The Science of Science Innovation Policy

The following two italicized paragraphs are taken from the 2006 National Science Foundation's *Science of Science Innovation Policy Prospectus.* However, industry has been tackling parallel problems for more than thirty years. Its leading edge knowledge already substantially meets this program's key objectives, as shown by the annotations.

> *The program's goals are to reliably evaluate the tangible (innovation, economic growth) and intangible (societal well – being) returns [1] from investment in research and development (R&D) [2] While recognizing its enormous historical impact, this program seeks to predict the likely returns from future such investment - in a body of usable analytical and empirical knowledge [3] including, but not limited to, the development of econometric tools analogous to those that have helped economic policy makers [4].*

> *Activities will advance the scientific basis of science policy [5], through the development of data collection [6] with surveys [7] based on a new taxonomy of twenty-first century science and engineering [8]. The totality of these activities is expected to foster the development of a new interdisciplinary field [9].*

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[1] The central problem for developing the Science behind Science Innovation Policy lies in Economics' lack of a solution to its 'quality change problem' – that is it has no methods for calculating the quality of use derived from goods (or more accurately the products of manufacturing technology). Because that is exactly what industry needs to be able to do, industry has had to solve this problem independently. Its decades long genesis has produced a fundamental scientific equation that uses economic and market data to enumerate the performance of a product or service, as perceived by its purchaser at point of purchase - including all the rational and irrational (including those related to well – being) surrounding that purchase (without having to identify each one). This not only connects innovation mathematically to economic growth, but also to societal well – being; whose enumeration is collateral to solving the quality change problem.

[2] Unfortunately *R&D Investment* has become somewhat of a cliché. However, if R is separated from D then a numerical connection (robust over five decades of data) emerges between D (as expense) and an innovation metric. That metric further connects to GDP.

[3] Access to empirical knowledge from the factory, laboratory and corporate office, which is not available to others, is exactly why industry has been successful in cracking the 'quality change problem' in Economics while Universities have not [1]. This was essential to finding, and then validating, the new solutions.

[4] When variables trend upwards from an underlying factor (such as population growth) almost any conjectured to be important might be admitted as significant, even when not. Britain's innovation index analysis recently fell into this trap. Such weakness in Econometrics can be avoided using a mechanistic algebraic model, validated by data; in the more scientific approach industry has taken.

[5] Yes. Industry's retrospective analysis of Federal investments in the space program and in supercomputers has already yielded historical insights into how science policy can better serve today's interests.

[6] The commercial synthesis had to be derived from a unique and comprehensive five-decade database, assembled from multiple disparate public and private sources. Dubbed DINTEC™, its success defines the sub dataset that needs to be harvested in future.

[7] National Science Foundation's new Business Research Development & Innovation Survey BRDI-1 does not collect the sub dataset [6], but can be refined to do so.

[8] Actually, leading edge generic taxonomies for technology and utility are already available.

[9] Commercial know how is inherently interdisciplinary and the codification of its tacit knowledge on innovation into an applied science of economic development is implicitly a new field.