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**U.S. EPA Water Technology Innovation Cluster Leaders Project:**

**Report on consultation activities by General Informatics, LLC, at and following the cluster leaders meeting on September 28, 2014 in New Orleans, Louisiana**

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# Overview

Approximately 50 people from about a dozen regional initiatives attended the Water Technology Innovation Cluster Leaders Meeting on September 28, 2014, in New Orleans, Louisiana. The stages of maturity of their water technology clusters varied greatly, but most were incipient or proto-clusters, that is, very early-stage. In addition, though receptive to presenters’ ideas about cluster design and management, some of the organizations attending were more concerned with solving region-specific water-related problems, and less concerned with economic development in the usual sense. Patterns of attendees’ post-workshop participation and non-participation are discussed in this report.

This final project report recounts the work performed by General Informatics, LLC and the results. Additional sections of the report offer interpretation of these outcomes, and recommendations for future actions. Appendices include meeting follow-up actions and the slide set from the workshop.

**About General Informatics, LLC**

General Informatics LLC is an international economic development, research and policy consultancy, providing industrial, science, and technology advice, at the Ministerial level, assisting policy-making in attracting, launching, and retaining innovative technology companies for regional wealth. Clients include governments, agencies, regional authorities, and research institutes. Dr. Fred Phillips, Managing Partner at General Informatics LLC, is a Senior Fellow at the IC2 Institute of the University of Texas at Austin, Distinguished Professor at Yuan Ze University in Taiwan, and Visiting Professor at SUNY Stony Brook.

# Work Performed

General Informatics, LLC:

1. Assisted with agenda development for the September 28 cluster leaders meeting in New Orleans, Louisiana.
2. Helped plan and participated in phone conferences, initiated by Maggie Theroux, prior to the cluster leaders meeting, with three of the member cluster initiatives.
3. Developed a workshop on the characteristics and importance of clusters for technology development and local economic development, and strategies for cluster initiatives.
4. Delivered the 3-hour workshop on September 28 to an audience of about 50 participants. The workshop material covered a review of cluster formation and maintenance, with attention to organization, structure, leadership, and governance; anchor companies; and the roles of the private, public, and educational sectors. It further covered collaboration mapping and patent mapping, cluster life cycle and maturity, benchmarking a cluster initiative, and a brief discussion of funding. It included a guide to deciding a cluster initiative’s program offerings. A summary of the presentation appears below.
5. Moderated two breakout sessions at the September 28 meeting.
6. Held individual conversations with cluster representatives.
7. Helped participating cluster initiatives assess their maturity levels.
8. Issued follow-up communications to all workshop participants, subsequent to the meeting. These communications covered networking opportunities, summaries of latest research on cluster formation and management, Dr. Phillips’ advice for the water cluster leaders, and offers to answer recipients’ cluster-related queries.
9. Answered emailed questions from participants.
10. Conferred with EPA technical leads Sally Gutierrez and Maggie Theroux concerning strategy, status of participating cluster initiatives, and progress reports.
11. At EPA’s request, reviewed and commented on Abt Associates’ meeting summary report for the September 28 meeting.

# Results

***Prior to the Cluster Leaders Meeting on September 28***

The preliminary interviews with cluster initiative leaders were conducted by phone, and are reported here in a question and answer (Q/A) format. The interviews showed there is considerable diversity among the cluster initiatives, regarding technological focus, maturity level, and local challenges.

On September 9, 2014, Fred Phillips and Maggie Theroux held a conference call with Helle Petersen and Henrik Laursen of Fresno’s New Tech Valley Initiative.

**Q.** What is the background, origin and age of your initiative?

**A.** It is 20 year old. It started strong, but plateaued after 10 years, keeping a narrow focus. Four years ago we broadened focus, and formalized the organization somewhat. Mapping [of lab and company interactions was] done two years ago.

**Q.** Can you give us an impromptu strengths, weaknesses, opportunities, and threats (SWOT) SWOT analysis?

**A.** We hold a conference every two years with 200 participants, good sponsorships. Other economic development efforts and technology cluster initiatives, plus the university, compete for company funds. We offer little differentiation from these others, from the perspective of the companies. We want to formulate long term goals as a non-profit. Blue Tech Valley and the Wet Center get good PR. Our quality of life is both good and bad; country living but remote. Our agriculture market draws high interest among investors.

**Q.** What are your frustrations?

**A.** Funding. Funding from regional workforce board is very restrictive. Leadership for the future. Fresno needs help with framing a value proposition. Big companies like Sun Maid will contribute more if this is done. We need to differentiate the roles of Blue Tech Valley, Wet Center, and Fresno State.

On September 11, 2014, Fred Phillips and Maggie Theroux held a conference call with Glenn Schrader and Hugh James of the University of Arizon's Water Technology Innovation Cluster.

**Q.** What is the background, origin and age of your initiative?

**A.** Started one year ago. It is a regional effort, into New Mexico, Sonora, Southern California. University of Arizona (UV) held the Biosphere 2 conference. The City and Mayor of Tucson held a follow-up workshop. We are a 503c6 [organization] and can lobby. We are a business membership organization, offering a council to match technology and markets. This activity is expected to drive the cluster. Its “pillars” will be: reclaimed water, reuse and conservation, policy, and education for the “new world” of water tech.

**Q.** Can you give us an impromptu SWOT analysis?

**A.**

**S:** Government research lab, EPA relationship. Leader in water reuse and capture. Joaquin Ruiz, Dean of Science and Vice President at UA is on the board.

**W:** Capital and cooperation are deficient. Cluster elements are still in loose alliance, need to make it stickier.

**O:** Challenges are the current technology for brackish water, which doesn’t work. We have acid lakes from running industry. We can work with Mexico’s water authority.

**T:** Maybe can’t get needed funding. People need “convincing to come out of the woodwork,” wanting to be last to jump in. Holding the unity of the initiative will be difficult.

**Q.** What are your next long term and short term goals?

**A.** Getting members. Now we really only have 5! Must grow membership rapidly. Bring in investment banks, private equity groups. Dialog with Indian nations. Making sure Arizona State University will not be obstructionist as UA builds connections in Phoenix. Launching Tech Launch Arizona.

**Q**. What are your frustrations?

**A**. Need funding for back office. UA is not contributing back office services. University of California-Santa Barbara, New Mexico State might sign first, and maybe University of Nevada-Las Vegas, but they have their own program. UA politics are Byzantine.

On September 12, 2014, Fred Phillips and Maggie Theroux held a conference call with Grasshopper Mendoza and Steve Picou of the Louisiana's Water Innovation Cluster.

**Q.** What is the background, origin and age of your initiative?

**A.** It grew out of [Steve] Picou’s university thesis. Emphases are coastal restoration and groundwater. An “Innovation Roundtable”, reduces out to several agencies and non-governmental organizations, including The Nature Conversancy, State Water Resource Commission, and other Statewide initiatives.

**Q.** Can you give us an impromptu SWOT analysis?

**A.**

**S:** Good cooperation from industry.

**W:** Need to strengthen research; get our constituents to spend on it.

**O:** Lots of British Petroleum (BP) [oil spill] penalty money. A $50 billion [state] master plan for a coastal protection system. Critical mass of [urgent water-related] events, high awareness. Senators Landreu and Witter have helped unification of public works agencies in New Orleans.

**T:** Defunding of the university system. Conflict with industry. Strong “corporate welfare” in Louisiana.

**Q.** What are your next long term and short term goals?

**A.** Learn “Who is our customer.”

**Q.** What are your frustrations?

**A.** Climate change denial. Need leadership.

***During the Cluster Leaders Meeting on September 28 – Summary of Fred Phillips’ presentation***

*Valorization*

Your technopolis repays constituents’ investment, via more and better local jobs, increased tax revenues, more local educational opportunities, more efficient economic development programs, and the invention and production of products and services suited to local and export markets.

One notable failure of valorization was Austin’s Microelectronics and Computer Consortium (MCC), partly due…to the lack of a productization function. In contrast, a key success factor for the Hsinchu Science-Based Industrial Park in Taiwan was the inclusion of production facilities and manufacturing companies. Thus it is helpful to plan a product development function—not just research and development—for your technopolis initiative.

*Measurement*

Most initiatives measure such metrics as new company formation, patents, foreign direct investment and venture investment, growth of support services, growth of existing indigenous companies, university graduates employed locally, cross-citations of scientific papers and patents, the ratio of business tax income to economic development budget, and the percent of business procurement satisfied by local suppliers.

These can be useful measures, but can be fatal to the cluster initiative when applied indiscriminately for program evaluation. A cluster is a complex system. Feedback effects and time lags between cause and effect—not to mention the definition of the exact boundaries of the system—are not yet well understood. Caution is needed, on the part of funding agencies, when evaluating success of cluster initiatives.

Measurement requires continuity: from one political administration to another and from one research park director to the next.

An example in this regard is the Malaysia Multimedia Corridor (MMC). The MMC correctly used fuzzy objectives, embraced measurement, and road-mapped objectives. However, it relied upon an inadequate life cycle model and did not perform benchmarking.

*Mapping*

A cluster initiative or technopolis initiative does well to begin with a mapping exercise. This includes mapping collaboration among laboratories, locally and globally. It includes mapping patent origins and forward/backward patent citations, co-authorship teams, and scholarly article citations.

Fortunately, there is ample software to help in this task.[[1]](#footnote-1)

*Know your Economic Development Jargon*

**Civic boosterism** is the most basic kind of economic development. It involves advertising, lobbying, and bragging—simply showing pride in one’s locale and touting it as a good place to do business.

**Economic development** is boosterism, plus targeted company recruitment. In its more advanced forms, it means balanced attention to recruitment, start-ups, and indigenous companies. The university’s role is recognized.

**Business ecologies/ecosystems** are sustainable networks of suppliers, distributors, amenities, etc.

**Research parks** are facilities for co-locating university, government, and corporate laboratories. Usually closely tied to universities, the parks maintain international research networks while building on local strengths. Parks may have a technology focus, e.g., semiconductor research. The parks are precursors to new industry clusters and new exportable products.

**“Small” technopolis** is anartificial sci-tech city, like Tsukuba, Japan. First embraced in the U.S. by Bechtel Corp., science parks were specialized real estate developments near existing cities.[[2]](#footnote-2) Bechtel and others quickly realized that cultural amenities were necessary to make the developments work. Modern examples are Daejeon, South Korea, and Zaragoza, Spain.

**“Big” technopolis** is achieved when major parts of a regional economy are oriented to innovation, technology and entrepreneurship. There is broad consensus among the electorate that technology is key to the future of the region or city. Examples include Silicon Valley, Austin, and Seattle.

**Incubators** can be university and non-profit incubators, internal corporate incubators, and for-profit incubators and accelerators are the major varieties.

**Corporate venture** divisions encourage employees’ innovation with an eye toward spinning successful initiatives into new companies that will become profitable investments or suppliers to the original corporation.

A mature **cluster** is characterized by a *critical mass* of firms in one industry or closely-related industries, located close to one another—including direct competitors. It includes a *dense web* of designer/supplier/manufacturer interrelationships. At least *one company engaging in world class innovation and significant exports* is necessary for a successful cluster. It is called the anchor firm. Clusters result in an ample knowledge workforce, and knowledge spillovers leading to still more start-ups. Companies “stick” to the locale because of the critical mass of knowledge and supply of materials. A cluster may arise spontaneously or by design.[[3]](#footnote-3)

**Triple helix** refers to government-industry-academic cooperation. It reinforces the lock-in effect of industrial location, but raises complexity and so introduces new risks.

**Convergence clusters** means the colocation of companies in industries that are converging or expected to converge. Example: forging/stamping and vehicle assembly.[[4]](#footnote-4)

**Micro-clusters**, also called proto-clusters (or less formally, wannabe clusters), are promising but not yet world class clusters. They have not yet reached critical mass. They may be targets for state funding and ‘buy local’ connections with potential customer companies.

**Superclusters** indicate dialog and commerce between clusters in related industries. Superclusters mean still greater synergies, more economies of scope, and more “lock-in.”

*Benefits of Clusters*

It is now well known that clusters mean a plentiful workforce and more efficient supply chains. From a government perspective, however, this benefit is small, compared to ***Lock-in.*** Lock-in means that companies come to the city *because other companies are here—*not because of local economic development programs or expenditures. Thus, achieving critical cluster mass will lower or eliminate the cost of recruiting companies to the region.

A nascent or mature cluster produces **knowledge** **spillovers.** Spillover (a “positive externality”) may be explicit knowledge or *tacit* knowledge. The latter kind of knowledge cannot be squirted through a wire; it needs face to face transmission, often involving manual skills, and so requires the kind of colocation that clusters provide.

Spillovers lead to still more start-ups, and an increased local stock of knowledge. Marshall wrote, “The mysteries of the trade become no mysteries; but are as it were in the air…” This means:

* Spillovers are very important, but are the hardest thing to measure.[[5]](#footnote-5)
* Importing knowledge is less efficient than “exposure to new knowledge before anyone knows it’s worth importing.”
* Tacit knowledge is far more difficult to convey over distance.

Spillovers need right ‘distance,’ nonetheless. Sender and receiver must have not too different initial knowledge bases, languages, organizational cultures and settings. There must not be so little cognitive distance that there will be competitive reasons to not communicate.

Just as it becomes easier to recruit companies to a cluster, companies “stick” to the cluster’s locale, becoming reluctant to move away. This also means less economic development marketing expense for the city, and fewer “clawback” problems (recovering economic development incentive funds from departing firms that have not fulfilled contractual obligations for local hiring or environmental responsibility).

Marshallian clustering implies *labor market pooling.* That is, larger clusters offer better matches between workers and firms. It becomes easier for a worker to get a new job, and for the firm to fill the old job.

These considerations are important, but you will get no political favor by talking about “input sharing,” nor public acclaim by talking about “knowledge spillovers.”

*Measure these things for internal use only. Publish only numbers that are meaningful to your intended audiences.*

The bottom line is that clusters are highly desirable elements of technopolis growth, and science and technology parks should drive toward cluster formation.

But the problem is how to get from here to there.

*Cluster Life Cycle and Maturity*

A region’s progress suggests a *maturity model.* Why a maturity model? Because “cluster life cycle models” are:

* + *Passive*. You want to manage your technopolis!
	+ *Simplistic.* Benchmarking calls for more details.
	+ *Uni-dimensional.* Technopolis maturity has several aspects.
	+ *Oriented to clusters.* Clusters are only one element of technopolis.

A maturity model, in contrast, will allow you to benchmark your technopolis against true comparables, help envision your next steps and formulate objectives, and celebrate moving from one maturity level to the next.

The elements of a maturity model are: science and technology, industry, social capital, relational capital, institutional support, and access to finance. General Informatics, LLC’s Technopolis Maturity Model™ appears as an Appendix to this report, and includes a form for self-assessing and benchmarking a cluster initiative.

*A Region’s Progress*

Few regions have reached the top maturity level. We, therefore, cannot say there is a ‘typical’ path for getting there. This section describes a reasonable path. Many regions have achieved the first few steps, so these can be described with confidence.

The cluster is likely to be born from early identification of a (Step 1) university center of excellence. The next step is the formation of research parks (small technopolis, Step 2) and incubators (Step 3). Next comes knowledge-based industrial parks (Step 4), with productization function. At this point, a critical-mass cluster (Step 5) may emerge, growing further into a knowledge business ecosystem (Step 6). With luck, the cluster makes contact with other local clusters, generating synergies leading to a supercluster (Step 7). Finally, the region becomes a ‘big technopolis’ (Step 8), with the majority of the economy and electorate oriented to growth in innovative businesses.

To move from Step 1 to 2, what’s needed is:

* Land and buildings
* Government and military contracts
* Private sector contracts and alliances
* Attracting company and government labs from near and far
* Skilled park managers
* Possibly, advice from World Technopolis Association.

 From Step 2 to 3, what’s needed is:

* Entrepreneurship education
* Cheap space and surplus equipment
* Skilled incubator managers
* Attracting tenant companies from many sources
* Strong interaction with universities and local government
* Strong public relations
* “Know-how network” of experienced business advisors and service providers.

 From Step 3 to 4, what’s needed is:

* New product development
* Manufacturing capability
* Export capability
* Logistics capability
* Continuing research and development.

 From Step 4 to 5, what’s needed is:

* One or more anchor companies
* Local, national, and international networks
* Critical mass of suppliers, distributors, customers, competitors
* Quality of life attractive to knowledge workers.

 From Step 5 to 6, what’s needed is:

* Service and support businesses
* Strong civic and trade associations
* Government committed to sustainable business growth
* Transport and communication infrastructure
* Strong, diverse educational institutions
* High-quality K-12 education
* Planning for quality of life, preparing for the new regime of traffic and real estate prices that success will bring.

 From Step 6 to 7, what’s needed is:

* “Bridge-builders” and convergence visionaries
* Interdisciplinary university research
* Innovative business models
* Synergies among companies, industries, and sectors
* Outreach to neighboring regions, creating ‘superregions.’

 From Step 7 to 8, what’s needed is:

* Continual renewal
* Continuing attention to quality of life.

When you get to the top of the mountain, keep climbing. There is no “end”! Other regions will continue to develop and to compete with you.

Success requires balanced attention to three planning categories:

1. Hardware
	* Land use: residential, industrial, commercial, etc.
	* Infrastructure: road, water supply, electricity, gas, telecommunications, drainage, etc.
	* Public facilities: parks and greens, schools, government buildings, etc.
2. Software
	* Institutionalization, legal system, governance, finance, missions, and strategies.
3. Human-ware/Organization-ware
	* Human capital, human resource management, psychology, day-to-day management
	* Population’s capacity to form organizations, perform within organizations, and cooperate between organizations both locally and globally.

Other bits of the terminological soup—free economic zones, science museums, export processing zones, urban renewal—may be helpful to know about. But don’t let them distract you. *Your goal is cluster-building!*

Especially be wary of “real estate operations” of two kinds: shared-office facilities that, for marketing purposes, call themselves incubators, but offer no business mentoring services; and greenfield parks and science cities (like Songdo in Korea) that require payback on the real estate investment in a time frame shorter than that in which new technological developments are likely to generate revenues. These operations have failed to balance hardware, software, and human/org-ware.

*Ways to Organize* We have said what is needed for climbing from one step to the next. Now, how to get it?

First, recognize that the technopolis is different from the technopolis initiative. A technopolis is the *desired outcome.* The technopolis initiative is the *organization(s) and activities that make it happen.*

The initiative may take one or more of many possible organizational forms: professional society, industry/trade association, incubator/accelerator, science/technology/research and development/manufacturing park, alliance, cluster initiative, virtual cluster, technopolis initiative, or consortium. Each has a different charter and purpose. Some organizational forms may allow government lobbying, and others do not. Some are better than others in accommodating the business competition among members while still accomplishing something toward the common good.

*Selecting Programs and Partners*: *An ”Outcomes-Programs-Resources-Partners“ Concept*

First, list desirable outcomes. Set priorities! What do the members of your initiative wish to see happen in the first years? Green jobs? Exports? Growth in existing companies? High-paying jobs? "Innovator" image? New companies - relocations? New companies - start-ups? Sustainable local economy? Trained, flexible workforce? Others?[[6]](#footnote-6)

Answering the following questions will lead to your best “organizational identity” and partner selection. Which programs best serve the highest-priority outcomes? What skills and resources are needed to make those programs work? Which potential partners/participants bring those skills and resources?

*Locating your Development: Urban? Suburban? Rural?*

This decision must balance real estate cost per square foot, industry characteristics (office space only needed, laboratories, or large fabrication facilities?), and workforce demographics/preferences/availability.

*Introducing General Informatics’ Technopolis Database*

This resource may be used to identify best practices and benchmark regions, technology exchanges/partners, research collaborators, contacts at distant science and technology parks, details about activities in other technopolises, and companies to recruit/invite to your technology park.

The database fields are: Date, City, Country, Headline, Writer, Writer’s Contact Info, People Named, Affiliated Organization(s), Organizational Contact, Source of Article, Description of Technopolis Activity, Description of Organization, and Organization URL.

There are 145 records to date, and more records added continually.

This is an example record:

*Bibliography*: 15-Apr-04: Dundee, U.K. “Dundee a Center of Excellence for Life Sciences.” Writer, Susan Aldridge. Publication: *Genetic Engineering News,* [www.genengnews.com](http://www.genengnews.com/).

*Contact*: Tom Shepherd, PhD, CEO of CXR Biosciences.

*Summary*: Biotech RandD and partnerships with companies locally and globally due to highly rated facilities and reputation, low cost.

*Firms*: BioDundee, Axis-Shield, Cyclacel, CXR Biosciences and others. Partnering with Univ. of Dundee.

*URL*: www.biodundee.co.uk

*Financing a Cluster Initiative*

How can clusters create long-term financial stability? Perhaps more importantly, s*hould they?*

Why ask *“Should they?”* Mature clusters are self-sustaining. They don’t need “funding.” This is the meaning of critical mass. The clusters persist because the companies are making money together!

That statement, while true in principle, is in practice overly idealistic. As noted above, there is no end to cluster development tasks, and when a city reaches the top of the mountain, it must keep on climbing. Nonetheless, an organization or initiative well-suited to move the city from Step 2 to Step 3 may not be qualified to move it to Step 4.

For this reason, a project-oriented cluster initiative should have a sunset clause. (Beware the feather-bedding staffer who knows success will cost him his job!) A non-project cluster-related organization should self-sustain from memberships, etc.

*Often the problem is not continuity of funding, but continuity of staffing and leadership.* Funding may be a hurdle because of a perceived lack of leadership, or leaders may fail to step forward because funding seems unattainable. A true chicken-and-egg problem.

This implies that the life cycle of the cluster initiative affects its attractiveness for funding. Hard to get it for a proto-cluster, when few people understand it or can envision success. Easy to get it when momentum has been achieved and a goal is in sight. Again hard to get it when companies’ goals for local value chain resources are well in hand.

Funding may come from government grant support at the city, state, or national levels, from membership fees, event fees and sponsorships, or corporate sponsorships.

In our experience, funding for metro-area initiatives is more likely to come from local and national governments than from states/provinces. This has to do with the motives of state/provincial legislatures, who represent every district in the state or province. They see little advantage in funneling funds to the technopolis district, which is already perceived as economically advantaged. These legislators may be ‘provincial’ in the other sense of the word, not understanding the potential of technology to enhance economic development.

There are real needs in the outlying districts. However, overly diluting technology development funds across geographies will produce zero results and benefit no one.

Another reason to concentrate on local and federal funding is the recent incidents of corruption in state-level innovation funds, particularly in Texas, and radical cutting of research university budgets, examples being Kansas, Wisconsin, and Texas.

*Relocation Incentives: Do they “work,” or not?*

A city offers tax rebates or exemptions to lure a company to locate in its borders. Would the company have come anyway? This is the “but-for problem”; would the company have come, but for the incentive? Do incentives cannibalize nearby communities, encouraging neighboring cities to compete for the same company, which would create jobs for residents of both cities anyway? And if the incentive succeeds in bringing a company, will the companies honor the terms of the incentive agreement?

A Kauffman Foundation study: Evaluating Firm-Specific Location Incentives: An Application to the Kansas PEAK Program, strongly suggests that such incentives do not make a difference to companies’ relocation decisions, nor does the base tax rate.[[7]](#footnote-7) Often the promised number of jobs are not created, or the number is achieved but with lower-wage jobs than had been planned. Companies accept the tax abatement, but then lobby, regardless, for reduction of the tax valuation of their building and land.

Yet it is not a black-and-white question, as illustrated by two cases.

 *Case 1:* Should Providence, Rhode Island, have paid 38Studios to come to town in 2012?

38Studios was a failed video game development company owned by a former major league pitcher. In the end, loan defaults leave Rhode Island taxpayers on the hook for $151 million. There were no apparent advantages to this deal. On the contrary, the move was aimed at stealing jobs from neighboring Massachusetts; a senseless zero-sum game. There was high risk that this company’s business model could not survive without public support. There was inadequate transparency: A state official asked 38Studios for a job, weeks after state made the grant.

 *Case 2:* Should Austin have paid Apple to come to town in 2012? Pros and cons to this question.

The “pros”: The offer showed a business-friendly policy on the city’s part. Apple is the world’s most valuable company, thus a prestigious catch for Austin. It is consistent with Austin’s overall tech development strategy. Austin has strong policies for not rebating taxes until a company has met auditable job-creation targets. There was the chance that Apple would create more jobs more quickly with the incentive than without it.

The “cons”: Apple would have come anyway. Apple didn’t need the money.

Austin’s tax rebate policy is thoughtful, and its performance is not bad. There have been twelve deals in eight years, including eBay, Facebook, and Samsung Electronics. This is far fewer incentive deals than the other major Texas cities of Dallas, Houston, San Antonio or Fort Worth. No incentives are offered to any company promising fewer than 200 new jobs. 94% of companies moving in or expanding since 2004 did not receive a deal.

Seven of the deals involved less than $1 million in rebated tax, and three of those deals were suspended for noncompliance.

Formal incentive contracts are put in place, and the city hires an outside firm to do detailed compliance reviews. The city holds the money, forcing companies to perform to contract.

Companies receiving deals brought billions in investment and thousands of jobs. Samsung’s investment alone amounted to $7 billion in factory and equipment. In the case of Apple, $8.6 million in tax abatements created 3,600 jobs.

Recent press stories, as well as a recent April 2014 Harvard report: Taxes, Incentives, and Economic Growth: Assessing the Impact of Pro-business Taxes on U.S. State Economies, suggest that knowledge-intensive companies value proximity to university research and to an educated workforce more than they value low taxes, when it comes to location decisions.[[8]](#footnote-8) The tax abatements extended as relocation incentives take money away from K-12 and higher education, meaning that it becomes harder to hire qualified workers and families with school-age children hesitate to relocate to work for the companies in these locations. (This effect is already felt in low-tax Texas.)

*Conclusions for Cluster Initiatives*

90+% of cluster initiatives will fail. Reasons for failure include no continuity of leadership and/or funding, no anchor company, no university centers of excellence, bad communication/transport infrastructure, or lack of learning from experience of other successful and failed initiatives.

Some encouraging successes are seen in ‘unlikely’ places—India, Pakistan, and Iran, for example. These are due to historical conditions, including concentrations of management talent, strong universities, massive government expenditure, or newly globalized markets.

Food, water, and energy are inseparably linked with each other and with the main effects of climate change. This means water clusters must soon reach out to energy, health, and food clusters.[[9]](#footnote-9) Water’s eventual role in superclusters is inevitable.

***During the Cluster Leaders Meeting on September 28 – Interactions***

The meeting participants were receptive to the cluster ideas presented by the speakers. It is this writer’s impression, however, that the audience did not exhibit much personal resonance with the argument that because of the great benefits of achieving a viable cluster, cluster-building should be the prime mission of their initiatives. More discussion of this point appears in the “Interpretations” section below.

The point that cluster initiatives should emulate realistic role models (not Silicon Valley!) was well received. Audience members were interested in the General Informatics cluster maturity assessment instrument, which several attendees took home with them.

Simplistic input/output measures of cluster performance are not likely to be accurate, due to complex interactions and poorly understood time lags between causes and effects. This view, put forth in journals by university researchers, was echoed by several participants at the meeting.

Two of the initiative organizations represented at the meeting (Washington State and Louisiana) were primarily focused on solving a particular water-related problem, rather than on economic development via attracting/nurturing/launching companies. The meeting summary report, developed by Abt Associates, aptly called this the “market opportunity” approach, contrasting it with the “geographic/economic development” approach. The problem-solving or market-opportunity focus requires different methods from the cluster-building focus.

There were questions about the feasible geographic size of a cluster. Dr. Phillips emphasized that knowledge spillover is an essential part of cluster functioning, and that spillover is for the most part a face-to-face process. Busy entrepreneurs and executives will not spend more than about an hour to attend a networking or educational event that promises to provide knowledge transfer. This limits the size of industry clusters.

There was a high level of interest in the incentives question—how to make the decision on whether to offer relocation incentives to a company the region is hoping to attract.

Communication with the cluster representatives was easy, and rapport was established.

***Following the Cluster Leaders Meeting on September 28***

The only email feedback received by General Informatics was from Mark Skinner of SSTI, Richard Seline of AcclerateH2O, and Melinda Kruyer of Confluence. There were no email responses to the consultant’s solicitation of cluster-related questions.

# *Interpretations*

According to the meeting summary report developed by Abt Associates, “The goals of this workshop were to: (1) share information on accomplishments and updates to national and international water cluster efforts; (2) learn and discuss effective organizational strategies for technology innovation clusters; (3) review and discuss successful approaches and schemes to fund cluster initiatives for the long-term; (4) share information on the Regional Innovation Accelerator Network (RIAN) with the water cluster leaders; (5) foster networking among the clusters leaders; and (6) identify next steps to further assist the water clusters.” The first four goals, at least, appear to have been met.

We conjecture concerning the meeting participants’ lack of post-workshop engagement with the cluster idea, and with continuing to network with this group. It is possible that:

* Because their stages of development are too early, a cluster strategy seems like a luxury and a distant prospect not relevant to their immediate hurdles. Specifically, they might have adopted a goal of attracting any water-related companies they can, regardless of whether this moves them toward a critical-mass cluster.
* They have received instructions from their organization’s sponsors at home that differ from the directions recommended the workshop speakers and consultants.
* They believe the differences among their individual situations are greater than the commonalities.
* They are receiving peer advice from sources other than this cluster leaders network.
* The representatives are young or inexperienced in building civic initiatives.
* They are simply too busy.
* Meeting organizers and speakers failed to sufficiently recognize the situations of the initiatives pursuing market opportunities rather than economic development.

# *Recommendations*

1. One participant asked about the best staff size for a new cluster initiative. Dr. Phillips replied, ideally, zero. If local institutions and companies are willing to support the initiative, they will volunteer some staff time. If they are not willing, the in-house head count won’t matter. If they are not willing, the cluster instigators must ask themselves whether the initiative is a bad idea in the first place, or whether the early-to-mid-career people involved are capable of persuading the companies. If the local companies are not ready to get behind the initiative, options are: give up, or find someone else who can persuade the companies. In other words, find a godfather.[[10]](#footnote-10)
* *Future communications should bring this point home to participants.*
1. Find out why there was a lack of post-meeting engagement.
	* *Survey participants for this purpose.*
2. Discussion and research may lead to more meaningful measures of the performance of cluster initiatives. This is an urgent and important matter for all participants.
	* *Connect with university researchers who can provide these answers.*
3. According to the meeting summary report developed by Abt Associates, “Mr. Schrader was in favor of a national cluster network, since water has never been a national priority (e.g., there's no Department of Water).” EPA is the natural home for such a function, and could organize to fulfill it. It would have to deal with the United States’ history of state and local control of water sources. The latter is evidenced by the diverse state approval processes that a water-related product must pass before being allowed on the market. This obstacle to the growth of water tech companies—which contrasts greatly with the centralized administration of drug approvals (FDA) or Internet policy (FCC)—was the subject of a phone meeting with Fred Phillips and EPA technical leads Maggie Theroux and Sally Gutierrez on October 30, 2014.
	* *Dr. Phillips recommended writing articles that will influence policy makers to ameliorate this inefficiency.*
4. Both possible themes for a next general meeting, proposed by participants during Ms. Theroux’ wrap-up session, are geography/economic development oriented. A meeting theme might well be developed that would also serve the members who are pursuing the problem-solving or market-opportunity focus.
	* *Presentation topics could include open innovation methods, TallyFox’ online collaboration platform and free water research networks, and new tools General Informatics, LLC has under development.*

1. Regarding participants’ ambivalence about continuing to work with each other, again from the meeting summary report (Abt Associates): “Mr. Schrader noted that maintaining a targeted technological focus will enable his cluster to support a broader geographic boundary. For example, if a community needed flood technologies, he’d send them to another cluster.”
	* *In future communications, emphasize this beneficial aspect of networking.*
1. Some resources for mapping are:

	* <http://www.epa.gov/nrmrl/watercluster/docs/Patent_Mapping_Report.pdf>
	* Dan Brass, *Do It Yourself Social Network Analysis.* linkscenter.org/teasna/2008/brassoverview2008.pdf
	* *Scientio's Intelligent web services.* [www.conceptstrings.com/](http://www.conceptstrings.com/)
	* General Informatics consultant Steve McMillan says, “I have used Ollie Persson's Bibexcel to generate the matrices, etc. and then Pajek for the actual mapping. Other programs are Netdraw, Netminder, and Vantage Point.”
	* Routines for Social Network Analysis in the R Environment erzuli.ss.uci.edu/R.stuff/
	* G. Steven McMillan, “Mapping the invisible colleges of RandD Management.” *RandD Management* 38, 1, 2008, 69-84.
	* G. Steven McMillan and Debra L. Casey, “Paradigm Shifts in Industrial Relations: A Bibliometric and Social Network Approach.” *Advances in Industrial and Labor Relations,* issue 17, 207 - 255.
	* *Scientometrics*. Volume 100 , Issue 3, Special Issue on TechMining.
	* More efficient economic development programs. [↑](#footnote-ref-1)
2. Seminal source: S. Tatsuno (1986) *The Technopolis Strategy: Japan, High Technology, and the Control of the Twenty-First Century*. Englewood Cliffs, NJ: Prentice-Hall/Aperture. (Plus later work by Gibson; Saxenian; Malecki; Phillips) [↑](#footnote-ref-2)
3. Seminal sources: Alfred Marshall, *Principles of Economics* (1890). M. Porter (1998) “Clusters and the New Economics of Competition.” *Harvard Bus. Review* Nov-Dec, 77-90. [↑](#footnote-ref-3)
4. <https://secure.hbs.edu/isc/login/login.do?http://data.isc.hbs.edu/isc/> [↑](#footnote-ref-4)
5. Mark Alan Hughes, Next American City Measuring the Impact of Innovation Clusters 08/07/2012 12:52pm http://americancity.org/daily/entry/ways-means-measuring-the-impact-of-innovation-clusters [↑](#footnote-ref-5)
6. Source: Alexandra Simon and Pilar Marques, Success Factors for Intermediary Organizations: Evidence from European Case Studies. Autonomous University of Barcelona, 2014. [↑](#footnote-ref-6)
7. Nathan M. Jensen, Evaluating Firm-Specific Location Incentives: An Application to the Kansas PEAK Program. http://www.kauffman.org/~/media/kauffman\_org/research%20reports%20and%20covers/2014/04/evaluating\_firm\_specific\_location\_incentives.pdf [↑](#footnote-ref-7)
8. Soledad Artiz Prillaman and Kenneth J. Meier, Taxes, Incentives, and Economic Growth: Assessing the Impact of Pro-business Taxes on U.S. State Economies. The Journal of Politics. Vol. 76, No. 2 (Feb. 28, 2014), pp. 364-379.

DOI:<http://dx.doi.org/10.1017/S0022381613001345>, Published online: 28 February 2014 [↑](#footnote-ref-8)
9. See, inter alia, “How Water Supply is Impacting the Future of Manufacturing” www.redhotlocations.com/report/2014/aug/water.cfm [↑](#footnote-ref-9)
10. F. Phillips, “The Godfathers: Characteristics and Roles of Central Individuals in the Transformation of Techno- Regions.” *Journal of Centrum Cathedra*, 1(2): 12-27, 2008. [↑](#footnote-ref-10)