



## The new partnership between research & technology institutes and industry

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**Research & technology institutes have long been key players in national innovation infrastructures, bridging the gap between industry and academia. However, in a world characterized by tighter control of government spending, greater government intervention and changing stakeholder expectations, they will be even more important. We examine how industry can ensure that it gets the best out of collaboration with these institutes and how the institutes themselves can adapt to their changing role.**

Research and technology institutes (RTIs) provide services to government and industry in research, development, technology and innovation. In developed countries RTIs have a long history, with many founded decades ago as government-funded national research laboratories. Today they have evolved into a number of different forms with varying emphasis on research, technical services and technology development and exploitation. There are many thousands of RTIs, both big and small. Well-known examples include the Massachusetts Institute of Technology in the US, Fraunhofer in Germany, TNO in the Netherlands and the National Physical Laboratory in the UK.

RTIs have been essential players in many countries' national innovation infrastructure, bridging the gap between industry and academia. However, as we face the "new normal" – a world characterized by tighter control of government spending, greater government intervention and changing stakeholder expectations – the role of RTIs will become more important, both for industry and government. This is because:

- Open or collaborative innovation is now accepted as a key approach enabling companies to innovate effectively and efficiently. RTIs have specialist expertise, especially in applied research, that makes them preferred partners for industry in sourcing novel ideas.
- RTIs have specialist knowledge in domains such as food, health, climate change, energy, infrastructure and socio-economics. This knowledge will be increasingly valuable to companies needing to address burgeoning sustainability and corporate responsibility challenges and opportunities.

However, if you ask chief technology officers in industry about their experiences of partnering with RTIs, the picture is not always rosy. Whilst RTIs are increasingly exposed to market forces, many still have poor customer focus and are

driven by cultures that emphasize scientific interest rather than corporate profit. This creates a degree of mutual suspicion and disconnect between industry and RTIs, often exacerbated by intellectual property (IP) concerns, which make relationships notoriously hard to manage.

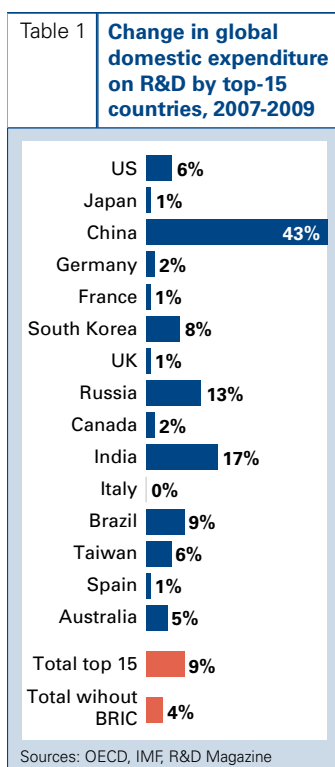
In this article we will review the current status of RTIs and examine both what industry can do to ensure that it gets the best out of collaboration with RTIs and what RTIs can do to adapt to their changing role.

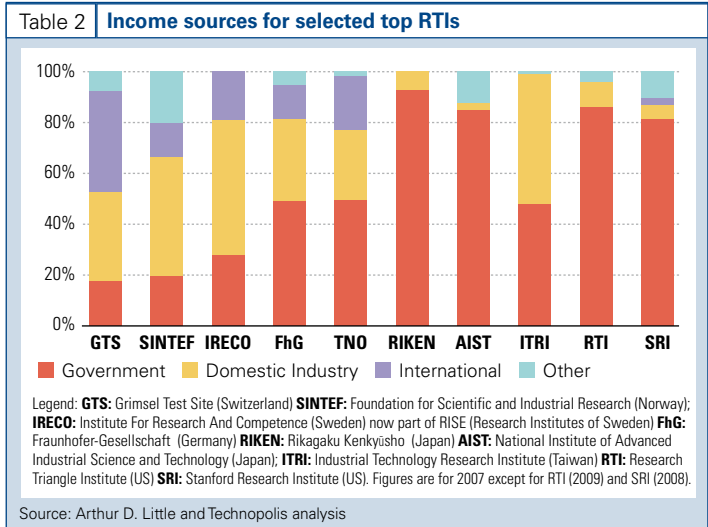
### The current status of RTIs

Despite the recession, there has been continued investment in R&D at a global level (see Table 1), but this does not mean that life is easier for RTIs. They are increasingly being held accountable. Most governments are putting increasing pressure on RTIs to demonstrate more clearly the value for money they are providing to the taxpayer, and to increase the proportion of their revenue that they generate from industry. At the same time, industry is under pressure to prioritize its R&D expenditure both internally and externally, which has resulted in increased competitive pressure on RTIs.

There is a wide variation in the proportion of government core funding between institutes. Although the proportion for most RTIs in the developed countries is now less than 50 %, most continue to rely heavily on it (see Table 2). This funding mix is at the root of problems that many RTIs have in clearly defining their role, because meeting the needs of government will not necessarily attract industrial customers.

In the “new normal,” resource-constrained customers are increasingly expecting world-class science for their investment. Funding data from leading RTIs such as TNO, FhG, and GTS demonstrate that their customers increasingly procure this science internationally, selecting the best providers from the global marketplace. This means that RTIs face increasing competition from research providers overseas.





Leading businesses recognize the value of accessing universities and RTIs to generate ideas which are high-risk in terms of likelihood of success but have high potential, or are in areas that are related but non-core to their business activities. Industry expects ideas of relevance to be transferred effectively, and is increasingly willing to openly share its IP with multiple partners to help them develop the best ideas.

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Leading RTIs recognize the importance of technology transfer and industry-led joint research projects. They recognize spin-outs and licences as measures of success. However, these relationships rarely evolve further into stable, long-term, open knowledge-sharing arrangements. Often there are significant barriers to be overcome, such as reluctance to share IP and differing priorities between business (profitability) and RTIs (research excellence and publication in world-class journals). Effective collaboration and partnership will be increasingly important for success in a more competitive “new normal.”

## How industry and RTIs can get the best out of collaboration

Based on Arthur D. Little’s experience of working with more than 60 RTIs and corporate research organizations around the world in the last decade, we highlight three key ways in which industry and RTIs can get the best out of collaboration.

### **1. Increase engagement between industry and RTIs in strategy and planning processes**

*The most successful RTIs anchor their strategies around customer understanding of and stakeholder involvement in the strategic planning process.*

RTIs often struggle to clarify their role and strategy. The mission and rationale for the institute drifts over time, or a series of small incremental changes are made which fail to respond adequately to fundamentally changing needs. The lack of clear strategy makes it difficult to prioritize the RTI's activity. Without a strong market focus, and without performance and incentive systems aligned to a clear strategy, RTIs find it easier to operate like universities. The research interests of the staff begin to dominate the organization, and it gradually becomes a set of independent research units operating as loosely associated technological fiefdoms, rather than as an organization with an overriding business mission to serve industry or national stakeholders.

In our experience, the most successful RTIs anchor their strategies around customer understanding of and stakeholder involvement in the strategic planning process. This is a significant challenge for many organizations that may pride themselves on "having the answers" in-house. Developing customer focus in particular requires a fundamental change in the mindset and motivations of many scientists.

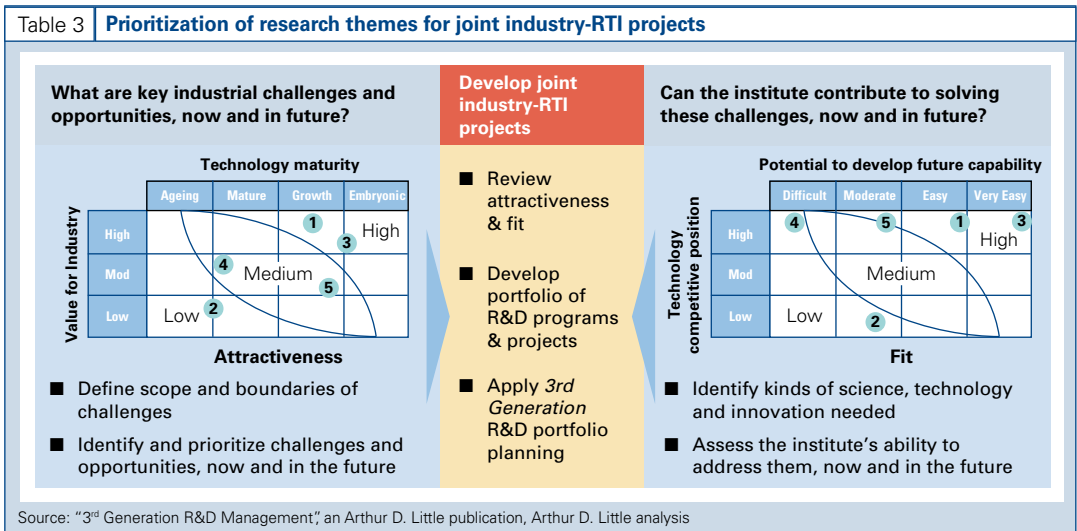
The strategy process must force the organization to abandon some activities and to increase the internal competition for resources in order to develop areas of strength where the institute can be nationally or internationally competitive. Deciding which R&D activities to abandon is a highly charged, emotive and controversial process. We have found that there needs to be a real break with the way things have been done in the past, especially in terms of prioritization processes.

Whilst a lot of RTIs typically want to "fix it themselves," we find that facilitating these difficult decisions is best mediated by two sets of external parties. First, by international R&D experts who command scientific respect and have experience of working internationally. Second, by technical industry customers, who provide non-partisan, external opinions on key needs and priorities which are invaluable in

defusing conflicts within the RTI and support rational decision making.

Workshop-based approaches may be used to engage industry customers in strategy development. A competence-based strategy with the classical fit-attractiveness methodology lends itself to this type of approach, with industry and government stakeholders providing the key inputs on opportunities and challenges that shape the attractiveness dimension (see Table 3).

Table 3 **Prioritization of research themes for joint industry-RTI projects**

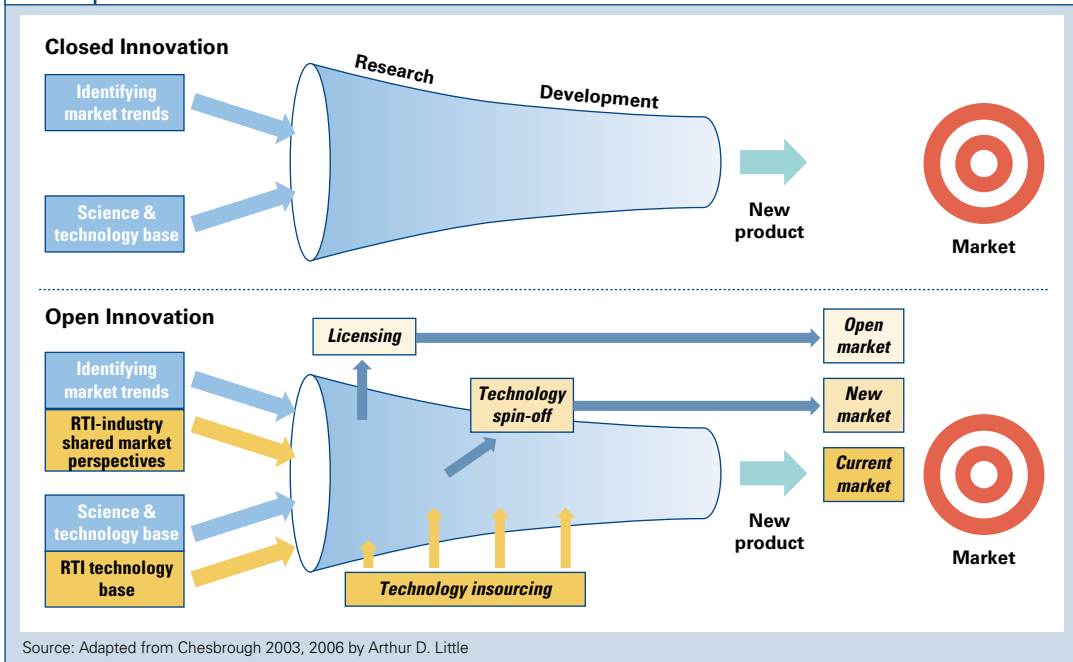


The outcome of such a process is a prioritized set of research “themes” that the RTI should pursue, based on a rational and objective assessment of what is most important to its customers and where the RTI can have the greatest impact. These can then be further translated into detailed objective-driven research programs.

**2. Develop a networked, collaborative model of innovation focused on knowledge transfer**

Industry and RTIs need to move from a linear “closed” technology transfer relationship to an “open” innovation ecosystem approach to succeed in the global marketplace (see Table 4).

Table 4 A model of innovation based on knowledge transfer



Achieving this shift requires industry to evolve the business models underpinning technology transfer and research partnerships towards a system that encourages long-term relationships and the transfer of knowledge and skills rather than intellectual property rights (IPRs). A more open approach to sharing common goals is needed – whilst not compromising the value of market exclusivity of IPRs. Four principles are the key to success for industry:

**a. Transfer knowledge rather than technology**

Businesses often find it difficult to translate IP licensed from an RTI into a workable idea. More successful technology transfer (as, for example, at Rolls-Royce and Glaxo-SmithKline) involves a transfer of skills and knowledge as well as technology. Examples include the secondment of staff to industry to raise awareness of industry needs within the institute. Conversely, industry may partially fund junior researchers who act as “IP scouts” to identify ideas of commercial relevance, a model used successfully by publicly funded entities such as the London Technology Network.

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**b. Become more targeted and outward-facing**

Industry partners can benefit from sharing their long-term technology needs with RTIs and thus helping the latter better target their activities. Often, RTIs waste resources and effort in raising awareness of topics that are not relevant to their customers. Leading businesses such as Procter & Gamble share their existing areas of interest with potential RTI collaborators and jointly maintain lists of technology needs.

**c. Establish IP management arrangements that encourage rather than deter collaboration**

Traditional mechanisms of technology transfer involve licensing or transferring IP in exchange for a royalty payment. In making this transfer, RTIs often over-value basic IP with no commercial relevance, whilst industry imposes tough corporate-level requirements for the defensibility and ownership of IP. Industry can seek alternatives to traditional licensing that are better suited to co-operation arrangements. Mechanisms include:

- Seeking new ways to reimburse RTIs for their IP emanating from research by, for example, setting up business-funded facilities on site or exploring alternative licensing models, such as the General Public License open source software model.
- Setting out a standard corporate or RTI-wide IP policy in terms of what is acceptable and what is not with regard to, for example, IP ownership, disclosure, record-keeping and royalties.
- Recognizing that some types of IP are further from commercialization than others. Differentiating between IP from different sectors is also valuable, as they have different times to market. For example, IP in the life sciences may require extensive clinical trials, whereas software can be commercialized relatively quickly.

**d. Work towards the creation of “competence networks” internationally**

Businesses procuring on a global basis seek out world-class research in the specific domains that interest them. Therefore RTIs need to focus on topics that are of greatest importance to their customers. Once these themes and



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competencies are identified, RTIs should, on the basis of shared scientific goals, form networks internationally to ensure their services are world-class and increase exposure to their customers through referral. One example of this is the Hewlett-Packard Consortium for Advanced Scientific and Technical Computing, which brings together users and academia internationally.

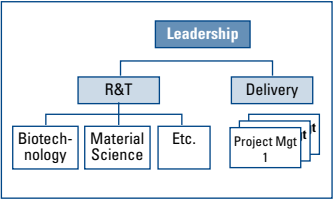
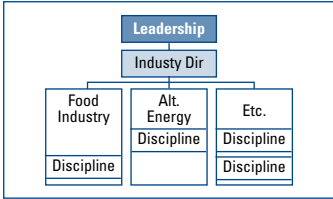
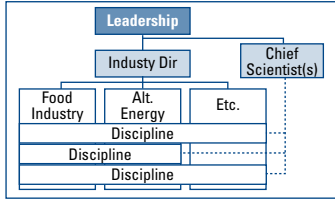
### **3. RTIs need to align their strategy with their organization, processes and resources for better customer focus**

Getting the strategy right through engagement with customers is one thing; delivering the strategy in practice is quite another. RTIs need to become truly customer-focused, whilst at the same time safeguarding and strengthening their ability to maintain state-of-the-art scientific excellence. This can be a tough balancing act and is not achieved just by training researchers in customer focus. Playing around at the edges but leaving the core organization, processes and culture unaltered will ultimately fail.

If an RTI is looking to improve its customer focus, it needs to structure its research organization accordingly – which generally means being application-based (i.e. split into units reflecting application areas or customer segments) rather than discipline-based (i.e. split into units reflecting scientific disciplines). Making this change provides a powerful mechanism for creating true customer focus, by enabling the best combination of specialists to be brought together to address an application-based challenge and by providing a means of breaking down the traditional silos between different research disciplines. In such a model, there is often a horizontal discipline line to ensure that scientific excellence is nevertheless proactively maintained (see Table 5).

This model works well for small to medium-sized single-location RTIs. Larger organizations such as Fraunhofer in Germany and VTT in Finland are based on a similar principle: they have an autonomous and decentralized branch structure which allows easier interaction with industrial customers, and they typically maintain the strength of their discipline-based competence through close interaction with universities.

Table 5 The pros and cons of alternative structures

Discipline-based	Customer-based, Disciplines within SBUs	Customer-based, Disciplines via Matrix
		
<p><b>Pros</b></p> <ul style="list-style-type: none"> <li>■ Aligns with typical university structures</li> <li>■ Scientists and researchers are one step removed from the customer, which is not aligned with a customer-focus strategy</li> </ul> <p><b>Cons</b></p> <ul style="list-style-type: none"> <li>■ Can lead to conflicts between customer priorities and scientific priorities</li> <li>■ Can lead to disconnect and conflict between the delivery and scientific functions</li> </ul>	<p><b>Pros</b></p> <ul style="list-style-type: none"> <li>■ Strengthens and simplifies management and development of customer-driven services</li> <li>■ Relatively uncomplicated to run (i.e. no dual responsibilities)</li> </ul> <p><b>Cons</b></p> <ul style="list-style-type: none"> <li>■ Scientific disciplines broken up</li> <li>■ Difficult to maintain and develop scientific disciplines</li> <li>■ Can lead to “stove-pipe” mentalities within units – poor cross-functional working</li> </ul>	<p><b>Pros</b></p> <ul style="list-style-type: none"> <li>■ Strengthens customer focus</li> <li>■ Enables scientific disciplines and platform technologies to be maintained and developed</li> <li>■ Can help to promote cross-team working</li> </ul> <p><b>Cons</b></p> <ul style="list-style-type: none"> <li>■ More complex situation in which RTI has to manage dual reporting lines</li> <li>■ Needs careful handling of career paths and incentive systems</li> </ul>

Source: Arthur D. Little

Although most organizations led by scientists will focus on management and execution processes, we often find that in organizations where so much of the value is in the skill of its staff, critical HR processes such as recruitment, appraisal and career development need to be aligned with strategy.

Because you “get what you measure”, aligning the incentive system (remuneration and promotion to management roles) is the only way to reinforce the effectiveness of the organization. Often researchers are incentivized primarily on the basis of scientific performance – using metrics such as publications and citations, which can be detrimental to the objective of developing customer accounts and achieving customer satisfaction. RTIs need to ensure that incentives such as customer satisfaction, quality and project delivery effectiveness are included in addition to scientific excellence – both at the corporate and individual levels – using balanced scorecard approaches. These changes in incentives and targets must be embedded in new coaching, appraisal and promotion processes as well as being reflected in the

organizational hierarchy. Otherwise, they remain paper-based procedures which are often ignored by staff with long traditions of focusing on academic-style research.

### Insights for the Executive

In the “new normal”, RTIs will become increasingly important both to business and to government. While collaboration between businesses and the research community has improved, there are still major barriers associated with IP sharing, differing priorities and conflicting roles. RTIs face major challenges in responding better to customers, dealing with global competition and demonstrating value for money, whilst still maintaining scientific excellence.

There are three key imperatives for improving RTI-business collaboration:

**1. Industry and RTIs should increase their mutual engagement in strategy and planning processes.** The most successful research organizations anchor their strategies around customer understanding and stakeholder involvement in the strategic planning process. This requires the RTI to abandon some activities and to focus and develop areas of strength where it can be nationally or internationally competitive.

**2. Industry should adopt a networked, collaborative model of innovation focused on knowledge transfer.** Industry and RTIs must transfer knowledge and skills rather than technologies. They should become more open about their research intentions to achieve better focus. They should establish IP management arrangements which encourage collaboration. They should collaborate internationally on the basis of shared scientific goals.

**3. RTIs need to instil greater customer focus into their organization, processes and resources.** Improving customer focus requires the right processes supported by a suitable organization – based on customer segments, rather than focussing exclusively on scientific disciplines. RTIs need to ensure that incentives such as customer satisfaction, quality and project delivery effectiveness are given the necessary prominence alongside scientific excellence.

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