

## Gideon Samid, Research Activity



Gideon Samid's research interest is centered on characterization and quantification of the knowledge-realization process (research, discovery, learning) as it applies to innovation, security and education. While in education the source of knowledge is helpful towards the knowledge realizer, in security it's the opposite – here the idea is to make it difficult for one's adversaries to learn how to compromise the protected system; and in scientific and technological innovation nature – the source – is neutral. In all three cases it is hard to estimate the effort needed to accomplish the knowledge-realization objective. Yet, such estimates are essential in terms of gauging progress of, say, a research and development project, as well as in terms of intrinsic guidance how to proceed. The research into the nature of research involves an aggressive effort of abstraction: identifying patterns, symmetries, isomorphism, and other invariants common to all research projects regardless of what is being researched. Similarly in gauging how difficult will it be for hackers (i.e. “black hat” innovators) to break into a protected system, one is attempting to discern similarities among break-in processes even if such similarities are quite elusive. And corresponding considerations apply for education.

Some interesting results so far are: (i) the intractability map – a recursive map structure which is based on a simple recurring graph-element, but is rich enough to chart every innovation process from its inception to its termination, including all the ‘wrong turns’ and mistaken inferences (See “The Innovation Turing Machine”). This innovation-map also serves as an effective framework to practice community innovation – allowing a community of researchers to cross fertilize with minimum confusion and complexity; (ii) Measuring intractability by the shape of the multi dimensional resource estimation curve – allows one to measure progress in solving an intractable challenge by tracking the diminishing residual intractability over time; (iii) The knowledge momentum concept – past discoveries create a preferred discovery trajectory (momentum) that reduces the probability of uncovering insight hidden way off that trajectory; (iv) deduction and inference can be expressed as a cascade of binary questions which are answered by every element of the available relevant knowledge, where the answer is binary plus a self measure of confidence, and the various answers can be neural-like linked to produce a high-fidelity summary answer; (v) symmetry and group theory may be used to describe thematically removed innovation sequences in extreme abstraction, leading to exposure of hidden similarities, and “buried” isomorphism that eventually allows one to migrate solutions across vast thematic distances.

We live in the age of knowledge, our economy is the economy of knowledge, our survival depends directly on the productivity of our research, on our effective security, and on our ability to disseminate critical knowledge to the community of users. This truism applies to every topic, and every discipline, accordingly the here described research effort is inherently interdisciplinary, and because its newness, it does not fit well with any established area of investigation. On the other hand, any finding, any practical conclusion from this study will extend its impact across the board - with respect to all knowledge intensive enterprise. The innovation-map and the intractability metrics, are examples of results that have already accelerated various research projects.

The science of innovation abstraction, intractability metrics, and knowledge realization characterization in the current form has its roots with Gideon Samid' PhD dissertation at the Technion in Israel; it continued with Gideon's consulting services, and is now planned for a serious academic effort at the School of Engineering at Case Western Reserve University.

#### Books by Gideon Samid

- Computer Organized Cost Engineering
- The Innovation Turing Machine
- The Unending Cyber War
- Most of What We Need to Know - We Don't

*Gideon Samid manages D&G Sciences - Innovation Productivity Corporation, is the chief technology officer with AGS Encryptions Ltd, and founder of FiiMA - The First International Innovation Management Alliance. Gideon worked at Exxon, NASA, the Pentagon, SAC, CSC and Presearch.*  
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