Innovation, Advanced Development, IP & Competency: Four Inescapable Product Development Trends

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Background

The "Innovation Era" is causing tangible changes in orthopaedic research & development (R&D) and product development. Small amounts are being shaved off traditional new product budgets for reallocation to advanced projects believed to have a higher return on innovation. These reallocations often result in double-digit increases in budgets for highly innovative and advanced products. Amounts, at times not small, are being directed toward external open innovation that affects R&D development. Processes and measures are now needed to understand the efficacy of changes in allocated R&D spend. As pure innovation plays often take more time to get to market, it is increasingly challenging to find frameworks that capture the essence of these new risks to determine if they will result in premiums in the orthopaedic marketplace.

At the same time, patents and other forms of intellectual property (IP) are becoming more important. The ability to monetize IP has increased significantly. In the next decade, the ability to transact an IP sale will begin to rival the ability to transact a product sale. Business and product plans will evolve to weight products and their IP equally as potential revenue and profit streams from any given R&D investment. Orthopaedic product development professionals will soon work in a highly concurrent fashion with their IP counterparts. These often separate organizations will become much more integrated.

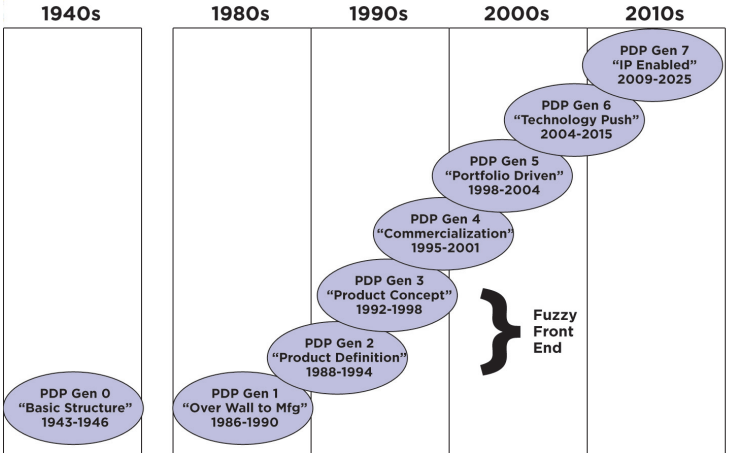
Underpinning this all is the ever-growing importance of maintaining core and functional competencies. With global knowledge doubling nearly every year for the last 20, keeping staff current on today's skills while building new ones for the future is a necessity. Human resource management practices are changing to facilitate the active management of competencies, historically a touchy subject. Competency measurement is growing. In orthopaedics, competent products that effectively and economically span the physical and biological domains are the key basis of competition.

These four macro trends will create permanent changes that permeate R&D/product development processes and metrics.

Professionals in western civilization caught a glimpse of the future of competition in the 1970s when Japanese automotive, consumer electronics, semiconductor and robotics manufacturers arrived in western markets with highly competitive product offerings. In less than a decade, market share began moving from west to east. The offerings were not simply lower cost goods manufactured overseas, but rather better designs at better prices. Western companies began to examine their entire business models. Historical approaches to product development and manufacturing were a center of focus. Over the next two decades, western companies concentrated on more effective and efficient execution, and on lowering of defect rates. Time-To-Market, Lean and Six Sigma were the great initiatives leading the way.

R&D and product development professionals had slightly different experiences to improve execution vs. their manufacturing counterparts, as we can observe in Exhibit 1.

Exhibit 1: Successive Generations of Western Innovation Productivity Improvement



Source: Goldense Group, Inc.

By the end of the 1990s, 80 percent of companies had overhauled product development processes to achieve seamless "Concept-To-Customer" execution. But the challenges had only just begun.

Advent of the Innovation Age

In the early 2000s, China and India arrived on the world stage. It was foreseen that these two giants would move more quickly through cycles of learning and would soon compete on

design, not just lower manufacturing costs. At the same time, western companies had achieved largely equivalent execution processes and now needed ways to achieve competitive advantage—to compete with other western companies and with rapidly-emerging Asian competitors. The next obvious basis of competition was on the "portfolio" of products being pushed through the execution processes. A better product mix would yield better business results.

It was soon obvious that a better product mix was highly dependent upon a company's ability to out-innovate its competitors. By roughly 2004, just about all western companies sought innovation techniques that would give them a competitive advantage. As is typical of capitalism, enabling tools and techniques are not created until market demand reaches a certain critical mass in which good returns on investment can be realized. By 2004, the demand was there.

Trend 1: Innovation

Two separate innovation-enabling markets emerged at about the same time. **Organic innovation**, historically the darling of Wall Street, needed improvement. For a decade or more, execution and time-to-market were the primary organic innovation values. Product development processes had become filled with execution tools and convergent value sets. If a product was not originally targeted to be innovative or inventive in nature, there was little chance it could become so with the execution mindset that was in place. **Open innovation**, historically a concern of top managers for a multitude of reasons, had to be pursued because two decades of execution had drastically diminished the investment in research and lowered the inventory of near-commercialization ideas and products that companies historically had in their coffers. Out of necessity, companies also started t o look outside of their four walls for opportunities that could give them fairly immediate gratification.

Numerous companies popped up to provide tools, techniques and software to spur organic innovation. Our research shows that over 250 tools have come to market in the past decade to spur organic innovation.

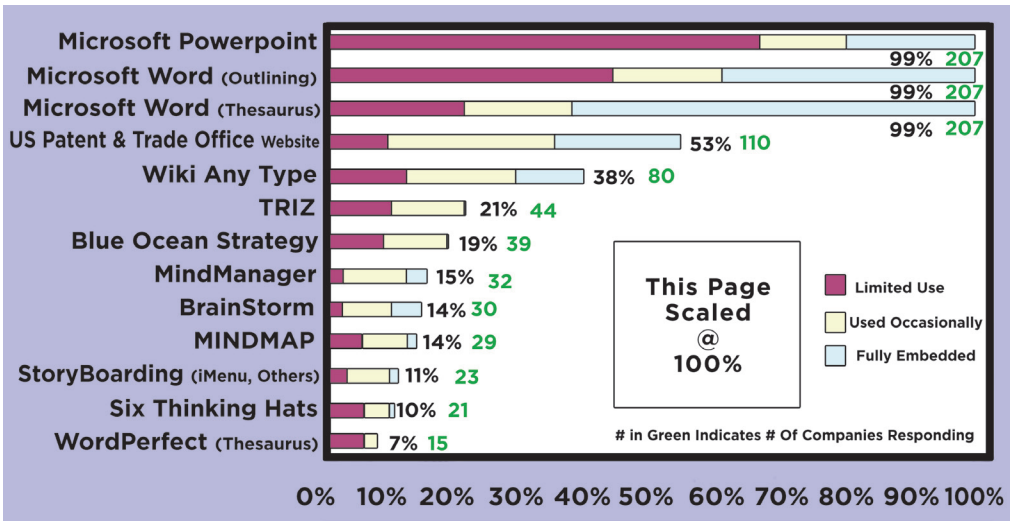
Like any new market, there are many failures and a few successes. Of the 250 tools, about 60 have become generally available and take only a few minutes to locate. We categorize these tools into five groups of increasing power and potential utility.

1. Outliners, Sketchpads and Text Manipulators
2. Self-Help, Group-Help
3. Emphasis on Sharing Knowledge
4. Emphasis on Sharing & Structuring Knowledge
5. Emphasis on Sharing, Structuring & Increasing Knowledge

It is not always true that a "higher group" will give higher value. For example, a "Level 2 Group-Help" tool combined with bringing outside experts into a historically employee-based activity could outperform the innovation of a "Level 5 Increasing Knowledge" tool that was not proficiently applied. There are many similar examples.

Of the numerous tools being test-driven by industry, only a handful has achieved any significant level of industry penetration. Our 2008 research shows the results of 208 companies in North America and Europe and the most adopted tools in the early stages of this rapidly-growing market. (See Exhibit 2.) Any tool that can facilitate non-linear thinking qualifies as a potential innovation tool. As such, Microsoft's market dominance in office software also dominates the results. MS PowerPoint is useful in "storyboarding." MS Word is useful in "outlining" for the efficient capture of brainstorming session results. MS Word's Thesaurus is filled with synonyms, antonyms and homonyms which can spur innovative thinking. Focus on the rest of the tools to see what is new and catching hold.

Exhibit 2: Industry Penetration of Emergent Innovation Tools & Techniques



Source: Goldense Group, Inc.

Additional tools, techniques and software are emerging faster than they can be researched. Not to be underestimated are some of the internet-enabled tools. "Crowdcasting" and "Crowdsourcing" have achieved rapid adoption in the past few years, largely due to Procter & Gamble's success in reaching out to untold millions of consumers for new ideas. Companies seeking to improve their organic innovation should not wait for the marketplace to sort itself out. Competitive advantage will

not result when companies select and use the same popular tool sets.

Open innovation is perhaps not quite as radical as what is happening in the organic space. Alliances, partnerships, joint R&D ventures and the use of subject matter experts from academia and industry have been going on for decades. What *are* new are the conscious efforts and stated strategies to increase the number and importance of these types of relationships.

A list of the major categories of open innovation techniques and initiatives reveals little that is new.

1. Co-Innovation with Customers
2. Co-Innovation with Suppliers
3. Co-Innovation with Universities, Think Tanks & Research Laboratories
4. Co-Innovation with Competitors
5. Co-Innovation in Multi-Company Consortia
6. Licensing-In Enabling Technologies Developed by Others
7. Licensing-Out Enabling Technologies Developed Internally
8. Scouting for Technologies and/or Alliance Partnerships
9. Retention of Intermediaries to Facilitate and Mediate Joint Innovation Alliances

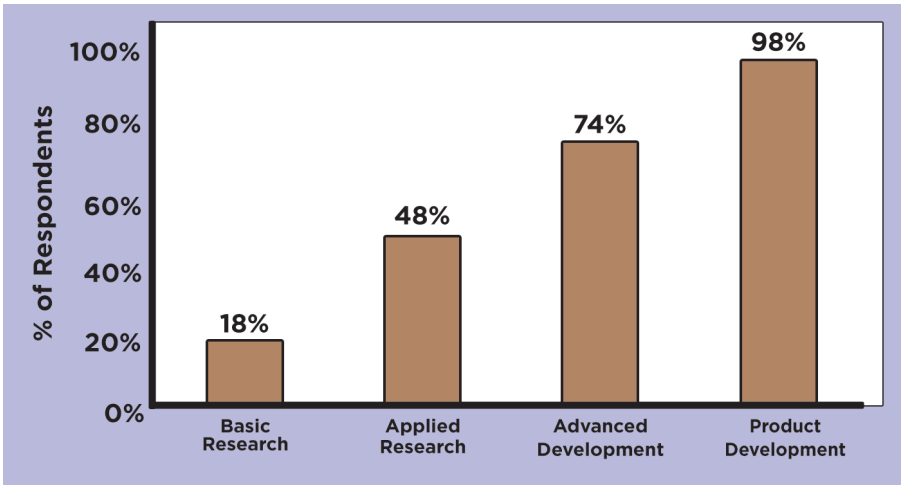
Venture funding, acquisition of early start-up companies or as-yet uncommercialized products or technologies are also increasing. The big story is the significant increase in volume of these activities.

What is common across both the organic and open initiatives, though, is that both approaches often result in a requirement to develop new technology. This growth in the need for new technology gives rise to the second major trend affecting product development.

Trend 2: Advanced Development

Driven by the need for increased innovation, or the need to replenish research coffers drawn down over two decades, companies are increasing the R&D that they allocate to activities that cannot yet be put on a time-to-market timeline. While relatively small amounts are being reallocated from product development budgets, these greatly increase the budget for advanced R&D activities. Historically a small sandbox of experimentation, these advanced activities have increased across industries. (See Exhibit 3.) They now need more oversight. Future business plans are based upon the expected commercialization of a greater percentage of these early investments.

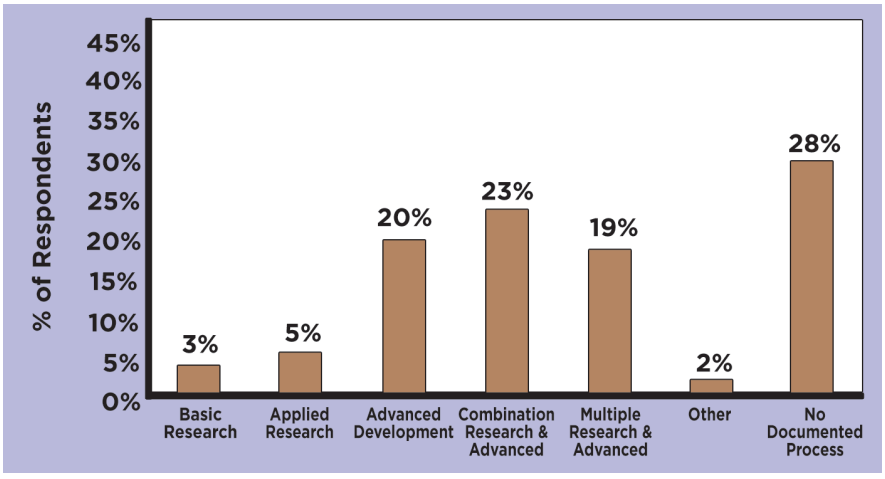
Exhibit 3: Cross-Industry Average of R&D Activities



Source: Goldense Group, Inc.

The increased business importance of advanced technologies and "New to X" products, along with increased funding in this area, is driving a new wave of business process development. Occasionally checking on the sandboxes is quickly becoming a thing of the past. Generation 6 "Technology-Push" (Refer to Exhibit 1.) has been going full throttle for a few years now. Our research shows that the institutionalization of "process-ware" is paralleling the increased activities in these earlier-stage development areas. (See Exhibit 4.)

Exhibit 4: Institutionalization of Formal Processes in Early-Stage Development



Source: Goldense Group, Inc.

Do not misunderstand. Processes for these advanced activities may have some of the same frameworks and constructs, such as stages and gates, but their requirements allow for more divergence and experimentation than their product development counterparts. Time and cost of development are key elements of the management of these processes, but most companies are clear that if these processes do not result in increased product innovation, then they will not be successful.

Trend 3: Intellectual Property

The need for increased product innovation, the emergence of the acceptability of open innovation, the increase in advanced development activities and the continually increasing globalization of all economies will drive the next great generation in product development: the licensing, sale and exchange of intellectual property. (Refer again to Exhibit 1.) Like music and mathematics, IP is a common language and will soon be a common currency. Every country wishes to develop locally with local suppliers to the extent possible. It is only a matter of time until IP becomes the tradable commodity.

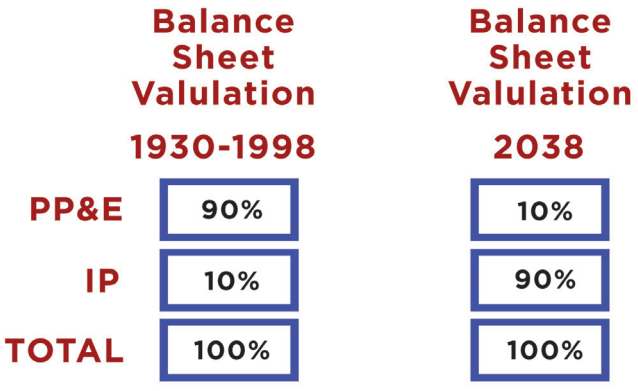
IP has been held back for years due to of industry's inability to assign value to IP. As a result of this limitation, companies are hesitant to show their hands. At an aggregate level, IP has had market value for years. People regularly buy stocks of companies at 15-100 times book value or P/E ratio. Why? Because investors "inherently know" that certain companies are more innovative and have better IP, and they pay premiums to own them. Eventually, this ability to value IP will make its way down to individual pieces of intellectual property.

For about 15 years working committees have focused upon the valuation of IP in the key regulatory bodies for financial markets. Though oversimplified, the question generally being asked is, "How should a patent be valued?" Once the value has been tackled for registered IP like patents and trademarks, it will be relatively easier to value unregistered IP such as brands and trade secrets. The train is on the tracks.

Also on track, is the emergence of public markets and auctions for the sale and exchange of IP. One can now bid for IP that companies willingly put up for sale. While achieving "Generally Accepted Accounting Principles" (GAAP) for IP valuation that would necessarily include market price, depreciated value and liquidation value is still years if not decades away. These auctions are increasing the domain knowledge on the subject of market value. Over time, industry will come to learn and accept these valuations. Then the rest of the GAAP will fall into place.

Some knowledgeable people believe there will be a time when the balance sheets of corporations will have IP line items, in an analogous manner to depreciable capital equipment line items. In this scenario, given the overwhelming value of IP vs. other physical assets, balance sheets and the valuation of companies would undergo severe transformation. To avoid rocking financial markets, these changes would have to be implemented gradually. (See Exhibit 5.) The figures on balance sheets would grow immensely, to be sure, but the ability to correlate financial statements to stock prices would improve commensurately.

Exhibit 5: Scenario in which IP Valuation Becomes GAAP



Source: Goldense Group, Inc.

Others argue that IP will never make it to line items on balance sheets, even if regulators could determine GAAP for IP. They argue that GAAP would lock down the negotiable nature of IP, and that corporations will resist GAAP for IP. Likely dominant companies would wish it to remain negotiable, while non-dominant companies would wish it to be a tradable currency with a known value.

What *is* sure is that IP is rapidly becoming a monetizable commodity. Many companies will elect to sell their IP to others who will put it into products when the value of the sale or license exceeds that of putting the IP into the company's own products—for instance, when a new plant must be built because there is no excess physical plant space. Right now, in the general absence of a market for IP, companies go ahead and build the new plant and reduce their ROI for that IP, because that is the best alternative available. The increased investments that companies are putting into Applied Research and Advanced Development will result in more enabling technologies that are not yet productized. Isn't this also IP?

The ability to monetize IP has increased significantly. In the next decade, the ability to transact an IP sale will begin to rival the ability to transact a product sale.

We should expect to see many more companies taking enabling technologies, locking down the IP associated with them and then selling the technology and its IP rather than putting it into products in their own product development process. Once IP becomes generally monetizable, the historical corporate success measures of revenues and profits from new products will change to also include revenues and profits from IP. Corporate product plans will then morph to include the possibility for either revenue/profit stream from a given investment that could lead to either outcome.

Trend 4: Competency Management

Dr. Charles Savage of the former Digital Equipment Corporation began writing about flatter knowledge-based organizations in the 1970s. It is uncontested that this is the way industry is moving. Little by little, we are all becoming "knowledge workers." Combine this with the rate at which global information is increasing, from doubling about once every 15 years in the 1920s to doubling about every 1.2 years in the early 2000s, and it is clear that the management of knowledge is a central issue for individuals and for the companies for which they work.

Societal demographics are also a key catalyst for the next 20 years. The post-WWII Baby Boomer generation is retiring in droves, yet the products they created and supported will live on for years to come. Between the need for knowledge retention and the need for knowledge acquisition, just about every corporation needs to do more than it has done in the past. The largely steady state nature of incremental lifelong learning after completing secondary education is at an end. Companies that do not change their approach to training and education, and test to assure that necessary competencies are being maintained and new ones developed, will degrade their ability to compete. This is especially true if the company wishes to compete on the basis of innovation.

Conclusion

Innovation, advanced development, intellectual property and competency are four major areas in which improved performance will positively affect the productivity and effectiveness of R&D and product development organizations. Typically, new product sales are about one-third of company revenues and an even greater share of company profits. Improved performance in these four key areas can only lead to better overall corporate performance.

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