

# Insights

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### The Emerging Leadership Role of the Chief Technology (or Chief Research) Officer

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The spotlight put by financial markets and management media on so-called "tech-firms" has generally focused on the most charismatic Chief Executive Officers (CEOs) of these companies; in fewer cases on their Chief Financial Officers (CFOs). Fortune magazine likes to make its cover story on the likes of Microsoft's Bill Gates, Cisco's John Chambers, Nokia's Jorma Ollila, or Oracle's Larry Ellison, among others. Prominent CEO successions - for example Lew Platt's replacement by Carly Fiorina at HP or Andy Grove's departure at Intel - have become the focus of intense media scrutiny.

Yet, hardly any article mentions the name of the men and women who, behind these CEOs, make or strongly influence the important technology choices on which these companies bet their future, i.e.: the Chief Technology Officers (CTOs) or Chief Research Officers (CROs). Yet, by recommending the technologies that need to be developed or out-sourced, the research programs that are worth supporting, and the partnerships that will give the company an edge, CTOs and CROs are behind many decisions with a 'make or break' impact on the company's destiny.

There are several reasons for CTOs' or CROs' rather low public profile, particularly when compared with CEOs and CFOs: firstly, and from the very nature of their function, these executives have few opportunities to take a public stand, and/or answer questions from external journalists or industry analysts. Many of the things on which they work tend to be obscure for the non-specialists and in any case subject to corporate secrecy rules. This lack of public exposure is generally not resented by these managers, who developed their personalities in the low-key profile world of science and technology. Secondly, and unlike the CFOs who tend to assume comparable responsibilities across various companies and industries, CTOs and CROs do not share the same role nor enjoy the same status in all companies. Actually, there are still significant disparities in their level of power and influence. They do not even share the same title, since the terms - CTO or CRO - or their foreign language equivalents, are still relatively unknown in many companies and countries (for example in France and Germany). Finally, and this will be developed later in this article, the outside world has not yet fully appreciated the extent to which the role of the CTO and CRO is evolving. Beyond his/her traditional mission as the company's most senior R&D and technology executive, and a management expert resource on technology issues, CTOs and CROs are becoming fully-fledged members of the top management team. Increasingly, they are viewed as the sponsors, architects and champions of their firm's future product and process offering. In the most advanced companies, CTOs or CROs are actually positioned as tomorrow's "new business creators".

#### CTOs/CROs: Despite title differences, a common interest

The emergence of CTOs and CROs as a top management function at corporate or divisional level, as distinct from the traditional role of head of R&D, is relatively recent. It can be traced to the combination of two factors: the growth of large, multi-product and multi-business corporations in the 70s, and simultaneously, to the realization by management that technology is becoming a critical strategic asset. Today, most large, technology-intensive companies - and a growing number of more traditional ones - have empowered a member of their top management team to be the highest representative of the company's scientific and technical functions in the board of management or executive committee. Differen-

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ces between CTOs and CROs relate essentially to the way they define their discipline and choose their process emphasis.

In short, CROs tend to see their world as science-driven. They focus their efforts on the research process and its corollary, the management of knowledge. CROs will naturally be found in research-intensive industries, such as pharmaceuticals or specialty chemicals under a variety of titles, e.g.: Vice-president Science and R&D; Scientific Director; Corporate Research Officer; Research Vice-president, etc. CTOs, on the other hand, talk and think in terms of technology, i.e. applied science. They focus their efforts on technology management processes: technology forecasting; road-mapping; planning; auditing; development; deployment; outsourcing; etc. They are found in electronics and information technology, but increasingly in a wide range of industries and under a variety of titles: Chief Technology Officer; Senior Vice-president Technology; Corporate Technology Officer, etc.

In most companies, and whatever their actual title, CTOs or CROs are generally expected to fulfill three core responsibilities:

1. They are usually the highest level supervisors of the company's R&D activities and the guardian of its intellectual property. This role often entails a combination of line responsibilities - through the direct supervision of all central or corporate R&D labs when they have not been totally decentralized - and functional coordination tasks, particularly vis-a-vis divisional or business unit labs.
2. In conjunction with their key R&D heads - and increasingly today, with their business colleagues - they are generally responsible, first for allocating corporate funds to R&D programs, then for monitoring whether they are being used effectively. This R&D portfolio management role tends to be one of the most potent ways for the CTO or CRO to influence the company's research and technology strategy, and ultimately the company's future.
3. Finally - and this is the most classical and widespread part of their role - they remain the ultimate advisors of their CEOs and boards of management on scientific and technological issues that continuously pop up in the company's competitive and market environment. Some companies - admittedly fewer today than a decade ago - still use their most senior technology officers primarily in this limited, non-executive function, i.e.: as the 'experts' which management pulls out of their technology development activities to consult on critical technology choices, then, sends back to their labs.



These pressures are introducing two kinds of changes in the role of the CTO or CRO. A change in agenda, and a change in role and management emphasis.

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### **The changing role of the CTO or CRO: From 'managing' to 'leading'**

For decades, R&D - and consequently the senior managers that represented them - have been, somehow, shielded from short-term external business pressures. The rapid evolution and convergence of markets and technologies, the globalization and growing complexity of companies, and increasing pressures exerted by the financial market to increase shareholder value, are changing the picture significantly. Market and financial expectations - regarding, both, top and bottom line numbers - are now passed on to the R&D and technology function heads, who are asked to contribute directly to the company's growth and profit performance.

These pressures are introducing two kinds of changes in the role of the CTO or CRO. A change in agenda, and a change in role and management emphasis. Both changes are profound, because they are dealing with the very essence of their function. They are highlighting a shift from a focus on 'management' in the traditional sense (managing a function, managing people, managing assets) to an emphasis on 'leadership' (creating a vision, leading people and driving change to accomplish it).

### **The changing agenda of the CTO**

A survey conducted by Arthur D. Little with 57 CTOs or CROs from leading European companies<sup>1</sup>, highlighted the premise of this change in preoccupations. In this survey, senior technology executives were asked to list the priority issues on which they had been focusing their efforts over the past five years, and the ones that retained their attention for the upcoming five years.

Interestingly, among the seven broad challenges proposed, a vast majority of CTOs and CROs indicated a declining importance for the two classical 'managerial' components of their job:

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- Managing for R&D efficiency, which had to do with project portfolio management and project management;
- Rethinking technology management, which had to do with R&D organization, technology funding and technology management processes.

In contrast, they highlighted at least an equal, or a growing concern for those issues that implied:

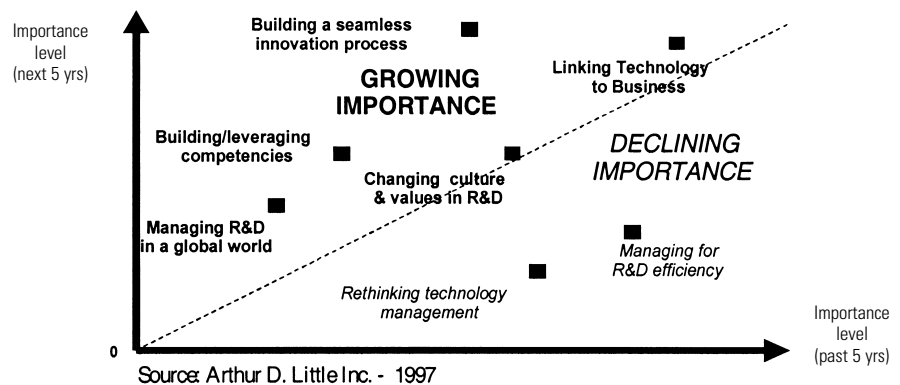
- a renewed strategic emphasis (linking technology to the business);
- a transformation process (changing culture and values in R&D);
- a future-oriented build-up of capabilities (building and leveraging competencies);
- a focus on shaping the future (building a seamless innovation process);
- or a desire to operate more globally (managing R&D in a global world).

These five challenges, undoubtedly, signal a stronger need for leadership.



The objective of the CTO or CRO's efforts is enlarging. From developing and optimizing the use of corporate assets...  
...to commit to deliver tangible 'output'.

### Priority Issues on the CTO agenda - Past vs. Future



### The changing role and management emphasis of the CTO

Indeed, in most companies, the job emphasis of the CTO or CRO is changing in, at least, four domains: positioning, scope, objective, and emphasis. The positioning of the CTO's or CRO's job is changing. From a 'specialist resource' within the senior management group, the CTO or CRO is increasingly becoming a full member of the top management team, sharing in all key business decisions, not just the ones dealing with technology. This broadening of horizon is bringing about a dramatic change in perspective. The CTO's or CRO's loyalty is no longer oriented primarily towards his/her peers in R&D or in the scientific community, but towards the company's stakeholders and his/her top management colleagues. This change is putting another pressure on these technically-educated managers, i.e.: becoming credible business partners, sharing the same understanding of business dynamics and the same vocabulary as their management-educated colleagues.

The scope of the CTO or CRO's involvement is shifting. From managing a functional slice of the corporation - R&D and technology - the CTO or CRO is increasingly being asked to steer or coach a number of critical business processes involving numerous other functions. Typical examples include the innovation process from idea and technology to market, the new business creation and venturing process, and - because so many technologies come from outside the firm - the partnering process. This change is putting another management pressure on these managers who have often climbed the hierarchy within their 'R&D chimney', i.e.: learning to steer cross-functional management teams and make trade-offs between conflicting technological and business objectives.

The objective of the CTO or CRO's efforts is enlarging. From developing and optimizing the use of corporate assets - i.e.: technological competencies, and R&D funds, two 'input' elements - the CTO or CRO is increasingly asked to commit to deliver tangible 'output', in terms of winning new products and processes, and ultimately, sustained growth and value to customers and shareholders. This change in expectations is putting a new pressure on managers who - at least for some of them - have started working in an environment in which management expected R&D to justify its level of efforts, but not its results. And finally, the emphasis of the CTO's or CRO's attention is also broadening. From managing 'hard' issues (i.e.: technologies), the CTO or CRO is increasingly being asked to focus also on 'softer' ones, like change in culture and mindset, teamwork, communications and motivation, not just inside the labs, but across

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functions, units and alliance partners. This change in emphasis is putting new demands on the traditional 'people management' skills of the CTO or CEO. It clearly calls for a greater and broader sense of leadership.

## **The emerging leadership role of the CTO or CRO: Change Agent and/or Entrepreneur?**

Numerous attempts have been made to highlight and characterize the leadership role of the CTO or CRO. For example, Arthur D. Little consultants see the CTO as an "agent of change"<sup>2</sup> driving, or at least strongly supporting the transformation of the company, by:



Building new 'legs' to the business, hence growth, has become a priority in this 'post-reengineering' period.

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- Establishing a strong partnership with the CEO in order to define a strategy (where to go, today and tomorrow), and build a roadmap for the company, integrating and aligning technological and business opportunities and constraints.
- Enacting change through the recognition and cross-functional management of key business processes, starting with technology and innovation processes (broadly defined).
- Creating an ambition-driven vision of the future to capitalize on emerging technologies and leverage existing competencies to create new value to customers and, ultimately, new businesses.

This last aspect introduces, yet, a new facet of the emerging leadership role of the CTO or CRO: that of an 'entrepreneur' and 'new business creator'. Indeed, CTOs and CROs are increasingly expected to leverage the company's R&D resources, not just to support existing businesses, but to create new ones. Building new 'legs' to the business, hence growth, has become a priority in this 'post-reengineering' period. This emphasis on new business creation has led to a variety of practices and mechanisms. In many companies - such as Bayer, ABB or Philips - management demands for new business creation have been translated by CTOs or CROs into new corporate R&D funding policies and criteria. Pure exploratory research is maintained, but at a relatively lower level than in the past, and considerable efforts and corporate funds are put behind 'strategic' research initiatives, i.e.: high-risk/high impact innovation projects, capable of generating new business streams.

Other companies - such as Motorola - have introduced a systematic search of technology-based business opportunities in their technology road-mapping process. Business and technology reviews, conducted jointly by business managers and CTOs, often under the chairmanship of the CEO, focus on "minority reports", i.e.: trends and developments that diverge from the current business, thus point to new opportunities. These "minority reports" can trigger corporate funding and new business development initiatives of significant magnitude and risk.

Finally, and this is probably a growing trend, CTOs and CROs are increasingly building a 'corporate development' group of their own. Many variations seem to exist in that domain. Some CTOs, as at Hewlett Packard, have set up a small strategic planning and development group as part of their corporate labs to study and pursue new business creation opportunities. Others have actually set up a corporate R&D-funded new business incubator of their own, responsible for pursuing opportunities until they can be transferred to existing business units or spun-off as separate ventures. At DuPont, this incubator - the 'commercial demonstration' group - reports directly to the CTO. At Motorola it is called 'Motorola New Enterprises'.

Whatever the approach chosen, the message is coming out loud and clear: the CTO or CRO is gradually becoming the 'CIO', or 'Chief Innovation Officer', and his/her mission is to lead the company towards new pastures. If the dual role of all senior managers is to "master the present" and "preempt the future", to use Derek Abell's terminology<sup>3</sup>, the CTO has always been expected to privilege the latter part of the job. Increasingly, however, he/she is expected to go even further, i.e. to 'create the future'.

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<sup>1</sup> *Priority Issues in Technology and Innovation Management – An Arthur D. Little Survey of Management Agendas*, published by Arthur D. Little Inc. in 1997.

<sup>2</sup> *The Chief Technology Officer as an Agent of Change*, by Nils H. Bohlin, Herman J. Vantrappen, and Alfred E. Wechsler, in Arthur D. Little Prism, Fourth Quarter 1994, pp. 75 – 85.

<sup>3</sup> *Managing With Dual Strategies: Mastering the Present, Preempting the Future*, by Derek F. Abell, The Free Press, 1993

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