Key U.S. Innovation Elements: What are they and how do they interact?

U.S. innovation indicators tend to focus on measurable data sets which have been readily collected by governmental and private entities for many years. While policy makers have traditionally looked at patent production, R&D spending, science & engineering degrees conferred and scientific article citation, the U.S. "innovation ecosystem" is a more complex series of interrelated phenomena. ASTRA has created a ***Periodic Table of Innovation Elements*** suggesting how key innovation elements interact and seem to affect one another. The more recognized innovation elements depicted below are organized according to eight "element" groups: **Inputs, Process, Outputs, Impact, Macro-Economy, Policy, Infrastructure** and **Mindset**. The key innovation elements selected by ASTRA are organized and color-coded depending upon their primary role.

Periodic Table of Innovation Elements

R&D Expenditures														
R&D	Capital											Impact	Impact	MacroEcon
Patents	Gross Capital Formation											# Innovative Enterprise	Birth Rate New Enterprises	Average Hourly Earnings
Talent	Capital											Impact	Impact	MacroEcon
# Researchers	ICT Investment											S&T Employment	Net Change Enterprises	Gross Private Investment
Talent	Capital	Networks	Networks	Networks	Management	Prod Dev.	Process	Process	Output	Output	Output	Impact	MacroEcon	MacroEcon
No. with Higher Education	Initial Public Offerings	Broadband Penetration	SMEs with Cooperation Arrangements	# Business Incubators	Entrepre-neurship	# Approved Patents	# Cooperation Agreements	R&D Used From Overseas	Sales New to Market	# New Products Introduced	New Markets Created	Leading Competitiveness Indicators	Real GDP	Real Interest Rates
Talent	Capital	Networks	Networks	Networks	Management	Prod Dev.	Process	Process	Output	Output	Output	Impact	MacroEcon	
Verbal SAT	Angel Networks	Computer Use per Capita	Intern'l Alliances	# Internet Domains	Quality of Management	Time & Money to Develop	Early Stage Entrepreneurial. Activity	Innovation Expenditure	Sales New to Firm	Output per Sector	Export Sales	High Tech Jobs Gained & Lost	Real GDP per Capita	
Talent	Capital	Networks	Networks	Management	Management	Efficiency	Process	Process	Output	Output	Impact	Impact	MacroEcon	
Math SAT	SBIR Funding	Internet Use by Business	Federal Lab CRADAs	Shareholder Value	# of Ideas	Availability Competent Managers	Research Quality	Enterprises Innovating In-House	Royalty, License Fees	New Companies Created	High Tech Exports	Income per Capita	Inflation Rate	
Talent	Capital	Networks	Networks	Management	Prod Dev	Efficiency	Process	Process	Output	Output	Impact	*Future*	*New*	*Metrics*
Pop with Life Long Learning	Investment Risk	Broadband Costs	University Spinouts	Customer Satisfaction	Technology Absorption	Cost Reduction	Quality of University Collaboration	Product Launch Speed	Overall Productivity	Value Add of SMEs	Employment in High Tech Sector			

Policy	Policy	Policy	Policy	Policy	Infrastruc	Infrastruc	Infrastruc	Infrastruc	Mindset	Mindset	Mindset	*Future*	*New*	*Metrics*
Corporate Tax Rate	# New Taxes, Excises, Duties	Time Required to Start Business	Foreign Ownership Restrictions	Rule of Law Governance	IP Rights	Environment Governance	Legal Rights Index	Home Affordability	Public Source of S&T Information	Informed about Policy Issues	Value Place on Creativity			
Policy	Policy	Policy	Policy	Infrastruc	Infrastruc	Infrastruc	Infrastruc	Mindset	Mindset	Mindset	Mindset	*Future*	*New*	*Metrics*
Overall Tax Burden	# Procedures to Start Business	Trade Barriers	IP Protection	Judicial Independence	Infrastructure Quality	Openness to Competition	# of New Bldgs Designed	Youth Interest in Science	Public Interest in S&T	Science Literacy	Wish to Own Business			

Innovation Element Groups (Families)*

Inputs	Process	Outputs	Impact
Macro-Economy	Policy	Infrastructure	Mindset