



## Creating globally scalable solutions for Green IT best practices

By Deborah Grove, Principal, Grove-Associates

Let's look at the challenges of creating globally scalable solutions for Green IT in the context of a problem about which we can all agree: We need to reduce global warming. The questions that need to be resolved are how we do it, how fast we do it, and what the target reduction should be.

In my 30 years in the IT industry around the world, I have not seen a level of cooperation among various parties that compares with today's collegial mood in Silicon Valley around promoting best practices in Green IT.

For the purposes of this paper, Green IT is specifically defined as "reducing power consumption of data centers." Of course, it can be much more but I'd like to address the innovation around this particular initiative without expanding the definition for this article.

This model, named NIC for "Novel Innovation Collaboration," is characterized by cooperation and transparency that can scale across geographies and politics, as we all struggle to lower our greenhouse gas emissions.

The attributes of NIC are as follows:

- Conceptualizing thresholds, not boundaries
- Facilitating ad hoc and self-nominated (contextual) leadership
- Encouraging p2p monitoring and governance: leveraging relationships as trust increases
- Enabling self-selection of tasks by active participants
- Integrating network and hierarchical structures
- Valuing small-scale contributions that aggregate to large-scale successes. There is little ambiguity in one's own "role." People take on what they can.

These six attributes are described in a report published by the Institute of the Future 2006, and we are very grateful to their authors, Andrea Sevieri and Howard Rheingold, for publishing the report online and sharing the intellectual property. See [http://www.iftf.org/docs/SR-935\\_Rapid\\_Decision\\_Making.pdf](http://www.iftf.org/docs/SR-935_Rapid_Decision_Making.pdf)

What's novel in this instance? Private sector competitors and research organizations, together with utilities, work to bring to market more energy-efficient products developing standards and efficiency metrics, so that "servers and storage show their miles per gallon, not just their 0 - 60 in 5 seconds equivalent," says Mark Bramfitt, principal program manager at Pacific Gas & Electric in San Francisco, responsible for data center energy efficiency programs for customers.

These attributes have been adopted unconsciously in several Silicon Valley initiatives to create data center energy efficiency (hereafter DCEE). There are today three major and countless minor groups working on DCEE. These include the Lawrence Berkeley National Laboratory; Green Grid and Silicon Valley Leadership Group, both industry associations; the US Department of Energy, as well as local utility companies (Pacific Gas & Electric as well as Silicon Valley Power).

The secret sauce in their successful achievements is none other than sharing and mimicry: Sharing problems, sharing pilot studies, negotiating metrics together, and offering up workable and non-workable solutions that larger audiences can mimic for their own use.

No single individual or single group is harnessing the groups to work together. Rather, NIC resulted from the social networks of key individuals, which is why it hasn't been identifiable as a novel variation on collaboration until now. Global warming and the known waste in electricity created the conditions for NIC to take hold.

Here are some of the organizations contributing to the model:

- Silicon Valley Leadership Group - industry association
- Lawrence Berkeley National Laboratory - federally funded laboratory
- Pacific Gas & Electric - regulated utility
- Critical Facilities Roundtable - industry association
- Sun, Oracle, Yahoo, Savvis, and other large corporations

Much has already been accomplished.

First, a pilot "direct current for data centers" (DC) project, in which the Lawrence Berkeley Lab "officiated" a pilot project measuring increased computing power with less power evaporation on two computers (one Sun and one IBM), took place in early 2006. Read more at <http://hightech.lbl.gov/dc-powering/pubs/coverage/TMCNET.pdf>.

The project led to considerable discussion in 2007 at events sponsored by other organizations, including the utility companies and additional vendors such as Intel, about the benefits that DC could provide in data centers.

The “big problem” of “should we use direct current instead of alternating current?” has now been reduced to, “If we want to use direct current, what three technical issues need to be overcome?” One is the lack of an industry standard converter. The second is a general ennui about the safety practices around plugging and unplugging DC. The third is the scarcity of engineers with experience in both direct and alternating current in today’s data center operations.

With solutions in mind, American manufacturers need to take the next step, which is a concerted effort to agree on a plug. A precedent has been set in Europe for this.

The Lawrence Berkeley Lab now plans to conduct pilot projects with six additional companies to test and measure the increased efficiency potential of DC and has requested that industry association members contribute by marketing the pilot projects.

A second example of NIC is the Silicon Valley Leadership Group (SVLG) bringing together members and interested guests to define metrics for energy efficiency as part of their committee on energy. SVLG is sponsoring a venue and peer review process for several pilot projects in three categories that impact data center energy utilization: equipment, data center design, and energy sources.

The projects got going under the leadership of Ray Pfeifer, a SVLG volunteer and former company founder, with a series of meetings in March and April 2007. The tasks have now been taken on by several companies - through a handshake agreement only - no regulation or legal binding agreement ties any corporation to their tasks. In each instance, pilot case studies have been written so that standards and metrics can result.

All of these 8 - 10 pilot projects over a 6 month period would cost \$800,000\* for manpower and measurement devices if they were to come out of a single budget. However, the manpower costs are absorbed by participants on the vendor and user sides, and measurement devices have been loaned by the utilities involved.

Most of the projects are facilitated by online collaboration:

1. Using Yahoo Group - not the best, but familiar to everyone, participants contribute comments, presentations, and discoveries. No participant was able to attend 100% of the meetings and the availability of presentations online keeps the group moving forward with minimal administrative overhead. Every participant’s role is clearly defined: They test, they describe, they seek approval to publicize, etc.

2. An archive of presentations made by Mark Bramfitt on behalf of Pacific Gas & Electric can be found at [http://www.pge.com/biz/rebates/hightech/past\\_events.html](http://www.pge.com/biz/rebates/hightech/past_events.html). These are regularly downloaded by other utility company managers who are creating similar programs and incentive structures for their own customers.

3. Silicon Valley's social networking culture and geography enable the players to create systems for allowing social capital to be exchanged and its value realized. Self-organizing experts have created systems to exchange social capital and realize its value in multiple committees that bridge the academic, regulatory, entrepreneurial, and technical communities.

For example, Bill Tschudi, when not on an airplane (his speaking schedule is shown online at the Lawrence Berkeley Lab website), can participate in SVLG meetings on the Peninsula, 40 miles from his office in Berkeley. Bruce Myatt of Critical Facilities Roundtable, can host meetings in Silicon Valley and also attend face-to-face meetings in Berkeley on the other side of the San Francisco Bay. John Koomey at the Lawrence Berkeley Lab participates with the Uptime Institute in Santa Fe, New Mexico online and in face-to-face events in Silicon Valley.

These examples are scalable to other geographies and cultures.

Novel Innovative Collaborators start by gaining consensus that there are rewards to learning from external sources in a way that costs little, benefits users, and engages partners by rewarding innovation directly. The swarm produces nimble new business models that can adapt proactively, respond to, and flourish in the ecosystem.

The challenges to NIC can be grouped as follows:

1. Low trust initially: Lack of trust among the members results in reactions, rather than decisions
2. Rigid thinking: most people work on projects that only they can resolve, defining their boundaries by their own resource authority
3. Conflicting agendas: A decision that everyone can endorse is unlikely unless conflicting agendas are transparent
4. Lack of cooperation: Most systems don't reward cooperation. In fact, they discourage cooperation and instead, institutionalize performance metrics that reward self-aggrandizement, so people aren't motivated to act cooperatively throughout their industry.

Low level of initial trust: Willingness to trust that pilot results and conclusions are for the greater good, and to dispense with arcane definitions of “confidential” have resulted in unprecedented achievements in a short time frame. In the swarm, members are determined to be successful as Novel Innovative Collaborators, and break the rules, where possible, to assume that the greater good is being served. There is a model of such a process, and it is ongoing in Silicon Valley around the topic of data center energy efficiency. “NetApp has undertaken some innovative approaches in regards to both our storage infrastructure and other innovative tools such as cogeneration to reduce our own power usage,” said Dan Hoffman, senior director of facilities, Netapp. “Not only are we practicing what we preach but also sharing our best practices with customers and vendors alike as part of a larger industry collaboration to reduce power consumption. We remain committed to helping implement real, achievable techniques to reduce power, space, and cooling in the data center.”

Rigid thinking: Regulated organizations like utility companies, national laboratories, and even professional organizations like ASHRAE and IEEE are generally rigid, process- and protocol-oriented, and more resistant to change than are non-regulated companies. So, the contributions by Pacific Gas & Electric and Lawrence Berkeley Lab seem to be out of character with what we traditionally expect from federally supported or state regulated institutions. Their contributions to the NIC have been out-of-the-box thinking, risk taking, and deep pockets. “We have every reason to foster new and aggressive thinking and no reason at all to remain contented with existing solutions”, says Bruce Myatt of Critical Facilities Roundtable. “Three years ago, facilities managers and data center managers weren’t even at the table to discuss energy efficiency in our critical facilities; now their expertise is in high demand as the complexity and magnitude of the problems are better comprehended.”

Conflicting agendas: Organizations have unique mandates, cost structures, revenue goals, precedents, and intellectual property which will dictate their agendas, both in terms of how to accomplish the solution to global warming and how fast to execute it. By looking at their own assets as contributions to the collaboration, rather than as proprietary silos, they become nimble NICs.

Lack of cooperation: Green IT seems to have brought out the best in all the organizations and individuals involved. “There is no upside to hoarding best practices,” says Andrew Fanara, EPA. “People are sharing because it makes sense to propel the discussion and the problem solving forward at an ever-rapid rate.”

Sevieri and Rheingold define successful pilot programs as follows. The challenges of NIC can be overcome when:

1. Success metrics for the pilot are redefined to highlight individual contributions.
2. Individual self-interest and objectives are leveraged to motivate a more cooperative decision-making process.
3. Face-to-face meetings are leveraged with online collaboration and trust-building.
4. Swarming behavior is used to overcome the constraints of boundary-thinking of “what I can do myself or personally approve”.

\*800,000 represents \$200/hr x 100 hours at each user site plus \$200/hr x 50 hours for each vendor providing technical support, plus \$200/hr x 50 hrs for writing up the case studies, plus \$200,000 laboratory review and \$100,000 utility company participation.

About the author:

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