



# Civic Hackathon Challenge Design Principles: Making Data Relevant and Useful for Individuals and Communities

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## *Overview*

The National Day of Civic Hacking (NDoCH) will tap into the power of data and innovation for government and communities around the country. Data and how to use it effectively for public benefit is a growing concern. 'Big Data' is an abstract idea. How can it be made relevant to individual citizens and local institutions working to improve their daily lives and communities? In recent years our research efforts in Intel Labs have allowed us explore this question in some depth. We offer here some guiding principles to support the efforts of local civic hackathon organizers and participants as they seek to design actionable challenges and build useful solutions that will positively benefit their communities.

## *The Opportunity to Make 'Big Data' Personally and Locally Meaningful*

A central opportunity for NDoCH participants is for them to explore how to match up local needs and concerns with the right kinds of civic data that can help. In order to do this match-making, teams need to think beyond the civic data that is available and consider the local and personal issues that are of central concern in their communities. Is it education? Health? Transportation? Jobs? What relevant data might an individual voluntarily contribute to an application or service so that a 'data profile' of their concerns might be established? That profile – a characterization of the data relevant to their challenge or need, can be mapped against civic and other publicly available data sources to help address an issue.

It is through combining personal or local data with the vast and varied sources of civic data that new value is created by the applications and services developed by NDoCH civic hackers. With each passing day, each of us produces more and more data electronically as we integrate digital services and technologies to help us connect and collaborate with others throughout all facets of our lives. Beyond companies seeking to use data to create value, citizens are now beginning to band together to try to directly derive value for themselves.

The 'Quantified Self' movement for example is a community where participants use a multitude of self-tracking technologies to do everything from track their run times, to monitor their diet, to understand their sleep patterns. Companies like Fitbit and Nike are developing new personal data tracking devices and working to provide users with data collection devices and services to let them learn more and more about themselves and each other. For example, users might map their own personal run data against the run times of others using a run tracking device like Nike+, or in the case of civic hacking, might map their personal run data against city data on hiking trails, or air quality data from the Environmental Protection Agency to understand the safest days for a run in an urban location.

We believe these are signs pointing to an opportunity for people to engage with and utilize their own personal data, civic data, and publicly available data in a new way. You might even call it a new 'data economy' where individuals are empowered to control and manage their personal data through trusted means and are able to combine and connect that data with other local and national data sets to derive new value for themselves and their communities. The NDoCH provides a unique opportunity for participants to explore this new data economy and the possibilities for how Big Data can be combined with local and personal data to bring value to individual users and society as a whole.

### *An Example: The Community Sensing Project and the Air Quality Egg*

An example of combining individual user's voluntarily contributed data with large civic data sources to create value is being explored at Intel Labs by Research Scientist Richard Beckwith. A small community in the North West of Portland, Oregon has some of the worst air quality in the nation. National data on air quality in the area is very general to the region, but local residents desired better data so they could understand with clarity their level of risk. Richard engaged in the Community Sensing Project (a Civic Hack) to explore this issue and collaborate with the local community.

In exploring data sets relevant to the issue, Richard discovered that every street tree within Portland city limits is logged in a civic database. Through combining this data with information from around the web on weather patterns, tree pollen release information, data from open source Air Quality Egg air pollution sensors voluntarily placed on residents homes, and a model of the city's built environment, Richard can make highly targeted predictions on the concentration of potential respiratory irritants at a particular point at any location in the city. This information could then be delivered to individual participants informing them of air quality 'hazard' areas.

This would be especially relevant to those with respiratory health issues such as asthma or COPD. In addition the team is also creating a phone app to allow individuals to report when they have an acute respiratory symptom attack (sneezing fit, asthma attack, etc.) to create a database of where and when folks are having issues. This voluntarily contributed citizen data,

improves the accuracy and quality of the air quality model and benefits everyone using the system. The Community Sensing Project research is exploring the potential that exists for multi-tiered, multi-stakeholder benefit (citizen, city institutions, community, national agencies) when technologies and tools are developed to facilitate the transparent and useful combination and circulation of civic and personal data.

## *Design Principles*

This example and the scenarios attached highlight several design principles that can help guide you as you design challenges and build civic apps at your local NDoCH events. Adhering to these design principles will increase your likelihood of success and adoption by end-users.

### **1) Focus on the specific needs and concerns of people or institutions in the local community. Solve their problems and challenges by combining different kinds of data.**

Data goes from being abstract to being meaningful when it is relevant to the cares and concerns of citizens. In this packet we are proving several personas based on interviews and research with actual people. In the personas we detail their lives, what is important to them, and what they struggle with every day. Focusing on these individuals and how you can help them leverage the data around them to make their lives better will help define the problem space.

Some questions to consider:

- What need or problem does the person or institution have?
- What pains do they want you to alleviate?
- What gains or benefits do they want you to provide?
- What would they 'hire' your application or service to do for them?

### **2) Seek out data far and wide (local, municipal, government, state, institutional, non-profits, companies) that is relevant to the concern or problem you are trying to solve.**

In the example of the Community Sensing Project national air quality data, data on individual tree locations, data on tree types and their pollination cycles, weather data, and the data of individual participants who contributed data gathered from their own home Air Quality Egg Sensors were all brought to bear. Think about **ALL** of the potentially relevant data that might contribute.

Some questions to consider:

- What are the data sets available (government, public, individual, community, etc...) that might be relevant to their problem?
- How could you best create a data profile of the problem to map against the data sets you find? I.e. gather voluntary data from users that would help you better align the public data sets available to their concern?
- How might these data sets be combined to reveal new patterns or insights for the user? How about for different stakeholders (a citizen vs a city agency staff member)

### **3) Keep it simple! This can't be overstated. Focus making data easily understood and useful to those who will use your application or service.**

Assume that your users will have limited knowledge of data, data science and data systems. A central challenge for civic hackers is in designing and developing tools that make large data sets easily accessible, useful and usable by everyday citizens. Democratize access to and understanding of data through attempting to design inclusive solutions.

- Could someone who has limited data literacy use your application?
- What simple visualizations or metaphors might you use to communicate data related concepts?
- How can your application or service be helpful to someone who knows nothing about data, only about their problem?
- Is there a designer on your team who can help with designing for ease of use? Can you get one?

### **4) Enable users to collaborate and form new communities and alliances around data.**

Civic Hacking and the kinds of applications being developed at NDoCH events across the country have the potential to catalyze new forms of civic collaboration, participation and cooperation. This is a big idea, but one worth considering. In the Community Sensing Project example, there are several ways that we can imagine that citizens could form alliances around the data that do not exist right now. Sufferers of symptoms of unknown origin could use the symptom reports of others that suffered similar symptoms in the same area with similar levels of particular pollens to help them narrow down the list of possible tree pollens they are allergic too. The data and software tools can enable them to interact with each other in new ways for mutual and societal benefit.

Some questions to consider:

- How might new data that is voluntarily contributed by citizen's help improve an issue in your community? For example, bike ride data by bikers using their mobile phones could help transportation officials design better bike lanes based on the areas of highest utilization.
- How might users form communities around data for civic benefit? Think of the Community Sensing Project.
- How might multiple data sets combine in ways that deliver new insights and allow for citizens to collaborate in new ways?

### *The Values Behind the Data Economy*

The following values were alluded to in the previous sections and have been derived from research that can be explored in detail at [www.wethedata.org](http://www.wethedata.org). They are meant to guide you in creating effective solutions that will enable people to meaningfully engage in using data for mutual and individual benefit.

Use these values to guide your work when designing your applications and services. The result will be tools that are more trustworthy, useful, usable, and collaborative. Ask yourself regularly throughout development, "how is my solution adhering to each value?"

#### ***DIGITAL ACCESS: THE TECHNICAL ABILITY FOR PEOPLE TO ACCESS, NETWORK AND STORE DATA.***

Access is the foundation. Key to democratizing our data ecosystem is ensuring that everyone has access to more powerful, affordable, connected tools and technologies – computers, mobile devices, sensors, and storage which allow them not just to consume information, but to participate in producing real value in their lives. While technological access is a necessary foundation, it is not sufficient.

#### ***DIGITAL TRUST: THE ABILITY TO CONTROL OUR PERSONAL DATA 'EXHAUST' AND BUILD REPUTATION AND ACCOUNTABILITY.***

In digital we do not trust. We are not in control of, nor have a right to, much of our own data. This collective distrust, from widespread tracking of personal data, the limited accountability of those who use our data, to even the use of data for purposes not sanctioned by users,

challenges the potential emergence of an economic data ecosystem where users feel comfortable and empowered to participate. Transparency, trust and accountability systems in the tools you develop will not only prevent abuses, but will engender the trust necessary for users to participate in the data economy and collaborate around their data effectively.

***DATA LITERACY: THE ABILITY TO INTUITIVELY ANSWER QUESTIONS WITH DATA AND CRITICALLY INTERPRET THE ANSWERS.***

Empowering non-experts to easily use data, make sense of data, and cooperate with others around data is critical to enabling broad participation in this new data economy. Even if we have more access to data, and more trustworthy data systems it can only produce value for society at large if the majority of people can read, interpret, and think critically about the information within. This is a technology design challenge. Teachers, designers, artists, technologists, social scientists – bring every discipline to bear on nurturing Functional Data Literacy.

***PLATFORM OPENESS: THE ABILITY FOR DATA TO EFFECTIVELY CIRCULATE, INTEROPERATE, AND COHERE ACROSS SYSTEMS, STRUCTURES AND ARCHITECTURES.***

Open data systems are key to accelerating the new value that can be unleashed from intersections between disparate data sets. Designing applications and services with data openness in mind through APIs and other tools can facilitate multiple stakeholders in building new value on top of existing data systems.

***Conclusion***

We sincerely hope you find some of these frameworks and tools useful as you design your local events. Feel free to use, or not use the materials as you see fit. Also please do contact us with any questions or concerns. Our goal is to share insights from our research in order to benefit the emerging Civic Hacking community and to learn from all of your efforts to catalyze a new form of citizen participation around open data and technology. You efforts are at the forefront of the emergent data economy that is opening up new ways for communities and individuals to benefit from and collaborate around all forms of data, 'Big' and small. Thank you for all of your hard work and good luck at your Civic Hack!