

**Speech Technology R&D in Industry and Universities:
How Are They Different and Can They Benefit From Each Other?**

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Researchers in universities on the one hand and industry on the other often fail to understand each other and may even despise each other. In fact, both groups contain their share of people who are brilliant and who are pedestrian, high-principled and unscrupulous, energetic and lazy. The differences lie not in the quality of the researchers but in the pressures they are under.

Success in academic research is established through publications and to a lesser extent reports for funding organisations. These require originality. They also require rigour, and more specifically thoroughness in carrying out repeatable experiments and in establishing a genuine advantage for the original idea over existing alternatives. This in turn requires a thorough knowledge of what others have published. The requirement for rigour requires continuity over time to complete a programme of research, including the time needed to track work elsewhere.

The requirement for success in industry is different. The work must generate revenue that pays the costs of the organisation, including the salaries of the researchers and a return for investors, without whom the work could not normally have started. The return normally has to come within a few years at most if the venture is to survive.

Generating enough revenue to cover costs – *i.e.*, being profitable – is extremely difficult in speech technology at present. Revenue comes only from output that is “useful”. This does not mean that the output must improve the world in some moralistic sense; it simply means that others perceive the output to be useful enough to them to be prepared to pay money for it.

In industry, originality has no value in itself; indeed, developers in industry might well be more successful if they spent more time copying others. However, where there is originality, if it is to be of value it has to be protected from copying by competitors by patenting or by secrecy, at least until the entity that developed it can gain an edge in its exploitation. This need to hide successful original developments for a while is directly opposed to the career needs of academic researchers.

Work in industry benefits from rigour and continuity over time, but these benefits are often swamped by the more important requirement for flexibility in responding quickly to changing market opportunities. Even without changes in the market, the optimal level of persistence in pursuing an approach is lower in industry. A respectable academic paper can consist of a rigorous demonstration that a particular approach is not useful, but there is no direct benefit in industry from such a demonstration. As soon as a particular approach looks unpromising, is probably best for an industrial developer to drop it and try something else.

Lest this makes industry seem unattractive, there are compensations. The very requirement for usefulness, even in the narrow, material sense, is a powerful criterion for the value of a line of research. This is not to say that research that does not lead to saleable products is not important, but it is true that worthless research will not lead to saleable products. In addition, the industrial criteria for success are more conducive to collaboration between individual researchers, since it is far more important that the team should be successful than that a researcher should establish his or her individual brilliance. Collaboration between organisations is also helpful in industry, provided that it is not the artificial kind often produced in exchange for European or national government subsidies. The most effective collaboration is between organisations whose outputs are complementary. However, even direct competitors can benefit from collaboration if the market is not static but can be increased by an improvement in the products being offered. This is definitely the case in speech technology.

Collaboration between industry and university departments is more difficult because of the differences in success criteria. Through the need for originality and rigour, academic researchers are inevitably drawn towards higher-risk approaches and towards longer-term programmes than industry would ideally require. Ironically, venture capitalists (VCs) share with academics a predilection for high-risk approaches. This is because VCs make multiple investments aiming for a few big successes amongst a majority of failures. Industrial researchers generally prefer to have a good chance of remaining employed rather than receiving a lottery ticket whose prize is belonging to the rare highly successful company.

In theory, large corporations can afford to spread risk as VCs do. Indeed some large corporations do that, but the trend is away from this approach. IBM, for example, closed down most of its science centres. The trend is towards “accountability”, which effectively means splitting a large organisation down into a set of small semi-autonomous business units, each separately required to be profitable, and hence dissuaded from taking risks.

Collaboration between universities and small companies seems to be more successful in the US. This is probably because of the different attitude in the US towards risk: unlike in Europe, there is no shame in attempting a business venture and failing, even repeatedly. US business ventures are therefore better aligned to the high-risk strategy that suits academic researchers.

My conclusion is that we should recognize that universities have an important role to play in research and development that will lead to industrial innovation. However, we should not fool ourselves that universities and industry can easily collaborate. The European cultural aversion to failure and hence to risk is unlikely to change quickly. Rather, we should stop bribing industry with research subsidies, especially those requiring artificial collaboration, and divert that money to support research in universities expected to be generally useful to industry in the medium and long term. Industrial panels could help advise on directions that are broadly interesting to them. We have much to gain from each other provided there is mutual respect and understanding of the different pressures on us.