For the past several years CIMS has been using big data analytics to address the strategic challenges confronting companies. By analyzing the publicly available data residing on the worldwide web we have been able to answer such strategic questions as:

- What major trends are impacting our industry?
- What market opportunities do these trends present to our company?
- With whom might we partner to deliver solutions to these customers?

CIMS Executive Director Paul Mugge and Chief Evangelist Dick Kouri demonstrated this last scenario at the CIMS Fall 2015 Meeting, which focused on “Open Innovation Revisited.” Locating eligible and qualified business partners is one of the principal tasks confronting companies attempting to build open innovation business models.

In their article below, Professors Mugge and Kouri explain how CIMS research was able to answer a leading pharmaceutical firm’s question, “Who are the key opinion leaders in personalized medicine? Where are they located?”

This was a real case presented to us by a pharmaceutical leader headquartered in the United States that desired to start a new line of business in the treatment of breast, lung and prostate cancers. The company recognizes that personalized medicine, a new approach to health care based on each person’s unique genetic makeup, represents a major breakthrough in the treatment of these difficult cancers. However, they don’t believe they have the skills in-house to understand and respond to this advance, nor do they have the time to train their own R&D employees.

Consequently, the company wants to form partnerships quickly with the leading thought leaders in oncology personalized medicine (especially breast, lung and prostate).

As Henry Chesbrough, the widely accepted father of Open Innovation at Haas School of Business, emphasizes, “in today’s information-rich environment, companies can no longer afford to rely entirely on their own ideas to advance their business, nor can they restrict their innovations to a single path to market.”
This could not be truer than for Big Pharma companies caught up in a
desperate search for people, and ideas, around which they can build new
sustainable business models. The field of personalized medicine holds such
promise, but how to identify and locate the “best of the best” of these
partners, anywhere in the world, is the challenge.

Enlisting Watson

To tackle the problem, we used IBM Watson Explorer with its ability to
“read” and decipher massive amounts of unstructured data. To enable
Watson to identify these people we used a search technique called
“follow the money” (see Following the Money, at left).

“We used IBM Watson Explorer with its ability
to ‘read’ and decipher massive amounts of
unstructured data.”

We know that the National Cancer Institute (NCI) is a leader in cancer
research and makes substantial annual grants to deserving faculty
across the world, including those at the top U.S. medical schools.
However, before searching NCI.gov for this information, Watson
has to be trained to recognize the specific words and phrases that
describe terms, like “medical schools,” “issued grants,” “personalized
medicine,” and “oncology.”

These words and phrases are captured in dictionaries that often contain
hundreds of entries. For example, to build the Oncology dictionary we
downloaded its definition from the NCI Dictionary of Terms and all of
the descriptors (synonyms) for lung, breast and prostate cancers from
the NCI Thesaurus.

In order to follow the money, we created a special annotator, called
“$money_finder,” which we set to identify those medical centers
receiving NCI grants greater than $1.5 million. We were looking for
large grants that NCI would likely only issue to prominent researchers
at the top medical schools. The answer to this first sub-question was
that the NCI had issued S.P.O.R.E grants (Special Programs of Research
Excellence) to 52 medical centers in 21 states (See Following the Money).

From there we moved to the second sub-question, “Which of these
centers’ grants were focused on breast, lung or prostate cancer?”
By using the oncology dictionary to search the S.P.O.R.E grants, we
identified 10 medical centers researching the use of personalized
medicine methods to treat patients with these specific cancers.

The third sub-question asks for the key investigators on these 10
grants. Again, we built another special annotator, called “name finder”
to extract the investigators’ names. Watson found 143 investigators
working on these grants.
These 143 investigators—all U.S. residents—are some of the most knowledgeable people in the world in the biology of breast, lung and prostate cancers. It stands to reason that these people would likely possess the skills that a company, like the one in our case, is looking for to help jumpstart its new line of business in personalized medicine in oncology.

Going Even Farther!

The case up to this point could have been solved eventually—albeit with a tremendous amount of hunting and pecking—by using Google and the search engine intrinsic to NCI’s website. Here is what could not be done using these tools:

Using Watson, CIMS crawled the Web and created a custom dataset containing the entire websites of the top 398 venture capital (VC) firms in North America that focus on developments in the life sciences. By mining this huge corpus of information—estimated to exceed 170 million web pages—we were able to answer the fourth sub-question, “Which of these key investigators are linked with startup activity?”

From this analysis, we get a good sense of how the VC community values these people and their technologies.

Only 13 of these people are engaged in startup activities and/or sit on the science advisory boards of the VC firms. For our pharma company, which is looking to partner with the “best of the best” of these people, this last test, or screen, yields this critical information.

The last sub-question can be equally valuable to the company. By searching the investment portfolios of the 398 VC firms with the dictionaries—personalized medicine + oncology—we are able to identify the six firms making investments in new ventures in this field. Possibly the company in the case would like to co-invest along with the VCs in these new ventures and their emerging treatments for breast, lung and prostate cancers. This represents another way of creating a new line of business while using VCs to help lessen the risk.

Final Thoughts

Publicly available data such as illustrated in this case contains a tremendous amount of raw intelligence. The trick is to extract this information using logical arguments the rest of the organization understands. In this case we used the editors of US News and World Report, the U.S. National Cancer Institute, and almost 400 VC portfolio managers to do the due diligence of locating special people with great expertise in a specific critical area.

For business people faced with making complex strategic questions, we believe “following the money” represents such an approach. Readers can learn more about this technique and how it was developed in our

If your organization is looking for business partners, or you are just interested in learning more about advanced data analytics, please feel free to contact us.

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LOOKING AHEAD FROM PG 3

Twentieth-century thinking and practices may be holding back the effective use of open innovation, Professor Terri Griffith told the CIMS Fall 2015 Meeting. “This is a problem given that more open practices are at the heart of growth in the 21st century,” said Griffith, who is professor of management and associate dean at Santa Clara University’s Leavey School of Business.

“Organizations will struggle to keep pace with the changing needs of their customers and clients if they don’t find ways to let go of practices that hamper the flow of knowledge needed to fuel innovation,” she added. Here’s her argument:

The idea of open innovation is very 21st century in that there is a definitional acknowledgment that innovations flow in and out of formal organizational boundaries.

Henry Chesbrough and Marcel Bogers defined open innovation as “a distributed innovation process based on purposively managed knowledge flows across organizational boundaries, using pecuniary and non-pecuniary mechanisms in line with the organization’s business model” (1).

That is, organizations can bring knowledge into the innovation process from other organizations, can sell or license out knowledge that isn’t part of their innovation focus, and/or can work with other organizations to co-create knowledge related to their joint innovation goals.

At the CIMS meeting I asked the participants how many were working on open innovation projects of some form (2). Most of the hands went up. I then asked how many thought they could improve on the process. Again, many hands went up. Although open innovation makes sense, it is still an organizational change. Most organizational changes fail to
reach their proposed goals, and this hasn’t changed in decades (3). In the case of open innovation, there may be constraints left over from management practices that made sense in the prior century but are barriers today.

20th Century Constraints

Some examples of old-school approaches that may be holding back your open innovation opportunities:

- **Information and knowledge sharing:** Information security is certainly critical. However, it’s hard to collaborate without sharing information. My own university doesn’t allow Google Docs to be shared globally. We can only share documents internally or with the specific people. This is a technology policy constraint that I believe is holding back our innovation mission. Instead, I’d prefer a “looser grip” on the specifics of sharing documents. If we provided training focused on the importance and methods of sharing documents securely, we might be able to let go of the strict policy limiting document sharing.

- **Performance management:** Many organizations emphasize annual reviews, yet much innovation is project based. Align feedback and incentives with the timeline of your innovation goals and let go of the fixed annual review.

- **Employment restrictions:** Open innovation is a thinning of organizational boundaries to allow needed knowledge to flow freely. Restricting organizational work to “balance sheet” (traditional) employees may limit opportunities. Freelancing and crowdsourcing are promising alternatives.

- **Intellectual property rules:** Some organizations find the lifecycles of their products are too short for traditional intellectual property practices—by the time a patent is issued, they’re on to the next thing. Trade secrets may be problematic given they, by definition, halt related open innovation. Faster lifecycles may mean you can share more. Even if competitors see what you’re doing, they can’t react fast enough for it to matter.

I use the phrase “lead by letting go” in the title to signal that it takes a light touch to effectively attract outside knowledge for innovation, even if outside only means outside your own department or team. Each of the organizations below has found greater opportunity by letting go of at least one 20th century constraint. They have done so thoughtfully, and by holding tight to perspectives that help them maintain control even with this lighter touch.

That is, you can lead by letting go of 20th century constraints, but you do need to hold tight to the “physics” of your organization: your performance standards, support for deep engagement with your
employees and partners, the value of education, and the realities, such as formal regulations in your industry. These dimensions provide a scaffold that keeps the process from turning into chaos.

21st Century Examples

Here are examples of small to large organizations that have found valuable ways to break some 20th century constraints.

- **Intuit** is my favorite example of how innovation can come from anywhere in the organization, especially when the organization is also tightly tied to its customers. If you let go of the idea that only the R&D team has rights to innovation and are willing to build-in innovation education for the whole organization, you can maintain engagement, education and performance standards. Knowledge of Intuit’s Design for Delight principles and methods for quick experiments to test new innovations exists across the organization. These give greater freedom for all employees to experiment in the real world with process and product innovations.

- **Pulse Mining Systems** is an enterprise resource planning technology company focused on the mining industry. By letting go of the idea that R&D should be done in secret (think skunk works) it assures technology feature updates happen quickly and are tightly tied to customer value. CEO Mark Spry shared with me how they co-create new features and updates with customers like Centennial Coal, and vendor Birst (a business intelligence and analytics company):

  Pulse holds tight to its performance standards, the value of engagement with its customers and partners, while still maintaining tight control of the core technology. Spry said, “This assures that updates are fast, by not reinventing aspects partner Birst has already built, and are focused on things the customers need most and in a form that will be immediately valuable to those customers.”

- **SAP’s Co-Innovation Lab** (COIL) demonstrates how big organizations that build proprietary software and hardware can also be leaders in sharing. The COIL approach brings customers and partners together in a way that holds tight to intellectual property while also allowing the engagement, education and performance necessary for quick responses to customer needs. The lesson: Let go of barriers and secrecy and instead protect intellectual property with careful, but fairly standard, partnership agreements and collaborative norms that allow for co-creation.

- **IBM** hasn’t let go of the idea of selling powerful “boxes” and services, but it does see value in keeping a relatively loose grip on its IBM Watson offerings. You can pay for what you use of the Watson cognitive computing platform instead of buying everything up front. The company is also letting go of the assumption that all ideas will come from its own R&D groups by making $100 million in venture funding available to startups.
and businesses building Watson apps.

- **Rallyteam** is a forward-thinking talent management tool that can help users see open innovation inside organizations. Rather than constrain people to the small “box” they fill on an organization chart, open up that box and allow people to see where help is needed anywhere in the organization. As time and interest allows, people can support those who need more help than allowed by their formal part of the organization chart. New eyes bring fresh perspectives; new perspectives hold tight to engagement and education, both especially valued by millennial employees.

**Next Steps**

Build a scaffold of performance standards, deep engagement with your employees and partners, on-going education, and respect the realities of your business—then allow freedom of movement across that structure. By letting go of obsolete constraints while holding tight to critical foundational elements, you can take the lead with a modern model of open innovation.

**References**


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**Innovation Management**

**NEW GENERATION WITH INTANGIBLE CAPITAL COULD FUEL ECONOMIC GROWTH**

Unfortunately, most contemporary analysis of business and government strategies for competitive economic growth in the United States ignores two critically important factors. So asserts William Miller, who consults on innovation to global businesses and has taught the subject at the University of Michigan. The two factors Miller considers essential for growth: 1) how best practices in a new generation of innovation management affect the competitiveness required for growth, and 2) how these best practices account for intangible capital (IC), now the principal...
Miller has written extensively about a new generation of innovation management, most recently in “The Generations of R&D and Innovation Management,” Jan. 2015 (1). His paper explains how the new generation introduces a non-linear model of innovation that supplants three previous linear generations. Miller’s article below highlights how this new generation can improve economic growth, professional education and government policymaking.

The new generation of innovation management identifies and measures intangible capital, which incorporates three components: 1) capabilities of people in organizations enabled by knowledge, tools, technology, and processes; 2) business models that combine manufacturing with networked services; and 3) organizational interrelationships that form market and industry structures such as value networks, supply chains and new types of bi-directional distribution channels.

The strength of the U.S. economy depends on: the competitiveness of domestic manufacturing, best practices in innovation management, and proper accounting for intangible capital (IC) by business and government. Nevertheless, the potential benefits to the U.S. economy from a new generation of innovation management that accounts for IC are generally ignored. Even an otherwise excellent analysis by the Information Technology and Innovation Foundation of the declining global competitiveness of manufacturing in the U.S. omits the topic (2).

Intangible capital is not even properly identified or measured in either current financial accounting as required by the Federal Accounting Standards Board or in government economic reports such as those by the U.S. Bureau of Economic Analysis. Since 2013, the BEA has revised its analysis and reports (3) to recognize that R&D in both business and government are fixed investments and an important part of the GDP. However, R&D only generates a small part of IC.

Other authors have reported that IC is much more than investments in R&D. The graph at left shows how and when IC in the 1990s became a larger part of fixed asset investments as a part of GDP than tangible capital. The graph was extracted from data published by Carol Corrado and Charles Hulten (4).

Intangible Capital’s Proper Role

The new innovation management generation changes financial accounting and economic analysis to measure the proper role of IC and the input/output process model of innovation within companies. Integrated Reporting is an example of this new financial accounting in innovation management (5). It enables disclosure to investors of a company’s
measurement of IC and its model for management of innovation in financial reports so that investors can more accurately assess valuation and the prospects for future growth.

PricewaterhouseCoopers (PwC) has studied Integrated Reporting in the top 40 companies listed on South Africa’s main stock exchange (6). The study made a detailed assessment of current reporting being practiced, confirmed the need for Integrated Reporting that measures IC, gave examples of the substantial benefits to companies that practice elements of Integrated Reporting, and described its benefits to investors.

PwC summarized the need and benefits by stating, “Only approximately 20% of the market value of a company today relates to its tangible assets and investors want businesses to account for the 80% intangible value as well.”

Better Assessment of Value Creation

Measurement of IC in the new generation of innovation management enables a better assessment of a company’s value creation from IC-driven innovation. The new generation also enables better measurement of employees’ contribution to IC in a process model of value creation and, consequently, a better determination of compensation.

The process model for value creation is poorly understood in the current generation of innovation management, which mainly measures tangible capital and largely ignores IC except for R&D. The principal measurements of tangible capital include worker compensation as expense on a P&L statement, the investment cost of tools including infrastructure (buildings, machines, R&D labs, etc.) on a balance sheet, and the free cash flows driven by profits. Moreover, the inputs and outputs of tangible and intangible capital are not linked to a business process model of innovation or value creation.

However, the most important driver of growth as value creation from innovation is no longer tangible but intangible capital. In the new generation process model for growth from innovation, the outputs are growth in both tangible and intangible capital.

The new generation of innovation management replaces the obsolete linear process model of innovation with a nonlinear, iterative process model. This model includes a new dyadic organizational structure with a COO focused on incremental sustaining innovation and the new executive position of Chief Innovation Officer focused on radical innovation. This kind of organization will make it easier to drive economic growth by enabling radical innovation, part of Schumpeter’s creative destruction, as I explain in (1).

Schools of Innovation

Because of the benefits described above, I believe strongly that innovation management should be taught as a professional discipline in new university schools of innovation. The instruction would lead to doctoral degrees similar to professional degrees in medicine that combine science and clinical practice.
Prerequisites for admission to these new schools should be an undergraduate degree in science or a BSE in engineering and an MBA. Innovation leaders in this new generation must be “T-shaped” with broad and deep capabilities that span multiple disciplines.

Changing Trade Policy

The new generation of innovation management with IC can help change trade policy to eliminate the business incentives for offshoring jobs, return many of those jobs to the U.S., and reduce the large negative balance of payments that has persisted since 2000.

According to an analysis by the Center for American Progress (7) the incentive for offshoring is mainly gaps in the U.S. tax code, not lower labor costs. This incentive comes from redirection of public investments in IC that supported the creation of capabilities intended to create economic growth in GNP, domestic jobs for American citizens and domestic factories.

Public IC includes investments in public and private education, federally funded R&D, national defense, homeland security, and public infrastructure. Consideration of the flows of public IC in foreign trade reveals the redirection of public IC from the support of domestic jobs and factories to offshoring. I believe this justifies a new regulation with a tax that might be about 35% on the value of imports to the U.S. produced by offshored jobs and factories.

Between 2000 and 2013, according to the ITIF, nearly 5.2 million manufacturing jobs in America were lost (2). In my opinion, this loss is mainly due to offshoring that created imports and a corresponding imbalance in trade as a large and growing deficit since 2000. As the ITIF paper states, “Based on BEA data, U.S. manufacturing unemployment shrank by 30.7 percent between 2000 and 2013, with a net loss of 5.2 million jobs.”

Once the unfair financial advantage of offshoring is removed with proper taxes, offshored jobs will return. However, offshoring to get closer to foreign customers and local talent without creating imports that are shipped back to the U.S. should not be subject to such taxation.

In conclusion, adoption of new best practices in innovation management and IC could fundamentally change business and government strategies and policies to create higher rates of growth in both tangible and intangible capital and competitiveness and restore U.S. domestic manufacturing to a higher percentage of GDP.

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Innovation is one of their top 3 priorities, 1,500 global innovation executives told Boston Consulting Group in 2014 (1). However, 70% of the execs rated their company’s innovation capabilities as only average. With such numbers, CIMS PhD candidate Tim Michaelis decided to find out what the biggest companies are doing to train their innovators. Here’s what he learned so far:

My initial findings—after interviewing 40 R&D directors and senior vice presidents of the largest companies in the world—is that innovation training does not happen in most companies. A lack of innovation training exists because employees simply do not have the time to innovate (they certainly have the ability). For example, one director told me “We just don’t have the time to do innovation the way it looks in the books.”

This got me thinking: so what is the problem? These 40 individuals are some of the smartest and most passionate people I have ever had the pleasure of speaking with. I could hear it in their voices; they all truly cared about developing better products and services for their end consumers. In an attempt to better understand the problem, I turned my sights towards an almost non-existent literature: innovation training.

What’s Innovation Training?

Innovation training is embedding innovation specific-knowledge, skills and abilities (KSAs) into employees. For my study, innovation was defined as “any novel product, service, or production process that departs significantly from prior product, service, or production process architectures” (2). I chose this definition because it best aligns with the strategic objectives of innovation-driven firms; e.g., innovation defined as “ novel processes or their outcomes (products or services), rather than administrative changes such as downsizing (3,4) or organizational restructuring” (5, 6, 7).
The Innovation Talent War

Large companies spend a lot of time and money searching for innovative talent in what is commonly referred to as the “talent war,” and rightfully so as the Baby Boomer generation is retiring at approximately 10,000 a day (8). This phenomenon is already happening and will continue through 2030. While hiring new employees is one route to building an innovative workforce, hiring is not a cheap endeavor and does not account for the potential knowledge loss of the retiring Baby Boomer generation. So what else can companies do to build an innovative workforce?

In-house training would seem a no-brainer and, consequently, should have extensive research already completed on the topic. However, I found only a handful of academic articles and nearly zero practitioner articles about it.

This lack of information drove me to interview 40 R&D directors and senior vice presidents from the world’s largest companies, beginning in June 2015. In addition to learning what those companies were doing, I wanted to know: Does innovation training work? If so, what are companies doing to teach innovation skills? Are they doing anything at all?

More specifically, I wanted to know: 1) how the largest companies measure innovation performance; 2) what they view as their innovation success factors; and 3) how are they training employees in those innovation best practices taken from Robert Cooper’s work on R&D best practices in new product development (9,10).

10 Common Themes in Innovation Training

My initial findings showed that innovation training does not happen in most of the companies interviewed. Typical responses:

1. “We don’t have standardized metrics to measure innovation... so how could we do portfolio management? It is impossible to compare any of our projects!”
   - Without standardized innovation metrics, portfolio analysis cannot be done. Thus, companies without defined innovation metrics will remain stuck in ad-hoc incrementalism.

2. “We hire smart people and expect them to figure it out.”
   - Companies need to focus on shifting knowledge from the retiring Baby Boomers to the next generation. One solution: have the experienced innovators teach internal innovation courses for newcomers.

3. “We do on the job training and trial by fire.”
   - This is not necessarily a bad thing, but embedding core KSAs early on will remove role ambiguity from newcomers to innovation. Innovation is inherently fuzzy. By providing clear instruction and training, newcomers...
to innovation will see reduced stress and higher commitment to the organization (11, 12).

4. “We have a project charter, but we mostly write down objectives, not definitions.”
   - Companies are not writing clear and early product/project definitions.

5. “If we spend too much time training people they wouldn’t get any real work done.”
   - Considering most companies do not do innovation training, this may not be a big issue for the majority of large companies.

6. “We have too many innovation tools, we are tooled out.”
   - Take the time to systematically review your company’s innovation toolbox. Managers need to reduce the reporting burden on their employees; i.e. get out of their way! Let them innovate!

7. “We have so many processes and so many best practices; we just don’t have time to do innovation how it looks in the books...”

8. Companies are confusing Stage Gate Process with an entire innovation management system.
   - “Focusing too much on getting through gates keeps us from thinking.”
   - “We have 157 gates before commercialization.”

9. Companies are confusing Project Management with Innovation Management.
   - We train in project management via PMI institute. Project management is a critical KSA, but not innovation management.

    - Many assume this is a method for understanding articulated needs when it is for unarticulated needs.

What Findings Tell Us

These findings suggest that the R&D units of the biggest companies in the world are overwhelmed with innovation tools, lack the time to learn them, don’t have standard innovation metrics, and expect their employees to just “figure innovation out” in a trial-by-fire manner. Companies seem to be adopting portions of best practices on an ad-hoc basis to solve current problems in their innovation pipeline.

As a result, companies never build a systematic innovation process. These mingled-together NPD best practices are rarely discarded and linger in the training / HR system for years, creating more and more
confusion. It's a real Catch-22. Companies don’t have time to use NPD best practices and train employees because their current collection of business processes and best practices keeps them from doing so.

What One R&D Director Said

This executive told me that one should try to fix an innovation system when the company is going down; e.g., a whole business unit fails! To quote, “It takes seismic shifts for a company to change their innovation process.” For example, he explained, “It takes months to change our policy on trip reimbursements; how would we ever change our innovation process?”

Implications for Management

Why do 70% of executives feel average in their capability to innovate, but still view innovation as a priority? I would hate for this article to be the bearer of bad news, but innovation in large companies today is stuck in a purgatory of indecisiveness. In fact, as I was completing this article, I read of a study by CEB which has “collected a wealth of data that indicates a clear and troubling reality: Most business activity is slowing down, not accelerating.” CEB chairman and CEO Tom Monahan reported a “common” complaint from top managers at the world’s largest companies: “It’s just so hard to get stuff done” (13).

It is clear that innovation training does not occur in the companies I interviewed. However, the real problem seems to be that large company innovation processes have deviated or mutated from a once strategy-driven approach to an ad-hoc, Frankenstein-esque, hodgepodge of complexity. As companies grow, they seem to be good at adding new tools to their innovation process, but bad at deleting old ones.

My recommendation: Big companies should look to simplify their innovation process relative to their strategic goals; e.g., incremental innovations or disruptive innovations.

Without a strategy-driven innovation process, the question for future research becomes, how long can a company last with an overly complex and ad-hoc approach to innovation? If there is any parallel to Mary Shelley’s Frankenstein, it would suggest that the monster—ad-hoc, non-strategic, innovation process—will eventually kill its creator; namely, the company.

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Innovation Lit

BREAKTHROUGH VENTURES, MOST INNOVATIVE COMPANIES, EXPLORATION SUPPRESSION, HIGH OUTPUT MANAGEMENT, CORPORATE ENTREPRENEURS, 3D PRINTING, ADA LOVELACE, AND MORE

Kressel and Winarsky describe themselves as “two technologists, executives, and venture capitalists who have combined our experiences from successful careers in developing technology and building breakthrough companies.” Kressel, a senior partner at the private equity firm Warburg Pincus, and Winarsky, president of SRI Ventures, wrote this book to answer the hundreds of questions they were asked throughout their careers—questions like “How did you go about launching a company from breakthrough technology? What was the methodology you used?

If You Really Want to Change the World leads readers through the critical stages of venture development, from concept to acquisition or public offering to maintaining a rich culture of innovation. Calling “‘fail fast, fail often’ marketing rubbish,” Kressel and Winarsky explain their process for building breakthrough ventures combines “four ingredients: A large market opportunity with potential for rapid growth; an outstanding team capable of execution; a differentiated technology or business solution that trumps the competition; a value proposition and business plan that articulate the company’s value, strategy, and plan and attract the required capital.”

“Without every one of these elements, the probability of success is nearly zero,” they add, before guiding readers up “a staircase with frequent exit points.” Examples like the Siri venture, Neustar, Intuitive Surgical, BEA Systems, and others ground an otherwise academic discussion in the real world of people who build breakthrough ventures.


BCG’s tenth annual global survey of the state of innovation in business ranks Apple and Google at the top of 50 companies deemed most innovative by 1,500 senior innovation executives from a wide range of countries and industries. Tesla Motors jumped to the third spot from seventh in 2014, followed by Microsoft and Samsung.

Authored by three BCG senior partners/managing directors, the report highlights innovation’s continuing rise in importance, with 79% of respondents ranking it as either the top-most priority or a top-three priority at their company. This is the highest percentage since BCG began asking the question in 2005, when 66% said innovation was their top or among their three top priorities.

“At the same time, science and technology continue to be seen as increasingly important underpinnings of innovation, enabling four attributes that fuel success: Achieving greater speed; perfecting lean R&D processes; leveraging technological platforms; systematically exploring adjacent markets.

“Taken together,” the report concludes, “these four capabilities provide a series of practical steps that any company can take if it wants to raise its innovation game.”

“How to counteract the suppression of exploration in publicly traded corporations”; Bob Walrave, Kim E. van Oorschot and A. Georges L.

Authors from Eindhoven University of Technology and BI Norwegian Business School (van Oorschot) investigate how top management teams and boards of directors can counteract the suppression of explorative activities that results from the so-called success trap. The authors consider this trap a serious threat to a firm’s long-term viability. It results, they explain, from mismanaging the balance between explorative R&D activities and excessive focus on exploitation of the current product portfolio.

“Recent studies of publicly traded corporations,” they write, “suggest that the suppression of exploration arises from the interplay among the executive team’s myopic forces, the board of directors as gatekeeper of the capital market, and the exploitation-exploration investments and their outcomes.”

The authors used system dynamics modeling to identify and test ways in which top management teams can counteract this suppression process. For instance, they find “that when the executive board is suppressing exploration, the board of directors can still prevent the success trap by actively intervening in the exploitation-exploration strategy.” They also recommend continuous monitoring of changes in customer needs, emerging technologies and other changes in the business environment.


Outside Intel, Andrew Grove is probably best remembered for the famous title of his 1999 best seller, *Only the Paranoid Survive*, which presents the strategic lessons Grove learned from leading Intel. But Ben Horowitz also remembers Grove’s “almost legendary” earlier *High Output Management*. This book, written in 1995 when there was little around to help a young entrepreneur, “amazed all of us that the CEO of Intel had taken the time to teach us the essential skill of entrepreneurship: how to manage.”

Horowitz is co-founder of the prominent Menlo Park, CA VC firm Andreessen Horowitz. His enthusiasm for the “extraordinary” *High Output Management*—“a true masterpiece”—is reflected in this review of its contents. Calling Grove the best teacher he ever knew, Horowitz asserts that the book’s power “is that it creates experts rather than merely competent managers.” Citing one example, Horowitz recalls learning “the importance of proper system design even when we are dealing with a system of human beings -- especially when we are dealing with a system of human beings.”

If his blog post rave encourages you to find the book, it’s still available on Amazon.


This installment in Steve Blank’s long-running series on the Lean Startup methodology he helped create describes the frustration experienced by a federal agency mid-level executive trying to adopt
lean methods. “Most of the time our attempts at innovation result in ‘innovation theater’ lots of motion (memos from our CEO, posters in the cafeteria, corporate incubators) but no real change,” complained the normally upbeat “Richard.”

Blank is a consulting associate professor at Stanford University and a National Science Foundation Principal Investigator for lean startups. He writes that hearing first-hand from an otherwise successful change agent drove home “how extraordinarily difficult it is to bring change to large organizations.” He proceeds to explain “the stark differences” between Richard’s world and that of startups.

After describing the obstacles faced in Richard’s agency and how they “simply don’t exist in the early days of a startup,” Blank turns to Richard’s request for “a manual on how to be a successful corporate rebel.” Subsequently, he is given a book by two successful corporate innovators in which he finds answers to some of Richard’s questions. This 2014 “must read”—Rebels at Work: A Handbook for Leading Change from Within by Lois Kelly and Carmen Medina—“will save your sanity if you’re a mid-level manager in a company or government agency trying to figure out how to get your ideas adopted,” says Blank, adding that, “it offers real practical, tactical advice about how to push corporate innovation.”

“The chapters march you through a series of ‘how to’s’: how to gain credibility, navigate the organizational landscape, communicate your ideas, manage conflict, deal with fear, uncertainty and doubt, etc. It illustrates all of this with real-life vignettes from the authors’ decades-long experience trying to make corporate innovation happen... After I read it I bought 10 copies for Richard and his team.”


The 3D printer’s inventor calls his medalist’s address “an engineer’s view of the third industrial revolution.” Charles Hull relates how he made his invention, starting with “an idea for a low-cost, high-resolution scanning UV microscope.” His account covers the familiar inventor’s route of many approaches and many failures on his “night job” at a small ultraviolet technology company. Finally, in 1983 he was able to summon his wife to rush to his lab and see “the very first 3D-printed part, a small cup.”

Today, Hull is cofounder and chief technology officer of 3D Systems and holder of more than 60 U.S. patents. He concludes his saga with an invitation for more inventors, innovators and entrepreneurs to tackle “the majority of advances in digital manufacturing that have not yet been invented.”


Zappos, the innovative online shoes and clothing store, is one of 10 examples of what Frederic Laloux called the next organizational paradigm in “The Future of Management Is Teal,” reviewed in CIMS Innovation Management Report Nov/Dec 2015, p.15. Laloux’s paradigm
INNOVATION MANAGEMENT REPORT

stands out for incorporating a new management system called Holacracy. Like any new idea, Holacracy has raised obvious questions, several of which are answered in this short interview with Zappos boss, Tony Hsieh.

The questions asked by The Wall Street Journal: Who’s the boss? What’s different or better than a hierarchical model? Describe your move to holacracy. What things might other companies might adapt?


It seems the founder of Wolfram Research has long been curious about “the real story” of Ada Lovelace. So with the approach of the bicentennial of her birth he set out to solve the “mystery of Ada”: i.e., was she a great hero or just a minor figure in the history of computing?

After “quite a bit of research” Wolfram feels he has grasped her complex story, “in some ways ennobling and inspiring; in some ways frustrating and tragic.” His account is amply illustrated from original documents and we won’t spoil it by revealing his conclusions here.

THE FUTURE POSTPONED: Why Declining Investment in Basic Research Threatens a U.S. Innovation Deficit”; MIT Committee to Evaluate the Innovation Deficit; dc.mit.edu/innovation-deficit, April 2015; www.futurepostponed.org

This MIT faculty committee report attributes “a growing U.S. innovation deficit” in part to declining public investment in R&D. It cites data from the American Association for the Advancement of Science showing Federal R&D outlays dropping from 10% of the 1968 Federal budget to 3% in 2015.

Chaired by Marc A. Kastner, Donner Professor of Physics, the committee’s report highlights 15 under-exploited areas of science and “likely consequences in the form of an innovation deficit, including: opportunities with high potential for big payoffs in health, energy, and high-tech industries; fields where we risk falling behind in critical strategic capabilities such as supercomputing, secure information systems, and national defense technologies; areas where national prestige is at stake, such as space exploration, or where a lack of specialized U.S research facilities is driving key scientific talent to work overseas. “

Areas in which the committee sees U.S. leadership and “even competitiveness” at risk due to budget cuts include synthetic biology, cybersecurity and quantum information systems.

Since Our Last Issue

INNOVATION NEWS YOU MAY HAVE MISSED

Collaboration To Advance Blockchain

Nonprofit Linux Foundation has announced a collaborative effort to advance blockchain technology. Early commitments to developing an
enterprise grade, open source distributed ledger framework have come from Accenture, ANZ Bank, Cisco, IBM, London Stock Exchange Group, and 15 other organizations, according to the Linux announcement.

“Distributed ledgers are poised to transform a wide range of industries from banking and shipping to the Internet of Things, among others,” said Jim Zemlin, executive director at The Linux Foundation. “As with any early-stage, highly-complex technology that demonstrates the ability to change the way we live our lives and conduct business, blockchain demands a cross-industry, open source collaboration to advance the technology for all.” Details at https://blockchain.linuxfoundation.org/

Artificial Intelligence Startup

A group of Silicon Valley investors and technologists will start an artificial intelligence company with the goal “to advance digital intelligence in the way that is most likely to benefit humanity as a whole, unconstrained by a need to generate financial return.” The non-profit OpenAI will be led by Google research scientist Ilya Sutskever and co-chaired by Tesla CEO Elon Musk and Y Combinator president Sam Altman.

“It’s hard to predict when human-level AI might come within reach,” the group’s 12/11/2015 announcement said. “When it does, it’ll be important to have a leading research institution which can prioritize a good outcome for all over its own self-interest.”

Wolfram Language Opens to Kids

Wolfram Research is making a version of its widely used Wolfram Language available without charge to students and teachers. Founded in 1987 by Stephen Wolfram, creator of Mathematica, the company released a beta version of Wolfram Programming Lab in December, 2015. It’s available at https://lab.open.wolframcloud.com

The announcement described Lab as “an interactive programming environment that contains dozens of “Explorations” step-by-step guides to creating programs with tiny amounts of code. Each Exploration gives the starter code for a program, and students are encouraged to dive in and change the code to create something new.”

In a Dec. 15 interview with The New York Times’ Steve Lohr (p.B8), Wolfram expressed hope that with free cloud access, one day “random kids can build things that only people with the fanciest tools could in the past.”

Google and Apple Patents Top Quality Ranking

Analysis of the patent portfolios of more than 6,000 commercial and other organizations worldwide ranks Google and Apple at the top of their respective industries in both patent quality and quantity. The analysis by Anthony Breitzman and Patrick Thomas is based on “objective, quantitative benchmarking” of their Patent Power Scorecard, carried out by 1790 Analytics, the Haddonfield, NJ firm they...
In addition to the number of patents granted in 2014, the Scorecard accounts for “metrics that reflect growth, impact, originality, and generality of the organization’s patent portfolio.”

Brietzman and Thomas present this annual analysis of the most valuable high-tech patent portfolios in “Patent Power 2015: Social Media and Smartphones Score Big,” Spectrum.ieee.org, Nov. 30, 2015.

**Tech Startups Raise Record Funding**

The 531 venture capital and private equity-backed technology companies in its 2016 Tech IPO Pipeline, have raised a record average of $182 million total funding, according to CB Insights. The VC research firm attributes this to non-traditional investors continuing “to pour money into tech startups.” Internet companies make up 64% of the Pipeline with business intelligence, analytics, and performance management the largest subindustries. The report is available at https://www.cbinsights.com/research-tech-ipo-report-2016

**Cord-Cutters Increasing**

More Americans are relying only on their smartphones for online access while their share of home broadband plateaus, according to a Pew Research Center national telephone survey of 2,001 Americans over age 18. Home broadband adoption is where it was in 2012 (67%) while 68% of Americans now own smartphones and 13% are “smartphone only,” reports Home Broadband 2015, by John B. Horrigan and Maeve Duggan, available at http://www.pewinternet.org/12/21/2015.

In its discussion of the implications of digital access and divides, the report highlights a substantial increase since 2010 in the share of adults who find lack of a home high-speed connection a major disadvantage when looking for job opportunities, accessing government information and in other areas. A Nov. 2015 Pew survey found that users of digital tools for job searches “face challenges when it comes to key tasks such as filling out job applications and writing cover letters.”

**Female Leaders Boost Company Profits**

More female leaders in top corporate management correlates with increased profitability, according to a survey of 21,980 public companies in 91 countries. The study was reported in a working paper from the Peterson Institute for International Economics (www.piie.com).

“The research demonstrates that while increasing the number of women directors and CEOs is important, growing the percentage of female leaders in the C-suite would likely benefit the bottom line even more,” said Stephen R. Howe, Jr., U.S. chairman of grantor EY (formerly Ernst & Young).