment



From Bain: Jim Gilbert, Preston Henske and Ashish Singh. Rebuilding Big Pharma's Business Model. In Vivo. Vol. 21, No. 10. November, 2003.

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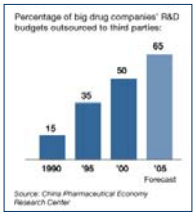
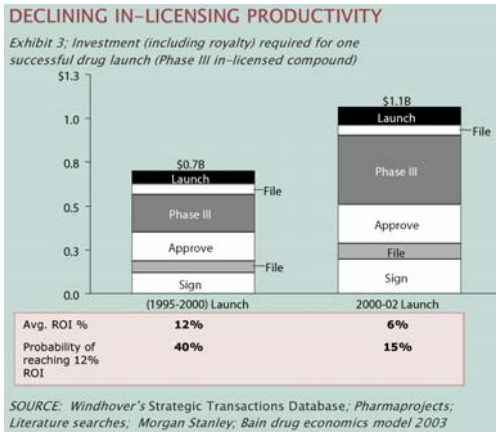
Declining In-Licensing Productivity





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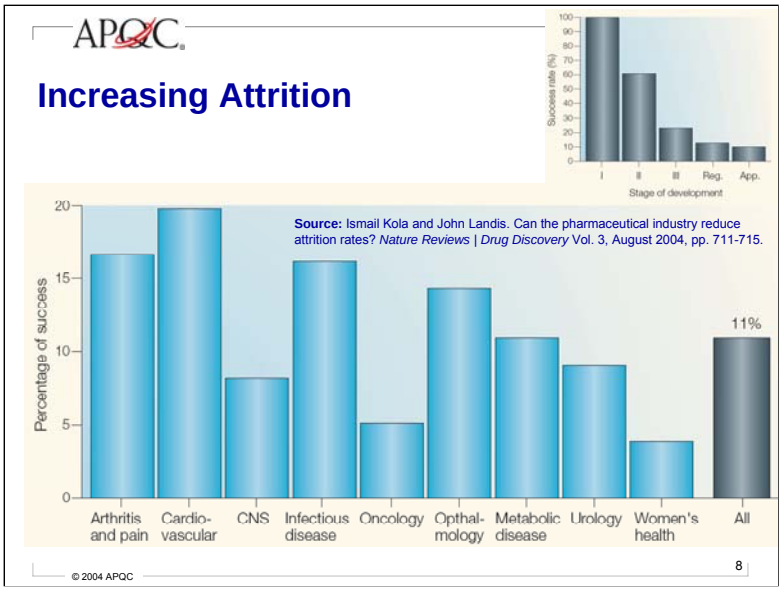
From: http://online.wsj.com/article/0,,SB110107801512980302,00.html?mod=health%5Fhome%5Fstories

and

From Bain: Jim Gilbert, Preston Henske and Ashish Singh. Rebuilding Big Pharma's Business Model. *In Vivo.* Vol. 21, No. 10. November, 2003.

Biotech therapeutic alliances ~$100B in 2004, per Recap (McCully presentation, Nov-04)

Key deals: http://www.recap.com/consulting.nsf/9e78c397f13b4c4488256ea4006834a2/$first?opendocument



Challenge and Opportunity on the Critical Path to New Medical Products. FDA. U.S. Department of Health and Human Services, Food and Drug Administration, March 2004.

"… inability to predict these failures before human testing or early in clinical trials dramatically escalates costs. For example, for a pharmaceutical, a 10% improvement in predicting failures before clinical trials could save $100 million in development costs per drug."

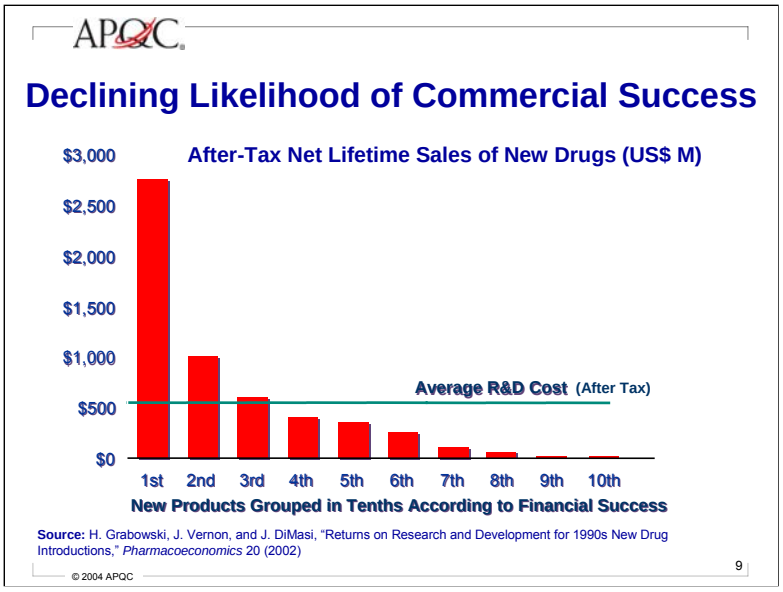


Chart from: Darren Filson. Current Issues in the Pharmaceutical Industry. Economics 326 - Advanced Industrial Organization. School of Politics and Economics at Claremont Graduate University. Fall 2003

http://spe.cgu.edu/faculty/facpages/darrenfilson/courses/grad/IO/video.ppt

http://spe.cgu.edu/faculty/facpages/darrenfilson/courses/grad/io/outline2003.html

http://spe.cgu.edu/faculty/filson.html

From: Christopher Seaton. SVP, Global Licensing Acquisitions, Bayer HealthCare – Pharmaceuticals, 2003. Slide entitled *Drug Development is a Triumph of Hope over Experience. It's an ugly picture!* R&D expense increasing at the same rate as sales, average development time unchanged (since 1990 at least), NME approvals flat to decreasing. Source: Institute for Regulatory Science.

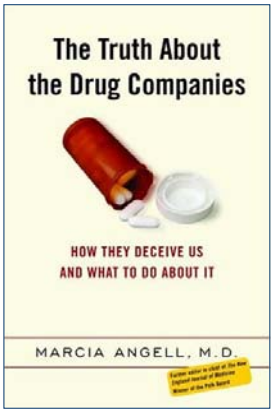
- Most development candidates fail
  - Attrition rates are about 50% in preclinical development and 35% in clinical testing
- Drug Development is long and expensive
  - Most drugs will spend 10 years in development
  - Industry R&D expenditures are about $50B per year and the average cost to develop a new prescription medicine has risen to over $800M
- Few marketed products are commercially successful
  - "Of all the drugs that come to the market, maybe only between one-third and one-half of them make a financial return" – Sir Tom McKillop, CEO AstraZeneca
  - Only about 200 prescription drugs had worldwide $300M sales in 2002
  - 10% of drugs generate >50% of profits

From: Lawrence J. Lesko and Janet Woodcock (FDA). Translation of pharmacogenomics and pharmacogenetics: a regulatory perspective. *Nature Reviews* | *Drug Discovery* Vol. 4, September 2004, pp. 763-769.

Axes of failure:

- drug safety (high incidence of adverse events or unexpected toxicity);
- drug efficacy (no strong signal of effectiveness over placebo and/or active comparator);
- industrialization (the product cannot be manufactured at a commercial scale with consistently high quality).

Increasing Public Debate



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Marcia Angell. The Truth About the Drug Companies: How They Deceive Us And What To Do About It. Random House, New York, 2004.

See also review of 'The Truth About the Drug Companies' and 'Powerful Medicines': The Drug Lords, by STEPHEN S. HALL

http://www.nytimes.com/2004/11/14/books/review/14HALL.html?position=&adxnnl=0&oref=login&adxnnlx=1100548750-qbtFQeXZ/3XAkbzNwtbK4g&pagewanted=print&position=

Jerry Avorn. Powerful Medicines: The Benefits, Risks, and Costs of Prescription Drugs. Knopf, 2004.

Increasing Public Debate

Say No To Prescription Drugs
Robert Langreth, 11.17.04, 6:00 AM ET

NEW YORK - Let the un-drugging of America begin.

The pharmaceutical industry, despite a golden age of biology that has unraveled mysteries of the genetic code and yielded miracle drugs that save thousands of lives, may be on the brink of getting hit by a backlash. Millions of us are popping prescription pills for innocuous ills, when simple lifestyle changes of diet and exercise--harped on by physicians for decades--are more effective and a lot cheaper. . . .

Thursday, November 18, 2004 - Page updated at 12:00 A.M.

Senate panel to scrutinize FDA over Vioxx review

By Alicia Mundy
Seattle Times Washington bureau
WASHINGTON — The nation's system for ensuring that drugs are safe faces perhaps its biggest crisis in years, with the disclosures that federal regulators and drug giant Merck allowed Vioxx, its billion-dollar painkiller, to remain on the market despite growing evidence linking it to heart attacks. . . .

Reuters Summit-Is big pharma's golden era over?
Wed Nov 17, 2004 03:10 PM ET
By Toni Clarke NEW YORK, Nov 17 (Reuters) - For big drug companies, the days of relying on huge-selling blockbuster products to sustain growth may be numbered as science drives toward the development of drugs directed at smaller, targeted groups of people, analysts and executives said. . . .

This overview forum will help participants establish a cross-company network as well as lay the groundwork for the next workshop in the series. Participants will work to develop breakthrough ideas that enable them to rise to the next level of performance and accelerate the transformation of the pharmaceuticals and biotechnology industry.

The American Productivity & Quality Center's (APQC's) "New Thinking" workshop series aims to develop breakthrough ideas that enable pharmaceutical and biotechnology companies to achieve the next level of performance. Workshop participants will learn how they can accelerate the transformation of the drug industry.

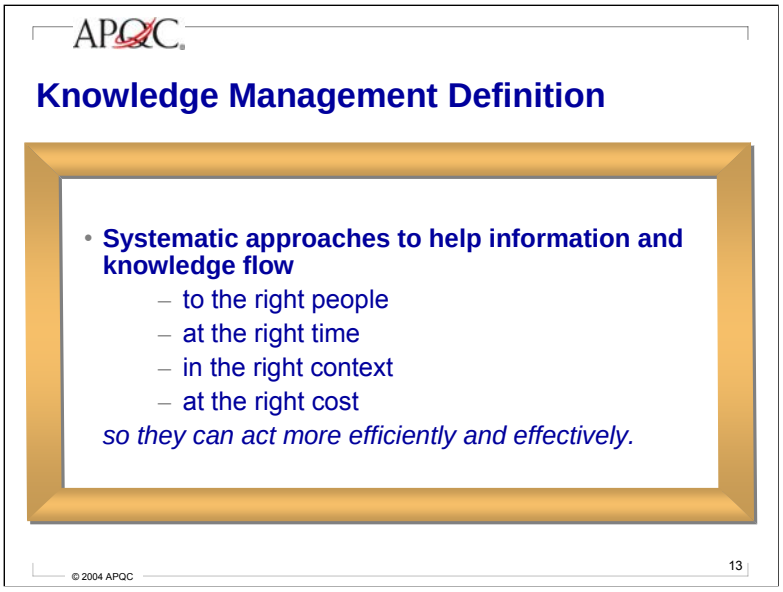
APQC's New Thinking workshop series offers participants an intimate setting where business managers and seasoned performance improvement practitioners can develop new thinking and tools, specifically focused on the rapidly changing pharmaceuticals and biotechnology sector.

Participants will work to:

- form a network to discover, develop, and share breakthrough ideas;
- address industry challenges by accelerating the way pharmaceutical and biotechnology companies operate; (Tufts and others argue that time is the key metric to attack.)
- reduce organizational reaction time by learning how to break down internal silos (among R&D, commercial operations, business development, and licensing); (break down silos with ELs, SNA, common portals, connecting the dots, collaborating so that everyone is on the same page – reminds me of Asset Management in the Oil & Gas sector. Cross-discipline understanding; understanding the uncertainties facing people in other functions.)
- effectively manage alliances, outsourcing, and the shift from internal to external research (collaboration with partners, outsourcers, customers?); and
- discover ways to approach potential partnerships with the FDA to enable new ways of demonstrating efficacy (FDA Critical Path initiative.)

Participants

To maximize the benefits of participating in this unique series, companies are encouraged to attend in teams that contain operational business managers responsible for key business processes (e.g., R&D, alliance management, portfolio management, and business development [mergers, acquisitions, and licensing]), in addition to those responsible for knowledge management, performance improvement, and organizational learning.



Knowledge

noun [U]

understanding of or information about a subject which has been obtained by experience or study, and which is either in a person's mind or possessed by people generally

From Cambridge Dictionaries Online

Knowledge is information in action.

The focus of knowledge management is improving organizational capability. To succeed, you need to create a new work environment where knowledge and experience can easily be shared.

You need to put in place the processes and technology and to align the behavior of the people of the organization so that information and knowledge emerge and flow to the right people at the right time so they can act more efficiently and effectively.

The key issues revolve around people, processes, technology and content.

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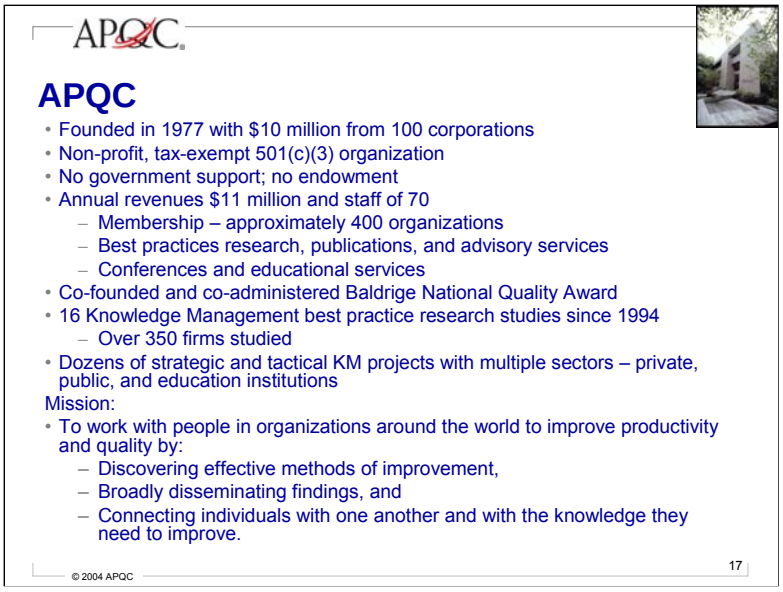
Knowledge Management Approaches

The * means either an APQC member (present or past) or has attended APQC KM conferences.

Who are we?



About APQC

A recognized leader in benchmarking, knowledge management, measurement, and quality programs, APQC helps organizations adapt to rapidly changing environments, build new and better ways to work, and succeed in a competitive marketplace. For more than 25 years, APQC has been identifying best practices, discovering effective methods of improvement, broadly disseminating findings, and connecting individuals with one another and with the knowledge, training, and tools they need to succeed. APQC has worked with many companies in the pharmaceuticals and biotechnology sector, including Amgen Inc., Aventis SA, Boehringer Ingelheim Pharmaceuticals Inc., Bristol-Myers Squibb Co., Eli Lilly and Co., Merck & Co., and Roche Pharmaceuticals. The research covers a variety of topics, including:

- *Benchmarking: Shared Learnings for Excellence,*
- *Competitive and Business Intelligence: Leveraging Information for Action,*
- *Succession Management: Identifying and Cultivating Tomorrow's Leaders,*
- *Improving Growth and Profits Through Relationship Marketing,* and
- *Using Knowledge Management to Drive Innovation.*

APQC is a member-based nonprofit serving approximately 500 organizations around the world in all sectors of business, education, and government. APQC is also a proud winner of the 2003 and 2004 North American Most Admired Knowledge Enterprises (MAKE) award. Learn more about APQC by visiting www.apqc.org or calling +1 (800) 776-9676 or +1 (713) 681-4020.

Wesley Vestal is the KM practice leader and a senior KM consultant for the KM practice area at APQC. He is responsible for all KM products/services in APQC's custom work and KM benchmarking research agenda. He also works with APQC's members, creates new products and services, and grows the KM practice. In his role over the last six years, Wesley has worked extensively in designing and implementing knowledge management strategies, solutions, training courses, and measurement systems for diverse organizations such as Pfizer, Mattel, ExxonMobil Chemical, Best Buy, Schlumberger, U.S. Army Medical Division, and the American Red Cross.

Wesley is an APQC-certified trainer on knowledge management and benchmarking skills. He is the co-author of the chapter "Best Practices: Developing Communities That Provide Business Value" in the book *Knowledge Networks: Innovation Through Communities Of Practice* and has published several articles, including "Ten Traits of Successful Communities of Practice" and "Using Knowledge Management to Replicate the Gains of Process Improvement" in the KM Review. He has also served as a subject matter expert and co-author in APQCs Replicating the Gains from Six Sigma and Lean: Capturing and Transferring Knowledge and Best Practices, "Integrating Knowledge Management and Organizational Learning" and "Talent Management: From Competencies to Organizational Performance" benchmarking studies..

Wesley, a certified Six Sigma green belt, has managed benchmarking projects on the topics of shared services, technology-based training, leadership development, performance management, aligning information technology systems, shared technical services, accountability systems in K-12 schools, and faculty instructional development.

Prior to joining APQC, Wesley spent four years at the United Way of the Texas Gulf Coast. He worked in new business development and advised the largest donor companies on developing and growing their charitable giving efforts. In his last position, he was manager of new business development and major campaigns, raising over $15 million, as well as a corporate trainer, facilitator, and advisor.

About Medstory:

Medstory is an information solutions and services company focused on the pharmaceuticals and biotechnology sector.

Medstory solutions provide managers and executives with a moment-to-moment understanding and positioning of their company's key initiatives.

They result in better informed decisions, reduced organizational reaction time and increased focus on value-generating programs.

Medstory's real-time knowledge hub software, information and knowledge services help pharma and biotech companies sense important changes, connect the dots, and share the right information with the right people in the right context. Real-time knowledge hubs are customized to match the focus of each client (*e.g.,* therapeutic area, disease, target, common mechanism) and job role (*e.g.,* Corporate Management, Sales & Marketing, Business Development, R&D). They bring together all relevant work processes, applications and actionable information – from internal and external sources.

Medstory has created an extensive business, medical and industry knowledge network. The executive team has more than 80 years of cumulative experience in building and operating **knowledge-intensive** systems in substantial organizations.

Learn more about Medstory by visiting www.medstory.com.

Hubs are Knowledge Integrators. They are able to do the work because of onboard domain knowledge.

Reid Smith is Senior Vice President for Information Solutions as Medstory. He is also a Senior Advisor to APQC.

Dr. Smith has been recognized worldwide as a leader in harnessing Knowledge Management to produce practical, bottom-line results. Prior to joining Medstory, he initiated the worldwide KM program for Schlumberger, a $10B oilfield services and information technology company, and led it from 1998-2002. The bottom line contribution of this work has been estimated by line management to exceed $200M per year.

During that period, Schlumberger was twice named to the Most Admired Knowledge Enterprises (MAKE) list of top 20 global companies and was awarded the 2002 Wharton-Infosys Award for an initiative-led Business Transformation. The Working Council for CIOs recognized the work in a number of reports, including: *Enterprise Portal Architecture: An Emerging Compact Between Corporate IT and the Line* and, *Building the Ship While Sailing: Question #6 - What Are the Attributes of World-Class End-to-End E-Business Infrastructure?* The work has also been recognized in several benchmarking studies, including *Building and Sustaining Communities of Practice*, *Managing Content and Knowledge*, *Measuring the Impact of Knowledge Management* and *Expertise Locator Systems*.

Prior to 2002, Dr. Smith served as VP of Research for Schlumberger in Austin, Palo Alto and Cambridge, UK. He received his Ph.D. in Electrical Engineering from Stanford University. He is a Fellow of the American Association for Artificial Intelligence.

Who are you?

- Name
- Company and Job
- What you want to achieve today

Workshop Participants

Name	Job	Expectation	1 Word Descriptor
Bernard Adebayo-Ige	BMS Project Manager	How to capture relevant knowledge for easy transfer	Innovative
Melinda Bickerstaff	BMS VP KM	Shift thinking on difficult problems	Innovative
Tony Cirillo	Jacobs Engineering Quality Manager	Best practice sharing on tools and projects	Spaz
Kathleen Huneycutt	APQC	Help out	Problem Solver
Kari Jeschke	Sanofi-Aventis Process & Team Effectiveness	New thinking & tools that others use	Reliable
Linda Klug	Sanofi-Aventis Process & Team Effectiveness	How to institutionalize & sustain practices	Compassionate
Marian Lordi	Sanofi-Aventis Process & Team Effectiveness	How to tap into new colleagues	Positive

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Workshop Participants

Name	Job	Expectation	1 Word Descriptor
Marty Purdy	Pfizer Development Ops	?	?
Christine Qubeck	Pfizer Development Ops	How to integrate business needs into oncology area	Impatient
Steve Roudebush	Jacobs Engineering Program Manager	Improve effectiveness of delivery to industry	Patient
Douglas Rush	Sanofi-Aventis KM	One thing to take back	Realist
Elizabeth Simonetti	KM Project Lead	What tools, how to use, what's next?	Intense
Reid Smith	Medstory SVP	New thinking in Pharma/Biotech	Excited
Wesley Vestal	APQC KM Practice Lead	New thinking about KM in Pharma	Sleepy
Denise Wakim	Pfizer Development Ops	Tips on transferring knowledge more effectively	Happy
Ken Zalevesky	Medrad Director of Technology	Tools & Techniques for KM	Energetic

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Join in a facilitated discussion about key issues and challenges facing the pharmaceuticals and biotechnology industry today.

Payer influence: stricter formularies and price pressure, especially on me-too drugs.

Regulators are focusing on innovative solutions, improved outcomes and safety.

Note that Sarbanes-Oxley compliance is another sort of regulatory issue.

This organizational breakdown is broadly representative of pharma / biotech companies.

KM opportunities exist in many functions and across the extended enterprise, including regulators and other stakeholders. How about customers?

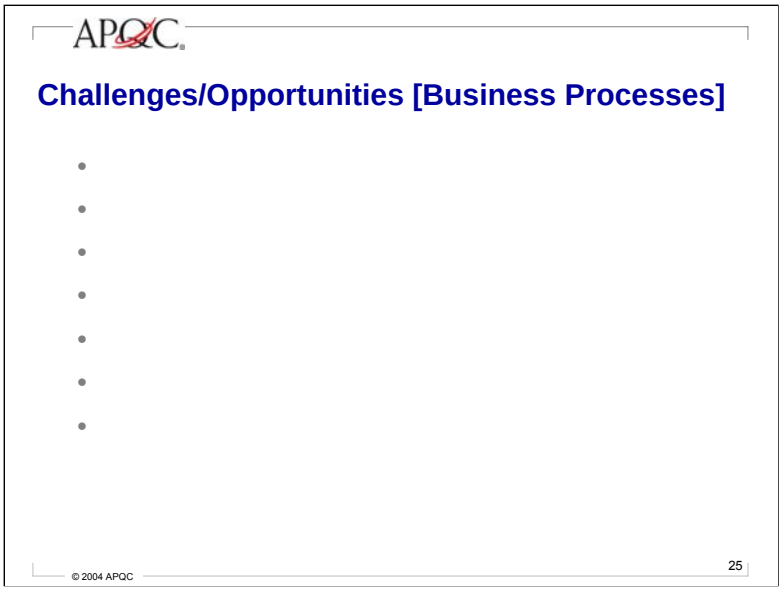
Where is the money spent in big pharma, beyond R&D?

- $30B was spent on physician and consumer marketing in 2003. (Source: Nancy S, Lurker, *Real-Time Response: Armed with the right data, marketers can quickly react to changing prescribing trends.* Pharmaceutical Executive. Sep 1, 2004. http://www.pharmexec.com/pharmexec/article/articleDetail.jsp?id=123890)
- From Novartis Q1 2004 financial results. M&S spend is more 2X R&D (32% vs. 14.7%).

Time is an opportunity

- Tufts Center for the Study of Drug Development, Outlook 2004
- http://csdd.tufts.edu/InfoServices/OutlookPDFs/Outlook2004.pdf
- *"A Tufts CSDD analysis that quantified the total clinical cost of developing a new drug by therapeutic category, including the cost of the time involved in creating those medicines, highlights opportunities to reduce expenses. For example, 48% of the clinical cost to develop drugs to treat central nervous system ailments relates to time. Given rising clinical study and related out-of-pocket costs, cutting development time offers a potent tool for containing total R&D expenditures."*

Portfolio Management is another opportunity. Kill quickly – avoid the clinical trial cost – fail fast – move failures from Phase III to Phase II to Phase I to Preclinical



Select particular company or industry challenges / opportunities.

Examples:

- Accelerate industry transformation
- Reduce organizational reaction time
- Alliances and outsourcing … cross-company collaboration
- FDA partnerships … also with NIH, academia

With which business processes are they associated?

Other ways to approach the problem. Ask yourself these questions.

- What are your KPIs for this year? What are the KPIs of your manager?
- What are the 3 or 4 pieces of information you must have at the start of every day?
- What don't you know that you feel is necessary to do your job?
- What are the biggest time-wasters for you (e.g. searching for information, meetings, rediscovering what is already known)?

Are there cross-company opportunities?

Challenges – Team Brainstorm

- Making highly matrixed teams work in the organization with inherently complex behaviors and communication*
- Manage knowledge for multiple R&D sites and deal with entrepreneurial and decentralized culture*
- How to get knowledge back into the functions*
- Work/life balance with lower productivity and disengagement – need to break the chain
- How to overcome instincts or job categories that discourage sharing
- How to bring internal change functions together to attack culture changes
- Increasing attention to outsourcing for cost savings
- Resourcing talent pipelines
- How to handle advisory committees
- Erosion of brand of the industry in public
- How to address science issues with business management reactions (need time to think)
  - Short term pressures limit the ability to think
  - How to make time and speed our ally instead of enemy
- Need to discover where people share naturally
- How to balance speed with cost and quality
- Effective and efficient recruitment of patients with limited pools
- Eliminate the impact of matrix structure and restructuring
- Moderate impact of the "metric of the month"
  - How manage to metrics that aren't a "perfect fit"
  - Understanding how to balance predictive measures and desired outcomes
- Compliance issues around sharing in highly regulated environment
- How to understand and work to organization vision and objectives
- Integration of KM, OD, HR and Learning to solve business problems

* Chosen by workgroups to focus on during workshop

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Knowledge is sticky.
Without a systematic process and enablers, it won't flow.

— Carla O'Dell, APQC

$$v = -\frac{k}{\mu}\frac{\partial p}{\partial x}$$

— Henry Darcy

for flow v, permeability k, viscosity μ, pressure p

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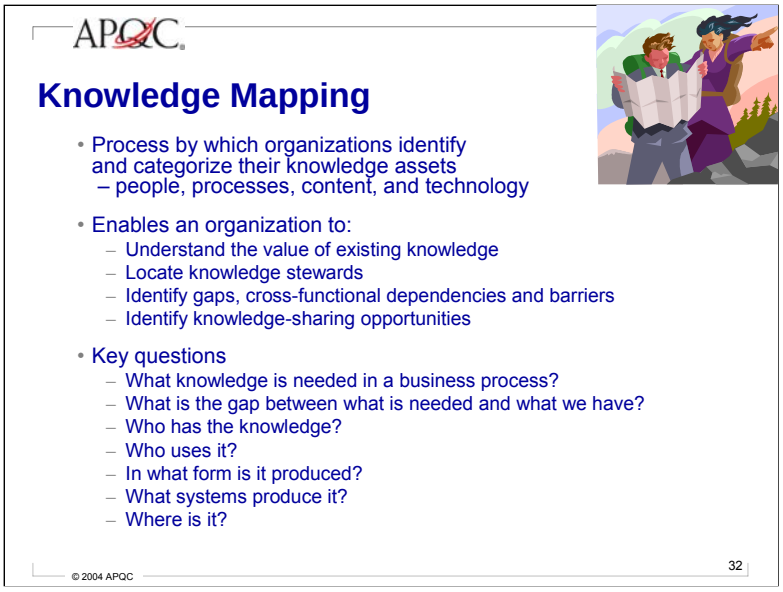
APQC has worked with companies such as Bristol-Myers Squibb Co., Aventis, and Johnson & Johnson. Review previous pharmaceutical and biotechnology case studies followed by a facilitated brainstorming session. Participants will also discuss specific knowledge management and performance measurement tools such as knowledge mapping, lessons learned, performance scorecards, expertise locator systems, social network analysis, and knowledge-intensive technology.

Overview

- Knowledge Mapping
  - Understanding the knowledge landscape
- Lessons Learned
  - Uncovering particular knowledge at key moments
- Expertise Locator / Social Network Analysis
  - Getting to the right people at the right time
- Knowledge-Intensive Technology
  - Automating processes whenever possible
- Performance Scorecards
  - Measuring the value



Knowledge Mapping is a typical early step of any KM initiative. It is also foundational for the rest of the tools we will show.

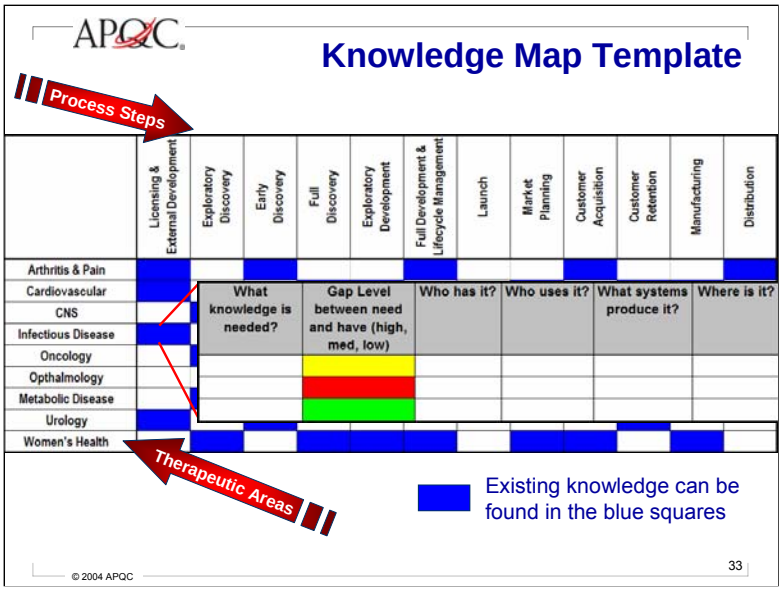
The map itself is a source of new knowledge: sources, producer-consumer, relevance…

Knowledge maps, taxonomies, ontologies are all related.

Knowledge Mapping Steps

- Select a key business process
- Map the process
  - Determine routine/non-routine tasks
  - Identify key decision points, hand-offs
  - Locate owners of, and stakeholders in key sub-processes
- Map the knowledge against the process
  - Identify important knowledge needed at particular steps of the process
  - Identify sources and recipients of knowledge
  - Follow knowledge pathways through the organization (referential)
  - Inventory types of knowledge utilized and needed (magnet content)
  - Identify gaps, lack of connectivity, and information overload
- Develop plan for collecting, reviewing, validating, storing and sharing knowledge and information

Knowledge mapping is useful to support mergers and due diligence. It is also useful for bringing new employees onboard and retaining the knowledge of employees who are leaving.

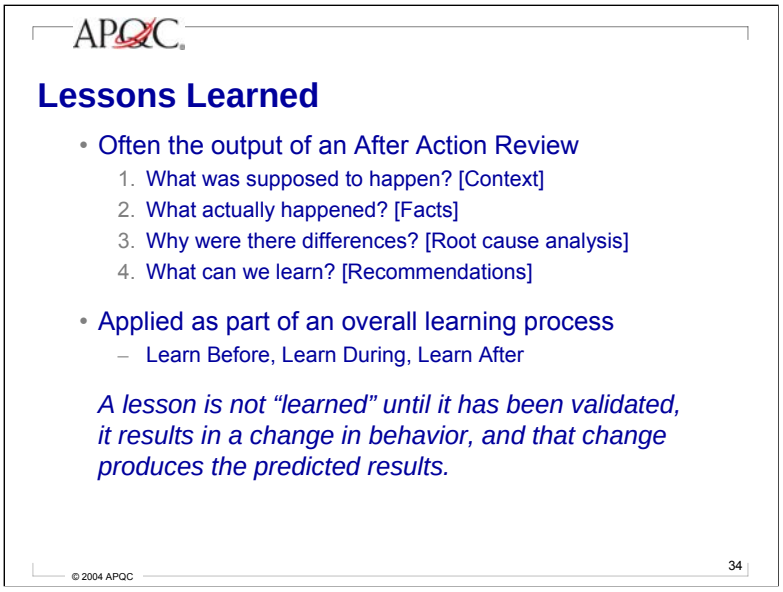


The steps are from the BMS Product Development &Commercialization process.

The Therapeutic Areas are from slide 8.

Could also apply to Sales & Marketing or other processes.

The original version of this template was devised in partnership with Schlumberger for the 2002 Winter Olympic Games.



Don't pay more than once to learn a lesson. Reuse the knowledge before next time.

Why where there differences – conduct root cause analysis to understand the gap between what was supposed to happen and what actually happened

Recommendations: What to keep doing. What to stop doing. What to start doing. What to change.

Schedule AARs when:

- memory is fresh and unvarnished
- participants are still available
- we can apply learning straight away

Good facilitation is key

Participants must understand that AARs are NOT about blame – instead they are focused on fixing problems.

Poor performers in AARs are those who are not candid about successes AND failures.

Some companies (e.g., Jacobs Engineering) do it with customers.

Lessons learned are a key part of just-in-time knowledge delivery – presenting the relevant "just-in-time" in a business process – when a person or team is about to execute a step in the process.

We use the word “expertise” instead of the word “expert” to avoid the debate over what constitutes an expert.

Integrated Approach

- People – users, those with the money, those to support it, those who need to provide links, those to maintain
- Process – how information flows
- Content – how do you organize information and make it easily searchable
- Technology – it is an enabler, which supports the process

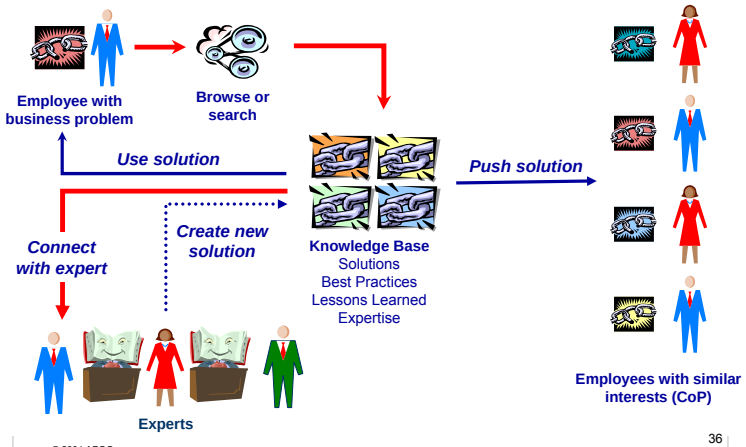
For some purposes, self-assessment is the norm. For others, management must be involved (e.g., assigning resources to customer-facing projects – like consulting or systems integration).

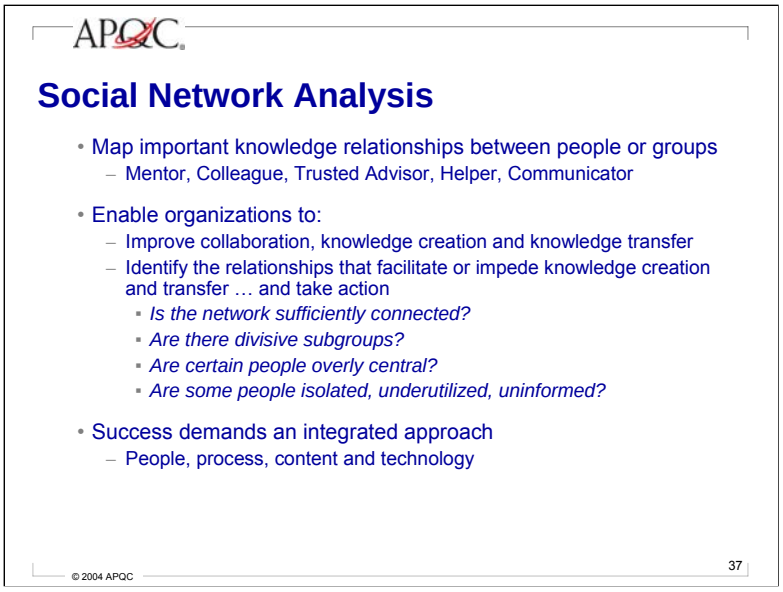
An EL serves a larger strategic initiative and purpose, such as to enable faster learning, innovation, better practices, and sharing better processes.

Our research shows that ELS is not a stand-alone solution, but part of a larger KM initiative. It must be tied into key processes.

Remember we need to connect people to people to share or explain what’s in the head or tacit knowledge.

Expertise Locator in Action



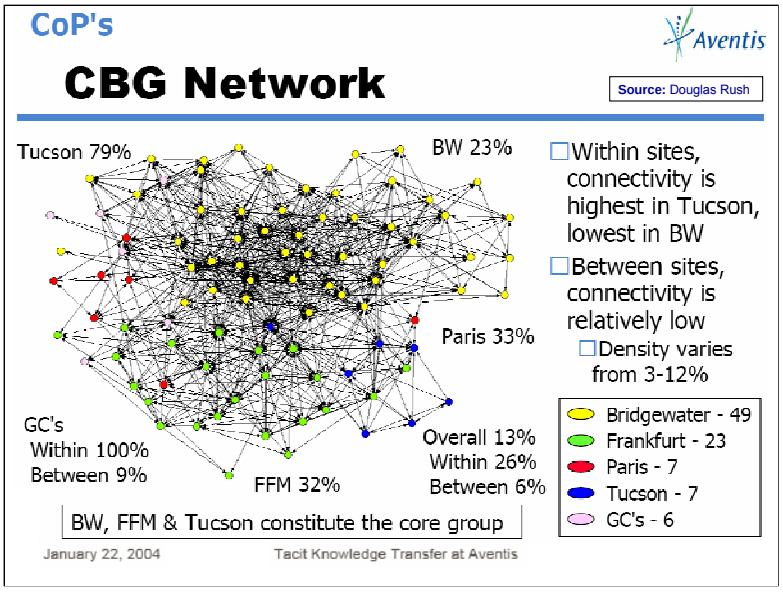


Understanding knowledge and community relationships

- Who are the key stakeholders that can lend credibility to the community?
- How can we measure the extent to which community members collaborate with one another?
- How does knowledge flow between individuals within a community?

Understanding the knowledge relationships – survey questions

- To whom do you turn to for information to get your work done?
- How often do the following people provide you with information you use to fulfill your job/role?
- Do you understand this person's knowledge and skills?

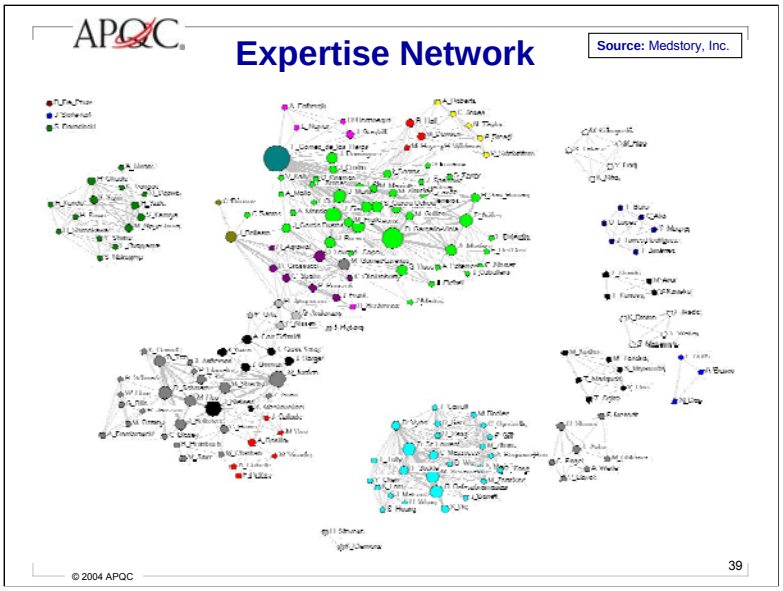


Chemical Biology Network -- group involved with GPCR (G-Protein Coupled Receptors)

The date were obtained via a Web form.

GC – Genomic Center

BW – Bridgewater
FFM – Frankfurt



Technology with onboard knowledge can also help determine some of the social network links – especially important in discovering cross-company networks.

Imagine that you are a manager at a small biotechnology company and you are thinking about launching a new initiative in an area you do not yet know well. You set out to find the experts.

Because you have good technology, you are able to find and organize the information needed to display this graph … in seconds.

The nodes in the graph represent people who have either published papers in the area of interest or have written patents. The nodes are colored according to the companies or universities at which the people work. You can see that most groups who publish together work at the same site, but there are a few crossovers.

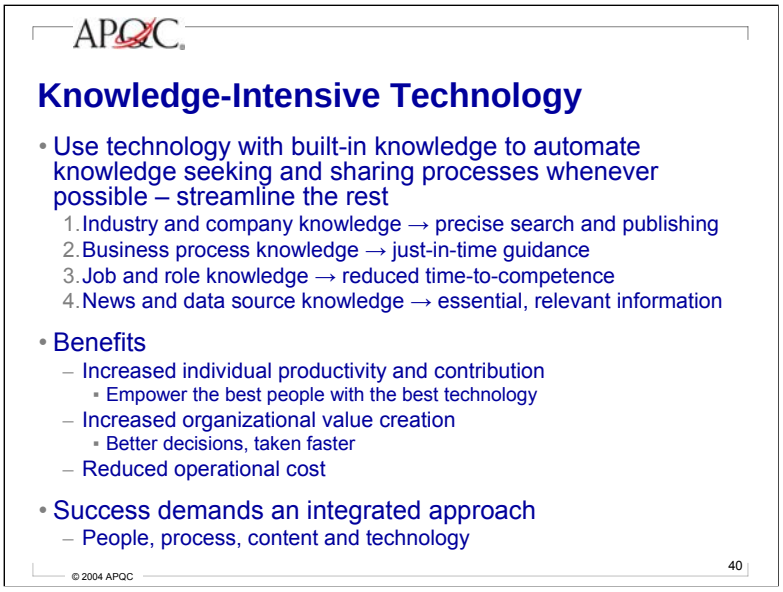
Node size is based on the number of papers or patents with which a person has been involved. Lines show people who have co-authored papers or patents with each other and the thickness indicates how many.

BMS Wallingford – Bright Blue

GSK Madrid – Bright Green

Merck Rahway – Gray

This is an example of a task that takes days if attacked manually (e.g., by making repeated queries to PubMed and the US Patent Office and building an Excel spreadsheet).



Enable people to focus on value creation. Don't force them to do tasks that can be automated

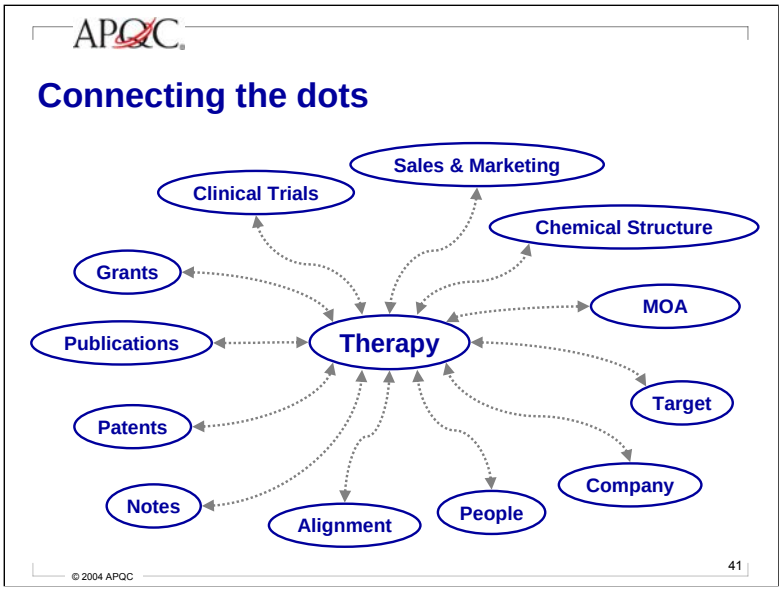
Reduce organizational reaction time by empowering workers with decision-ready information

- Add context to data – connect the dots and close the loop: data → knowledge → data
- Make good on the promise to deliver the right information to the right people at the right time in the right context at the right cost

Work with technology suppliers, internal or external.

Questions

- What key information do you need to do your job?
- Is real time information necessary?
- Are you able to get the information you need quickly and efficiently?
- Are you frustrated by your technology? Why?
- How much do your KM systems know about your business?



A central 'knowledge' element is the therapy (chemical compound or lead) and the slide shows some of its descriptors … selected from more than 50 in an actual knowledge service. Some relate to the "technical profile" of the compound; e.g., its mechanism of action, chemical class, chemical structure and molecular target. Some to its "development profile"; e.g., clinical trial, grant, publication. Also represented is the "intellectual property profile" – patents as well as the "business profile" – company. The relevant people and the alignment of the compound with the corporate strategy (i.e., whether this compound, perhaps owned by another company, is "in strategy" for your company). Sales and Marketing data. Finally, management notes; i.e., annotations and documents related to the compound.

Each of the elements shown on the periphery is itself connected to set of descriptors, and so on.

With technology that has this kind of onboard knowledge, it is possible to "navigate" the connection graph to understand context and uncover non-intuitive relationships … to "connect the dots."

A Pfizer quote relevant to "connecting the dots".

bio.com InFocus Discussion Transcript: BioIT: Knowledge Management, 07-Mar-02 – http://www.bio.com/file_temp/bioit.pdf

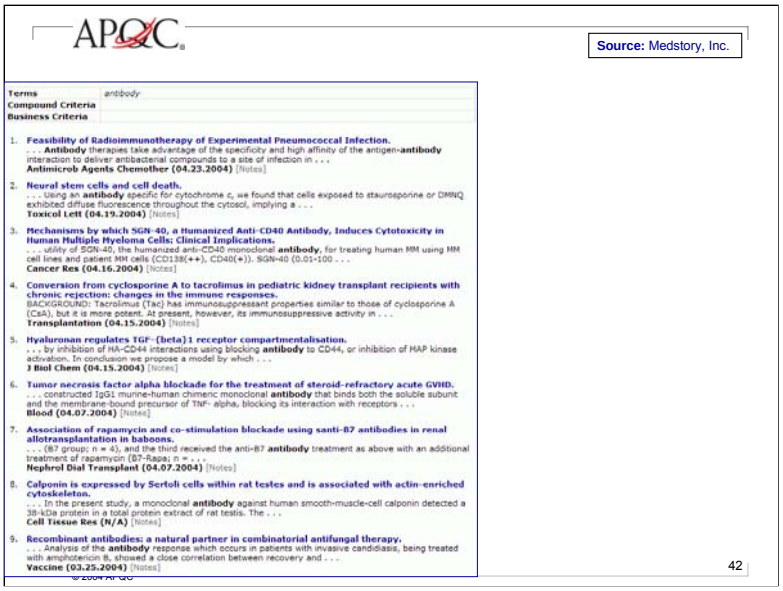
Interview question for Sheryl Torr-Brown

Q: What are some of the issues that you're considering at Pfizer when developing a knowledge management strategy?

A: … there's four parameters here: 1. data 2. information 3. knowledge 4. wisdom. And they're kind of a continuum, so it generates from the data, and you put a bit of form around it and it becomes information---you apply it and it becomes knowledge. And once you can add that very subjective component that is hard to pin down, it becomes wisdom.

What we've always focused on in the past I think is going from data to knowledge to wisdom, and we haven't done so much on how we go back to data. So I think what's been said is very important. I think you start with some data, you put some structure and context around it and you get knowledge, but the subjectivity increases as you go along that continuum. So what you need to do is move very freely along that continuum, so that if I have a piece of knowledge that someone has shared with me, I would like to be able to go back and understand how that was derived […]. So I need to be able to go back to the data. By the same token I might have some information and I really would like to find out how its been used before, so what the knowledge confirms. To be able to trace that back and forth up and down that continuum, and I think that technology can be a big lever there.

And finally, you need to have the capability of novel insight generation. This is particularly applicable to bioinformatics. We have a wealth of all kinds of -omics data out there, genomics, proteomics, metabolomics, etc. There's so much data, we need to have a way to ask very smart questions of that data set, but at the same time, pull out that data in novel and interesting ways that allows us to have insights that we wouldn't have had outside of that. So I think obviously the technology is very important here, but also that very human element of knowing what the right questions are to ask. Also, knowing how to take that data to challenge assumptions, to make sure we're asking the right questions, and really to catalyze change in the business. Whether it's scientific or in any other kind of industry.



The next few slides illustrate some ways in which knowledge can be used in your technology.

Imagine you are the head of the pre-clinical team for an antifungals program at a pharmaceutical or biotechnology company. You are looking for new compounds and/or partners.

Today you are focused on antibodies and you start with a search for the latest publications.

KNOWLEDGE USED: Your search engine knows the domain and the sources (e.g., PubMed) and categorizes the information/data so that the search can be very focused – a far cry from what you get with a generic search engine.

#9 strikes you as interesting … so you check the abstract at the source.

Your technology enables you to determine the compounds that are related to this publication.

KNOWLEDGE USED: The names of compounds associated with antifungals, together with their 360° profile – including technical, development, business and patent perspectives. Because the system recognizes compound names, it can "read" the text to see that Amphotericin-B, a compound, is mentioned. Using further knowledge, it is able to construct a 360° summary – including technical, development, business and patent perspectives. Compiling the list of relevant compounds and filling in their 360° profiles is done automatically, freeing people from the need to do a task that can be done by machines. Much of the necessary data exists on the Internet or in proprietary databases. It is questions of taking advantage of it in the KM technology.

The color of the traffic light is filled in automatically using a business rule.

KNOWLEDGE USED: Company strategy. In-strategy, "green light" compounds for your company have oral bioavailability, cidal activity and protein synthesis inhibition MOA. "Yellow" means that this compound is not completely aligned with your company's strategy, but there is some interest.

Looking more intently at the technical profile, you check the chemical structure of the compound.

KNOWLEDGE USED: How to access the relevant information source (NIAID).

Then, you look to see what other compounds have the same Mechanism of Action – cell wall permeability.

KNOWLEDGE USED: Antifungal compounds and how they function in the human body.

One of the compounds you come across is anidulafungin. You see it is owned by Vicuron Pharmaceuticals.

KNOWLEDGE USED: The business profile of relevant compounds.

As it is a public company, it is possible to check its business relationships with other companies.

KNOWLEDGE USED: How to find and "text mine" the relevant SEC documents to find the business relationships. Again, this process has been automated, freeing up the humans who used to do it for more productive activities.

Finally, you decide to alert a colleague to what you have found … in context. The system fills in the simple template, enabling you to focus on your comments. And so on.

You have been able to accomplish this set of tasks in a matter of seconds, with a few mouse clicks – and have not had to sift through piles of useless search results. This is due to knowledge-intensive technology. It changes the game. It doesn't replace the human conversations you need to have with your colleagues – and it doesn't tell you what to do about what you have found. However, when it comes time to have those conversations and to make decisions, you have "the right information" – in context – and you get it quickly – and the technology can keep you up to date every day.

APQC

Source: Medstory, Inc.

Terms antibody
Compound Criteria
Business Criteria

1. **Feasibility of Radio**
. . . **Antibody** the
interaction to d
Antimicrob ents Chemoth

2. **Neural s cells and cell d**
. . . Using **antibody** specific
exhibited diffuse fluorescence th
Toxicol ett (04.19.2004)

3. **Mech isms by which SGN-4**
Huma Multiple Myeloma Cel
. . . ity of SGN-40, the human
cell lines and patient MM cells (C
Cancer Res (04.16.2004)

4. **Conversion from cyclosporin**
chronic rejection: changes in
BACKGROUND: Tacrolimus (Tac
(CsA), but it is more potent. At
Transplantation (04.15.2004

5. **Hyaluronan regulates TGF-(**
. . . by inhibition of HA-CD44 int
activation. In conclusion we pro
J Biol Chem (04.15.2004)

6. **Tumor necrosis factor alpha**
constructed IgG1 murine-hu
and the membrane-bound precu
Blood (04.07.2004)

7. **Association of rapamycin an**
autotransplantation in baboo
. . . (87 group; n = 4), and the t
treatment of rapamycin (87-Rap
Nephrol Dial Transplant (04.

8. **Calponin is expressed by Sc**
cytoskeleton.
. . . In the present study, a mon
34-kDa protein in a total protein
Cell Tissue Res (N/A)

9. **Recombinant antibodies: a natural partner in combinatorial antifungal therapy.**
. . . Analysis of the **antibody** response which occurs in patients with invasive candidiasis, being treated with amphotericin B, showed a close correlation between recovery and . . .
Vaccine (03.25.2004)

ELSEVIER
HEALTH SCIENCES

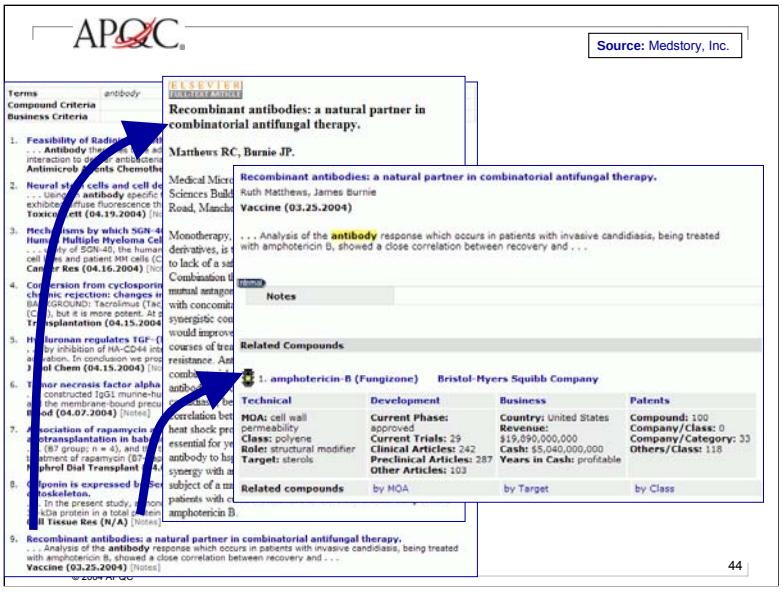
Recombinant antibodies: a natural partner in combinatorial antifungal therapy.

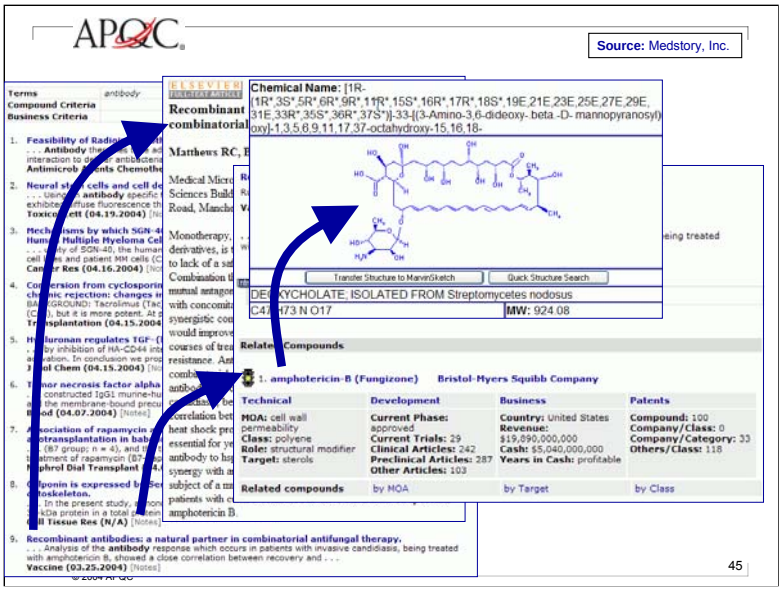
Matthews RC, Burnie JP.

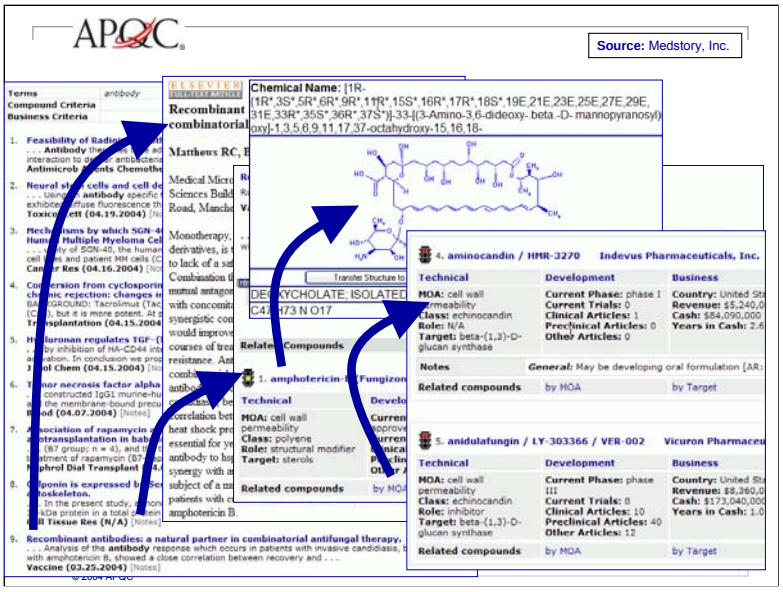
Medical Microbiology and NeuTec Pharma plc, 2nd Floor, Clinical Sciences Building 1, Central Manchester Healthcare Trust, Oxford Road, Manchester M13 9WL, UK.

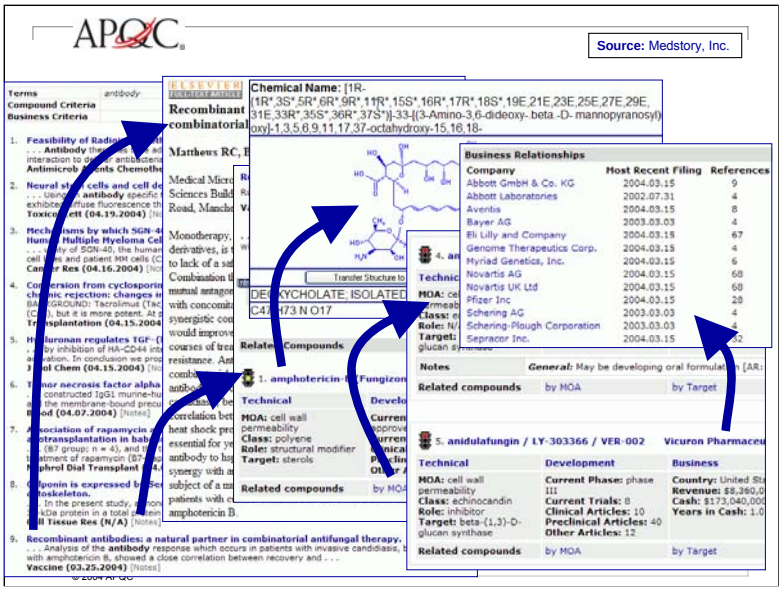
Monotherapy, in the form of amphotericin B or one of its liposomal derivatives, is the usual treatment for invasive fungal infections, due to lack of a safe, effective combination of antifungal drugs. Combination therapy is not necessarily beneficial-there may be mutual antagonism or indifference, increased toxicity or interference with concomitant medication. But the benefits of a well-tolerated, synergistic combination would be great-the enhanced efficacy would improve clinical outcome, reduce the need for prolonged courses of treatment and prevent the emergence of antifungal drug resistance. Antifungal antibodies would be a natural partner in a combinatorial approach to antifungal therapy. Analysis of the antibody response which occurs in patients with invasive candidiasis, being treated with amphotericin B, showed a close correlation between recovery and antibody to the immunodominant heat shock protein 90 (hsp90). The molecular chaperone hsp90 is essential for yeast viability. Mycograb is a human recombinant antibody to hsp90 which shows intrinsic antifungal activity and synergy with amphotericin B both in vitro and in vivo. It is now the subject of a multinational, double-blind, placebo-controlled trial, in patients with culture-confirmed invasive candidiasis on liposomal amphotericin B.

43


APQC
Source: Medstory, Inc.
Terms antibody
Compound Criteria
Business Criteria
Recombinant antibodies: a natural partner in combinatorial antifungal therapy.
Matthews RC, Burnie JP.
Recombinant antibodies: a natural partner in combinatorial antifungal therapy.
Ruth Matthews, James Burnie
Vaccine (03.25.2004)
. . . Analysis of the antibody response which occurs in patients with invasive candidiasis, being treated with amphotericin B, showed a close correlation between recovery and . . .
Notes
Related Compounds
1. amphotericin-B (Fungizone) Bristol-Myers Squibb Company
Technical
MOA: cell wall permeability
Class: polyene
Role: structural modifier
Target: sterols
Development
Current Phase: approved
Current Trials: 29
Clinical Articles: 242
Preclinical Articles: 287
Other Articles: 103
Business
Country: United States
Revenue: $19,890,000,000
Cash: $5,040,000,000
Years in Cash: profitable
Patents
Compound: 100
Company/Class: 0
Company/Category: 33
Others/Class: 118
Related compounds
by MOA
by Target
by Class
9. Recombinant antibodies: a natural partner in combinatorial antifungal therapy.
. . . Analysis of the antibody response which occurs in patients with invasive candidiasis, being treated with amphotericin B, showed a close correlation between recovery and . . .
Vaccine (03.25.2004) [Notes]
44


APQC
Source: Medstory, Inc.
Chemical Name: [1R-(1R*,3S*,5R*,6R*,9R*,11R*,15S*,16R*,17R*,18S*,19E,21E,23E,25E,27E,29E,31E,33R*,35S*,36R*,37S*)]-33-[(3-Amino-3,6-dideoxy- beta -D- mannopyranosyl)oxy]-1,3,5,6,9,11,17,37-octahydroxy-15,16,18-
Transfer Structure to MarvinSketch
Quick Structure Search
DEOXYCHOLATE; ISOLATED FROM Streptomycetes nodosus
MW: 924.08
Related Compounds
1. amphotericin-B (Fungizone)
Bristol-Myers Squibb Company
Technical
Development
Business
Patents
Related compounds
by MOA
by Target
by Class
45


APQC
Source: Medstory, Inc.
Chemical Name: [1R-(1R*,3S*,5R*,6R*,9R*,11R*,15S*,16R*,17R*,18S*,19E,21E,23E,25E,27E,29E,31E,33R*,35S*,36R*,37S*)]-33-[(3-Amino-3,6-dideoxy- beta -D- mannopyranosyl)oxy]-1,3,5,6,9,11,17,37-octahydroxy-15,16,18-
4. aminocandin / HMR-3270 Indevus Pharmaceuticals, Inc.
Technical
Development
Business
MOA: cell wall permeability
Class: echinocandin
Role: N/A
Target: beta-(1,3)-D-glucan synthase
Current Phase: phase I
Current Trials: 0
Clinical Articles: 1
Preclinical Articles: 0
Other Articles: 0
Notes
General: May be developing oral formulation
Related compounds
by MOA
by Target
5. anidulafungin / LY-303366 / VER-002 Vicuron Pharmaceu
MOA: cell wall permeability
Class: echinocandin
Role: inhibitor
Target: beta-(1,3)-D-glucan synthase
Current Phase: phase III
Current Trials: 8
Clinical Articles: 10
Preclinical Articles: 40
Other Articles: 12
Related compounds
by MOA
by Target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Chemical Name: [1R-(1R*,3S*,5R*,6R*,9R*,11R*,15S*,16R*,17R*,18S*,19E,21E,23E,25E,27E,29E,31E,33R*,35S*,36R*,37S*)]-33-[(3-Amino-3,6-dideoxy- beta -D- mannopyranosyl)oxy]-1,3,5,6,9,11,17,37-octahydroxy-15,16,18-
Business Relationships
Company | Most Recent Filing | References
Abbott GmbH & Co. KG | 2004.03.15 | 9
Abbott Laboratories | 2002.07.31 | 4
Aventis | 2004.03.15 | 8
Bayer AG | 2003.03.03 | 4
Eli Lilly and Company | 2004.03.15 | 67
Genome Therapeutics Corp. | 2004.03.15 | 4
Myriad Genetics, Inc. | 2004.03.15 | 6
Novartis AG | 2004.03.15 | 68
Novartis UK Ltd | 2004.03.15 | 68
Pfizer Inc | 2004.03.15 | 28
Schering AG | 2003.03.03 | 4
Schering-Plough Corporation | 2003.03.03 | 4
Sepracor Inc. | 2004.03.15 | 2
Technical
MOA: cell wall permeability
Class: polyene
Role: structural modifier
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Related compounds
by MOA
Notes
General: May be developing oral formulation
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Target: beta-(1,3)-D-glucan synthase
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Current Trials: 8
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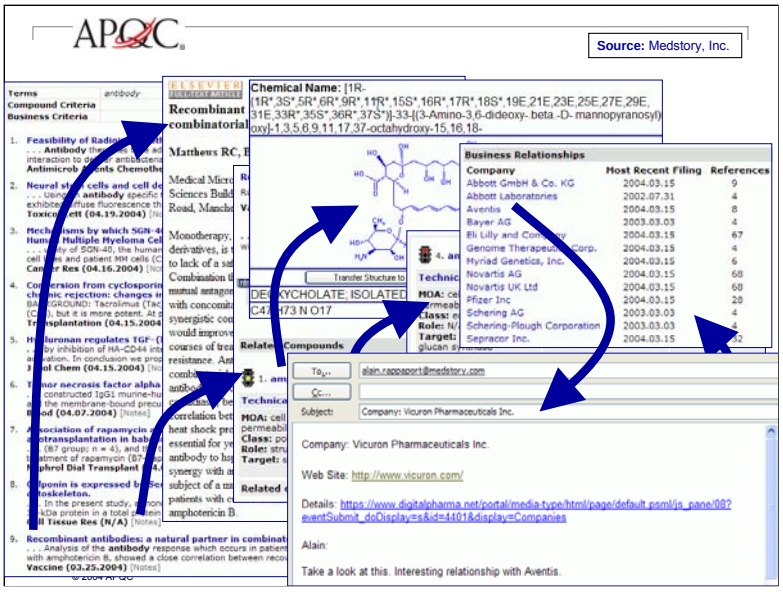
Preclinical Articles: 40
Other Articles: 12
Business
Country: United St
Revenue: $8,360,0
Cash: $173,040,000
Years in Cash: 1.0
Related compounds
by MOA
by Target


APQC
Source: Medstory, Inc.
Chemical Name: [1R-(1R*,3S*,5R*,6R*,9R*,11R*,15S*,16R*,17R*,18S*,19E,21E,23E,25E,27E,29E,31E,33R*,35S*,36R*,37S*)]-33-[(3-Amino-3,6-dideoxy- beta -D- mannopyranosyl)oxy]-1,3,5,6,9,11,17,37-octahydroxy-15,16,18-
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Genome Therapeutics Corp. | 2004.03.15 | 4
Myriad Genetics, Inc. | 2004.03.15 | 6
Novartis AG | 2004.03.15 | 68
Novartis UK Ltd | 2004.03.15 | 68
Pfizer Inc | 2004.03.15 | 28
Schering AG | 2003.03.03 | 4
Schering-Plough Corporation | 2003.03.03 | 4
Sepracor Inc. | 2004.03.15 | 2
To...
alain.rappaport@medstory.com
Cc...
Subject: Company: Vicuron Pharmaceuticals Inc.
Company: Vicuron Pharmaceuticals Inc.
Web Site: http://www.vicuron.com/
Details: https://www.digitalpharma.net/portal/media-type/html/page/default.psml/js_pane/0?eventSubmit_doDisplay=s&id=4401&display=Companies
Alain:
Take a look at this. Interesting relationship with Aventis.

APQC

Performance Scorecards

Winning Minds

1. Deliver results
2. Use disciplined project management & blended approaches
3. Measure

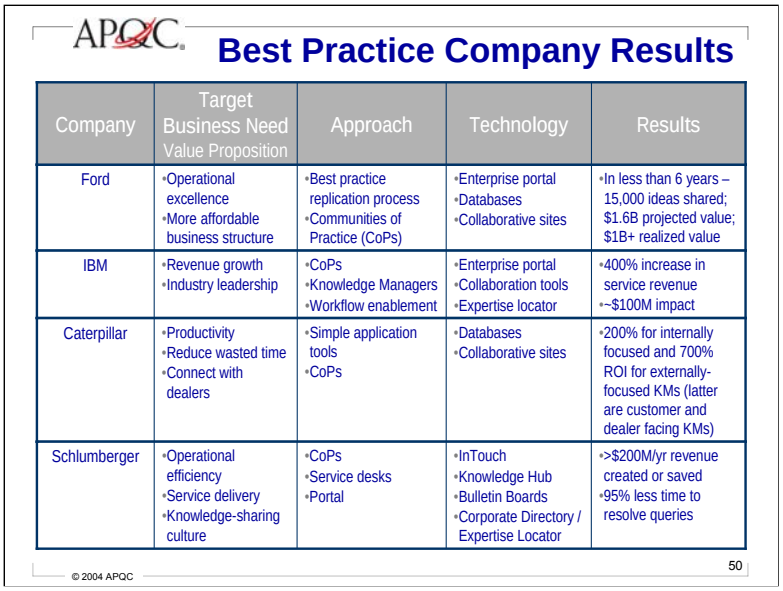
Winning Hearts

1. Involve
2. Inspire
3. Change the conversation

Measurement is critical. “As good as this KM stuff sounds, kindly show me the money – the results.”

Results are a key prerequisite for sustainability.

Blended approach: Self-Service+ and Communities of Practice and Facilitated Transfer of Best Practices



APQC

Best Practice Company Results

Company	Target Business Need Value Proposition	Approach	Technology	Results
Ford	•Operational excellence •More affordable business structure	•Best practice replication process •Communities of Practice (CoPs)	•Enterprise portal •Databases •Collaborative sites	•In less than 6 years – 15,000 ideas shared; $1.6B projected value; $1B+ realized value
IBM	•Revenue growth •Industry leadership	•CoPs •Knowledge Managers •Workflow enablement	•Enterprise portal •Collaboration tools •Expertise locator	•400% increase in service revenue •~$100M impact
Caterpillar	•Productivity •Reduce wasted time •Connect with dealers	•Simple application tools •CoPs	•Databases •Collaborative sites	•200% for internally focused and 700% ROI for externally-focused KMs (latter are customer and dealer facing KMs)
Schlumberger	•Operational efficiency •Service delivery •Knowledge-sharing culture	•CoPs •Service desks •Portal	•InTouch •Knowledge Hub •Bulletin Boards •Corporate Directory / Expertise Locator	•>$200M/yr revenue created or saved •95% less time to resolve queries

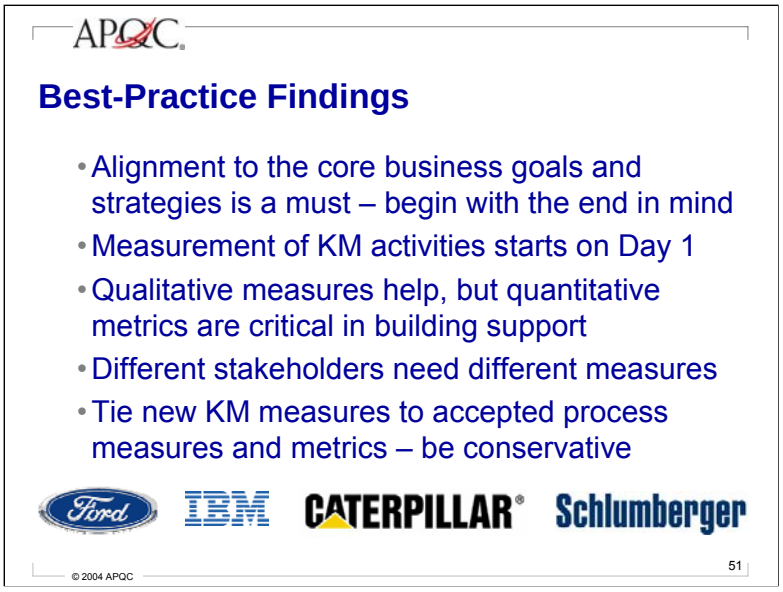
50

We have seen concern from some workshop participants that presenting results makes it look like KM people are claiming all the credit. A few clarifications are in order.

1. It is line management that has reported the results, not the KM managers.
2. Best-practice companies typically do no attribute results to a particular function (KM, IT, HR, …). For example, in Schlumberger's case, the results are for InTouch. When seen that way, it is not a case of some functional group claiming all the credit.
3. This kind of reporting is consistent with the way companies attribute revenue to new products. They don't carve up the revenue by function (R&D gets this percentage, Marketing gets that percentage, and so on). Of course, the analogy to KM-related results isn't perfect because company accounting systems track revenue for individual products, whereas they typically don't track cost savings by program with anything like the same rigor.

Something to avoid: percentage credit negotiation. In this approach, a functional group (like KM or R&D) approaches business managers and engages in a kind of negotiation about what percentage of the revenue or cost savings for a particular program should be attributed to their efforts. Experience has shown that this is a waste of time and reduces the credibility of the group doing the negotiating.

Sustainability depends on continuing management support. Without it, there will be no funding and no jobs for any KM-related effort. And to maintain management support, you must have a crisp value proposition and you must have results.



The easiest measures to get are the ones that come from the process and IT application itself. These process measures are surrogates for participation and health, not value.

The second easiest are survey measures of the participants and executives.

- IBM controls how many survey's go out – there is an Employee Survey Registry group that has to approve any survey going to more than 100 people.

Different stakeholders need different measures – you need to keep in mind who your customer is; i.e., who cares?

Not all results are financial. A result of importance may be an improved ability to attract talent or capital (by becoming known as a 'cool' company.)

Lessons Learned: Err on the side of caution when reporting financial numbers. It's better to underestimate than over!

From Carla O'Dell 2004 Grapevine presentation, based on best-practice benchmarking studies

- Leaders track the impact of KM. Others tend to track costs and activity.
- Financial Impact: Median $15M (Range: $7M - $200M)
- Cost per participant: Median $152 (Range: $33 - $771)
- Impact per participant: Median $357 (Range: $100 - $1,100) ~240% ROI

Emerging Pharma/Biotech Results

Company	Target Business Need Value Proposition	Approach	Technology	Results
Bristol-Myers Squibb	•Improve Processes and Success Rates •Improve Health Agency Interactions •Continuous Learning & Improvement •"One BMS" Culture	•Lessons Learned & CoP Consulting •Knowledge Integrator •Health Agency Landscape (HAL) •Playbook Creation •Use of Story	•Enterprise Portal •Collaborative tools and spaces •Lessons Learned Knowledge Desktop and Repository	•KM embedded in IM Project Management Framework (PMF) & in Product Development & Commercialization (PD & C) Process •Cost savings > $4M
Amgen	•Improve manageability of regulatory information	•Self-Service+	•Documentum •Livelink	•1996 - First computer-assisted license application to FDA's Center for Biologics Evaluation & Review
Hoffman-LaRoche	•Right First Time – accelerate drug development and approval processes	•Knowledge Maps •Identification of critical knowledge •Gap Analysis	•Enterprise intranet •Expertise Locator	•Reduced filing time for one new drug from 18 months to 90 days; reduced US FDA approval time from 3 years to 9 months

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To date, there has been little publication of pharma/biotech KM results comparable to those shown in the earlier slide from other industries. Therefore we use the term "emerging" as a general header.

But there have been a few encouraging examples. Those from BMS are the most recent. The Hoffman-LaRoche results date from 1995-96.

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Knowledge Management Approaches

Facilitated Transfer of Best Practices

Uses **structured processes** to capture tacit knowledge, convert it to explicit, transfer it to a recipient and to measure the business impact of reuse.

- **The Use of Story**
- **Enterprise Lessons Learned Consulting Service (LLCS)**
- **Knowledge Capture/Filings Playbooks**

Communities of Practice & Networks

Highly effective in **transferring** tacit knowledge and converting it to explicit knowledge, via enabling technology,

- **Enterprise Community Consulting Service (ECCS)**

Self Service+

Technology-focused and most effective with explicit information.

- **Health Agency Landscape (HAL)**

- **Integrated Support Model for FDT's**
- **Knowledge Integrator (KI) Role**

Emerging Pharma/Biotech Results

Company	Target Business Need Value Proposition	Approach	Technology	Results
Millennium	•Better, faster decisions •Improve R&D success rate •Speed pipeline progression •Improve mapping of science to unmet medical need	•Data & Knowledge Management •Knowledge base development blueprints •Collaboration	•Portals – MyBiology – Compass •eRoom	
Novartis	•Improve drug development	•Data & Knowledge Management •Knowledge and Data Synthesis •Modeling / Simulation •Knowledge Networking •Inter-departmental project grants •Knowledge Fairs	•Knowledge Space •Knowledge MarketPlace Expertise Locator (internal & external) •Virtual Forum BB •Web-based collaboration tools	

By looking at how different groups will need to draw upon & contribute to each KB, we are building "blueprints" for KB development

Used by: \ Maintained by:	Biology	Drug	Disease	Customer	Operations
Biology		Which targets in my gene set fall into druggable target classes?	How do clinical outcomes correlate with my set of surrogate markers?	What events should we co-sponsor in personalized medicine?	What therapeutic areas have worked on this target?
Drug	Which target variance should we use for assay configuration?		What were the trial results for drugs similar to the one we're optimizing?	What's the required Drug Safety Profile for the indication(s) we may target?	What rights do our partners have on my projects?
Disease	What signaling pathways is my target associated with?	How were the early DMPK results initially interpreted?		Who has access to rheumatoid arthritis patients?	What are the critical pipeline milestones the clinical group is responsible for?
Customer	What articles are being written about the anti-inflammation properties of INTEGRILIN?	What's the IP landscape for compounds like we're developing?	How many patients do we forecast will have a disease?		What is the entire history of this product program including partners?
Operations	What the status of target advancement and biomarker discovery efforts?	Are we likely to achieve our milestones for our priority LO projects?	Do enrollment trends for our trials match our expectations?	What's are our competitors putting into the clinical in the oncology area?	

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08:30 – 09:15	Welcome and overview
09:15 – 10:15	What keeps business managers awake at night?
10:15 – 10:30	Networking break
10:30 – 11:30	Best-practice approaches to performance improvement
11:30 – 12:30	Networking lunch
12:30 – 13:30	Working group session one
13:30 – 13:45	Networking break
13:45 – 15:15	Working group session two
15:15 – 15:30	Networking break
15:30 – 16:15	Next steps
16:15 – 16:30	Wrap-up and questions

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Working Group Session One

- Select opportunities from those discussed during the morning and lunch sessions and begin development of those issues in small working groups
  - Challenge / Business Process
  - Opportunity
  - Execution: what to do, how, who, what to measure
  - Role of New Thinking Network
- Deliverables by the break
  - Challenge / Business Process, Opportunity, Execution
- Issues and Opportunities
  1.
  2.
  3.
  4.
  5.

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Working Group Session Two

- Continuation of working group activities
- Presentation of the findings

- Group 1
- Group 2

Group 1

Creating High Performing Teams in Matrixed Organizations

- Processes Involved
  - Selecting team leaders
  - On-boarding and orientation
- Goals and results
- Team structure
- Roles
- Operating principles
  - Decision making
  - Conflict resolution
  - Ground rules
- Stakeholder management
- Embedding collaborative (KM) tools
- Vision/shared purpose for group

Group 1

Creating High Performing Teams in Matrixed Organizations

- Opportunities
  - Coaching and competency development
  - Institutionalized lessons learned at key milestones
    - Incorporate lessons learned into the process
  - Knowledge mapping to identify gaps created by team turnover
    - Knowledge "interview" of team and departing employee to gather key knowledge and connections
    - Identify key people to develop as replacements
  - 360 degree assessment of team for same
- Execution
- Implement knowledge mapping to identify gaps created by team turnover
  - Capture gaps on ongoing basis
  - Capture gaps created by team member turnover
  - Capture gaps created by loss of key knowledge holders (social network)
- Measurement
  - Team wellness checks
  - Demonstrate absence of delays (control groups)
  - Role of New Thinking Group: Implement in unique company environments and share results

Group 2:
Effective Team Alignment within/between Functions

- Business processes
  - Project progression
  - Submission management
  - Clinical studies
- Implement a process knowledge role to apply predictive measures (just in time) for teams
- Opportunities
  - Create a job accountable for administrative team members with authority
  - Implement enabling tools across sites/functions to support teams
  - Codify and communicate processes
  - Knowledge of cutting edge technologies and benchmarks
  - Team with HR and OD for on-boarding processes

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Next steps

- Plan the organization, activities, and timing for the next workshop
- New Thinking Network
  - Focus
  - Governance
  - Interaction methods
    - Meetings / Teleconferences
    - Online resources
      - Subscription-based news, best-practice sharing / collaboration service, …
  - Two practices from this workshop that should be adopted/adapted for the next workshop

    …

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Wrap-up and questions

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Power = Knowledge^{Shared}