

## **The Triple Helix Quest for Innovation and entrepreneurship**

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Interaction among industry, university, and government to foster the capitalization of knowledge speeds up the innovation process and leads to new forms of integration among these institutions. The triple helix is neither a model of non-intersecting circles or institutional spheres with specialized purposes and strongly defended boundaries nor circles in the Venn diagram in which one circle or institutional sphere, such as the state, totally encompasses the others. Rather the triple helix is somewhere in between as a set of overlapping circles with negotiations among spheres interacting on a roughly equal basis, with networks and new organizations to carry out joint activities.

### Dimensions of the Triple Helix

There are four dimensions to the development of the triple helix: the first is internal transformation in each of the helices, such as the development of lateral ties among companies through strategic alliances or an assumption of an economic development mission by universities. The second is the influence of one helix upon another, for example, the role of the US federal government in instituting an indirect industrial policy in the Bayh-Dole Act of 1980 or of state governments in formulating policies and programs to encourage universities to establish industrial ties. A human capital consequence of helical intersections is that people will increasingly be moving from one sphere to the other and not staying within a single sphere and certainly not within a single organization for their entire career.

The third dimension is the creation of a new overlay of tri-lateral networks and organizations from the interaction among the three helices, established to generate new ideas and formats for high-tech development. This phenomenon is especially salient at the level of regional industrial clusters that formerly lacked a common organizational structure. These new arrangements are typically given birth to under crisis conditions such as those induced by general economic depression or increased international competition. The fourth dimension of the helix model is a recursive effect of these institutional spheres, both on the spirals from which they emerged and the larger society. One such effect is on science itself as a result of internal changes within academia, strengthened and diffused by government policy. Seeking tangible rewards as well as prestige---weaving knowledge, money and power into a single framework---entrepreneurial scientists are creating a new and potent element in the ethos of science.