



Technology Transfer

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Technology transfer, also called **transfer of technology (TOT)**, is the process of transferring skills, knowledge, technologies, methods of manufacturing, samples of manufacturing and facilities among [governments](#) or [universities](#) and other institutions to ensure that scientific and technological developments are accessible

to a wider range of users who can then further develop and exploit the technology into new products, processes, applications, materials or services. It is closely related to (and may arguably be considered a subset of) [knowledge transfer](#). Horizontal transfer is the movement of technologies from one area to another. At present: transfer of technology (TOT) is primarily horizontal. Vertical transfer occurs when technologies are moved from applied research centers to research and development departments.^[1] Technology Transfer is closely related to [Innovation](#). Three perspectives on [Innovation](#) and Technology Transfer has been unveiled.^[2]

Technology transfer is promoted at conferences organized by such groups as the [Ewing Marion Kauffman Foundation](#) and the Association of University Technology Managers, and at "challenge" competitions by organizations such as the [Center for Advancing Innovation](#) in Maryland. Local venture capital organizations such as the Mid-Atlantic Venture Association (MAVA) also sponsor conferences at which investors assess the potential for commercialization of technology.

[Technology brokers](#) are people who discovered how to bridge the emergent worlds and apply scientific concepts or processes to new situations or circumstances.^[3] A related term, used almost synonymously, is "technology [valorization](#)". While conceptually the practice has been utilized for many years (in ancient times, [Archimedes](#) was notable for applying science to practical problems), the present-day volume of research, combined with high-profile failures at [Xerox PARC](#) and elsewhere, has led to a focus on the process itself.

Transfer process

Many companies, universities and governmental organizations now have an Office of Technology Transfer (TTO, also known as "Tech Transfer" or "TechXfer") dedicated to identifying research which has potential commercial interest and strategies for how to exploit it. For instance, a research result may be of scientific and commercial interest, but [patents](#) are normally only issued for practical processes, and so someone—not necessarily the researchers—must come up with a specific practical process. Another consideration is commercial value; for example, while there are many ways to accomplish [nuclear fusion](#), the ones of commercial value are those that generate more energy than they require to operate.

The process to commercially exploit research varies widely. It can involve licensing agreements or setting up joint ventures and partnerships to share both the risks and rewards of bringing new technologies to market. Other corporate vehicles, e.g. spin-outs, are used where the host organization does not have the necessary will, resources or skills to develop a new technology. Often these approaches are associated with raising of [venture capital](#) (VC) as a means of funding the development process, a practice more common in the [United States](#) than in the [European Union](#), which has a more conservative approach to VC funding.^[4] [Research spin-off](#) companies are a popular vehicle of commercialization in [Canada](#), where the rate of licensing of Canadian university research remains far below that of the US.^[5]

Technology transfer offices may work on behalf of research institutions, governments and even large multinationals. Where start-ups and spin-outs are the clients, commercial fees are sometimes waived in lieu of

an equity stake in the business. As a result of the potential complexity of the technology transfer process, technology transfer organizations are often multidisciplinary, including economists, engineers, lawyers, marketers and scientists. The dynamics of the technology transfer process has attracted attention in its own right, and there are several dedicated societies and journals.

There has been a marked increase in technology transfer intermediaries specialized in their field since 1980, stimulated in large part by the [Bayh-Dole Act](#) and equivalent legislation in other countries, which provided additional incentives for research exploitation.

Drawbacks

Despite incentives to move research into production, the practical aspects are sometimes difficult to perform in practice. Using DoD [Technology Readiness Levels](#) as a criterion (for example), research tends to focus on TRL (technology readiness level) 1-3 while readiness for production tends to focus on TRL 6-7 or higher. Bridging TRL-3 to TRL-6 has proven to be difficult in some organizations. Attempting to rush research (prototypes) into production (fully tested under diverse conditions, reliable, maintainable, etc.) tends to be more costly and time-consuming than expected.^[6]