Part 2

Create a Community-Based

Ecosystem of Support

2.1 GROUND TECH EDUCATION IN THE COMMUNITY

Heart disease kills more men in the US than any other illness. High blood pressure is one of the biggest risk factors for it, and yet according to Doctor Aaron Carroll, "we have had a hard time getting patients to comply with recommendations and medications." A recent study targeting hard-to-reach patients tried to help them using a community-based strategy:

Barbers screened patients, then handed them off to pharmacists who met with customers in the barbershops. They treated patients with medications and lifestyle changes according to set protocols, then updated physicians on what they had done.

When one part of the community ran into trouble, another stepped up. For example, if some barbers were having trouble consistently measuring customers' blood pressure, pharmacists helped out.

The end result: in six months, 63% of the intervention group now had normal blood pressure compared to only 12% of the control group. The reason for this success?

Getting barbers involved meant health messages came from trusted members of the community. Locating the intervention in barbershops meant patients could receive care without inconvenience, with peer support. Using pharmacists meant that care could be delivered more efficiently.[[1]](#endnote-2)

Similar experiments in other fields have been equally effective. And as we have seen with Extension Services and Citizenship Schools, when a community-oriented approach is used on a large scale, they can produce remarkable results.

In Part 1, we discussed how smoothing the learning curve can narrow the gap between emerging tech and people in the community. To close the remaining gap, we will need to harness the power of a community-oriented approach to education.

Today, most community-based groups for teaching coding use the often-meager resources they have to employ a few facets of a community-oriented approach to education. What if we provided the resources and institutional support they need so they could collectively operate on the same scale that Extension Services and Citizenship Schools did? The following is a sketch of what this approach might look like.

# Pieces of the Community-Oriented Education Puzzle

Different types of communities will need a different set of strategies to help members of their community master emerging tech. But there are some strategies that can be incorporated by all communities. The following are some examples.

Create Multiple On-Ramps

For someone living in a community our society has written off, the idea of getting started in coding can be daunting. The obstacles you're facing can feel overwhelming. And if classes will put a big strain on your life because of the cost and time they require, how do you know it's worth the sacrifice? At this point, you don't even know if you like coding enough to want to do it for a living.

That's why we need to create multiple on ramps. We need to go where people are, where they are surrounded by their peers, and create opportunities for them to get their feet wet.

Where it makes sense to create on ramps will depend on the community. For example:

* + Barbershops and beauty salons
  + Union halls
  + Churches and other houses of worship, who could offer a short program before or after one of their weekly sermons so members could try a little coding and talk to people who are already doing it

Wherever people congregate, wherever they are surrounded by people they know and trust, we should explore ways of breaking down barriers and firing up interest.

Community-Oriented Trainings and Support

In the play *Our Town*, when George tells Emily about his plans to become a farmer, he says:

Y'know, Emily, whenever I meet a farmer I ask him if he thinks it's important to go to Agricultural School to be a good farmer. Yeah, and some of them say it's even a waste of time. You can get all of those things, anyway, out of the pamphlets the government sends out.

George is exaggerating a bit, but the idea wouldn't seem out of line to farmers in his time. Extension Services was created was because the system of Land Grant colleges that had been built to help spread modern agricultural practices through formal schooling couldn't reach enough people. Extension Services succeeded where Land Grant colleges failed because in virtually every county, it embedded one or more extension agents who built upon existing social networks and created new ones to create a massive infrastructure of informal peer to peer learning.

Extension agents used a wide range of techniques to create an infrastructure for training and support:

* + **Identified and Developed Natural Leaders.** Extension agents often focused on identifying and developing natural leaders: farmers who were already widely respected in their community. These natural leaders had preexisting social networks and relationships they could use to recruit other famers. And they were also likely to understand the concerns and fears that agents needed to address if farmers were to be convinced to adopt new techniques.
  + **Nurtured Neighborhood Clubs.** Extension agents helped farming communities form neighborhood clubs and worked with clubs to ensure farmers got a steady stream of ideas about how they could improve their farming. As a result, farmers weren't just hearing about an idea brought in by an outsider, they were learning while surrounded by their peers who spoke the same language and understood the realities they faced.
  + **Produced Informal Learning Materials**. To supply these clubs, extension agents provided lots and lots of pamphlets and other written materials that were crafted to help teach farmers new techniques and address any concerns they had. Many extension agents also were heavy users of radio broadcasts and other new forms of communication.
  + **Fostered Community Events**. Extension agents helped foster state fairs and other places where farmers could see demonstrations, compete to see who could use new techniques to grow the best crops, etc.
  + **Reached Adults through Their Children**. By creating and supporting 4-H Clubs, Extension agents not only began training the next generation of farmers, they also gave adult farmers the chance to learn from their children's successes with new techniques that have been proven to work not just in the laboratory but in the very fields they farmed.
  + **Fill the Gaps.** As the story at the beginning of Part 2 demonstrated, any system of support is inevitably going to have gaps; being able to dynamically address these problems can make the difference between success and failure. Extension agents were expected to look for gaps and find solutions to fill them.

If we were to adapt the techniques used by Extension agents to the circumstances communities are facing today, we could substantially increase our ability to make emerging tech coding more accessible.

This kind of community-based approach also has the potential to knock down obstacles that many are afraid we can't overcome. For example, some have argued that many people -- especially men -- who work in blue collar jobs won't want to become coders because their sense of identity is tied to working with their hands. That's a huge problem for an outsider who's trying to convince them. But if someone who's resistant is being recruited by a natural leader they trust? If they know they'll be making this transition surrounded by their peers who've also spent a lifetime working with their hands? This is a much easier nut to crack.

# Building on Existing Efforts

To implement Extension Services' community-oriented approach, we don't have to start from scratch. From online courses to blogs and podcasts to terrific online communities like Glitch and CodePen to face-to-face Meetups and hackathons, we already have some of the elements we'll need for building a great informal, peer-oriented training and support system. Now we need to learn from the example of Extension Services about how to take this fledgling infrastructure to the next level.

For example, tech meetups are often a great educational resource for those who attend them. But even these meetups don't reach anywhere near the number of people needed to make a big difference. This is often because there simply aren't enough resources available to do the labor intensive work for community-oriented strategies to reach more people.

But sometimes this is also because tech meetups need to adapt their culture to these more ambitious goals. For example, for everyday people who live in a community where they don't know anyone who makes a living from emerging tech, these meetups often feel intimidating and alienating.

Similarly, some parts of the tech learning universe have cultures that are hostile to outsiders. For example, many beginning and experienced developers rely heavily on a Q&A website called Stack Overflow as a major source for learning new tricks and troubleshooting problems. But the culture on Stack Overflow has gotten so bad that in 2018, Jay Hanlon, Stack Overflow's executive vice president of culture and experience, felt compelled to write a post called "Stack Overflow Isn’t Very Welcoming. It’s Time for That to Change." He confessed,

Too many people experience Stack Overflow as a hostile or elitist place, especially newer coders, women, people of color, and others in marginalized groups.

This is exactly the kind of problem that a community-oriented approach is designed to solve.

Creating Real Accountability

Although the immediate issue with Start Overflow was its toxic culture, there was a deeper problem driving this issue. Stack Overflow wasn't unaware of the issues with its culture. As Hanlon explained,

Our employees and community have cared about this for a long time, but we’ve struggled to talk about it publicly or to sufficiently prioritize it in recent years. And results matter more than intentions.[[2]](#endnote-3)

This points to a crucial difference between Extension Services and what the tech community has built so far: accountability. Extension Service agents were expected to deliver. Making progress in their county was their top priority. In emerging tech, with its patchwork of informal training and support, there's no one who's similarly accountable.

It's not that there isn't any accountability in emerging tech training and support. Ask the people who run an online training course how they're doing, and they're happy to give you a bevy of stats. But what they're measuring -- eg., how many students took their course -- doesn't tell us what we need to know. In an era where the tech world is mad for metrics, there is no one who can tell you if the patchwork of overlapping efforts of training and support have actually paid off for specific communities, helping enough people to get a job or create a business to make a real difference in that community.

It's too soon to tell if we need the equivalent of an emerging tech extension agent in every county. But what is clear from Extension Service's experience is that a key to success is accountability where it counts.

Designing In Diversity

As we struggle with the issue of accountability, we can also learn an important lesson from Extension Services' failures.

Extension Services often ignored African Americans or treated them like second class citizens. It often reinforced gender roles in a way that limited women's opportunities. Over time, it increasingly favored Big Ag over small family farms. The problem wasn't that Extension Services wasn't effective, it's that at points in its history it was designed to help some audiences and ignore or harm others.

This is why it's critical that as we build a community-oriented system of training and support, we must ensure the system we develop is designed from the ground up to be inclusive -- and it must hold people accountable for achieving this goal.

# The Advantages of Operating at Scale

Operating at scale allows us to deploy resources and pool experience in a way that otherwise wouldn't be possible. For example:

**Leveraging Our Collective Experience**. Suppose a network of churches decided to work together to come up with the best strategies for helping members get their feet wet. One or two churches can begin an experiment, and other churches can learn from their experience, making it easier for smaller churches or churches whose resources are committed elsewhere to get involved. A network of churches can also make it easier for members with computer skills and tech volunteers to have a bigger impact than if they were working with just one church.

**Leveraging Existing Resources**

* + If you are trying to build custom trainings it's much easier to fund it -- or get outside funders to pay for it -- if you can pool resources and talent from a large network.
  + Suppose you need a bunch of computers to set up a training room or to give to low income students so they can work at home. It's common for midsize and large companies and nonprofits to replace their staff's computers every three years, which means they regularly have a large number of computers they no longer need. If you had a network of churches working together, it's much easier to get outside volunteers to help set up the hardware and to offer some ongoing support -- or, if it's a large network of churches, to get the funds to pay for it.

# Explore Connecting Community and Workplace Support

Between waves of automation and waves of new tech, corporations are going to face a never-ending need to train and retrain their staff. Currently, most simply aren't equipped to do so.

Staff in corporations and other large organizations don't have the same needs as people in the community. But there are many areas where they may overlap. As communities are developing a rich ecosystem for their members, it may be worth exploring if there are ways to jointly address their needs. For example:

**More Accessible Trainings for All.** Trainings in a new technology are often intimidating for all but the most technically skilled staff. Because the tech is so new, the people who know it best are better at understanding the tech than they are at understanding how to teach beginners. But since community-oriented groups have to develop their emerging tech trainings so there accessible for everyday people, there's a good chance corporate staff who aren't skilled techies would also benefit from these trainings. If corporations and other large local institutions invested in funding or providing staff to help develop these trainings, both the community and the world of work would benefit. There may even be ways to design trainings to facilitate this approach -- e.g., building trainings that are like playlists, so it's easy to mix & match parts to fit a particular audience.

**More Friendly & Inviting Support Groups**. Many corporate and other organizational staff don't take advantage of tech meetups and other existing support groups they find them too intimidating. If a community is trying to create a more inviting support ecosystem, large organizations might find that their staff might also benefit from some facets of it.

By exploring these possible overlaps between corporations and communities, we can also get more bang for the buck:

* + **Foster Informal Connections That Can Lead to Jobs, Opportunities to Create Wealth**. The ecosystem support could spawn informal connections between people in the community and people working in corporations & nonprofits. These kinds of informal personal connections are a great way of finding good jobs -- especially given that many jobs are never advertised. Similarly, these informal personal connections will be an invaluable resource for fledgling community co-ops and small businesses.
  + **Leverage More Resources**. For corporations and other large organizations, embracing a community-oriented ecosystem support is a twofer. They get to give back to the community, and their organization directly benefits from the resource they have helped to create.
  + **Provide a Bridge for Thinking through Learning-Work Connection**. The other function this connection could serve is to provide a space that will encourage thinking through the connection between learning, support, and work. That's the subject of the next chapter.

2.2 BUILD A BETTER BRIDGE

BETWEEN TRAINING AND WORK

It takes a leap of faith as well as a lot of time and money to get the training you need to start a new career -- expenses that most folks in marginalized communities can barely afford. If there isn't a job or an opportunity to start a small business on the other end? It can dash hopes and drain pocketbooks, leaving people worse off than when they started.

This was the bitter experience many community groups had with green jobs. They worked hard to train members of their community only to discover that the jobs they'd been told to expect never materialized.

If we are going to ensure that as many people in every community can find work in emerging tech, training isn't enough. We need to build a bridge between training and work that communities can count on.

# Connecting Training and Work When Jobs Are Plentiful

For inner-city and some other communities, there are often plenty of good paying emerging tech jobs in the surrounding area. The issue is how to ensure people in their community can get hired. The following are some strategies that might be worth exploring.

Apprenticeships

While training is valuable, what employers most want is experience. There's a big difference between what goes on in classes and the real world:

* + **The Real World Is Messy**. In class, everything is designed to help you learn. If they're teaching you sophisticated AI techniques, for example, odds are you'll be working with cleaned up data. Classes usually spend relatively little time on what will eat up most of your day when you get a job: cleaning your data so it fits the AI technique's data requirements.
  + **Tech Is about People**. In most classes, you spend most of your time working by yourself. In the real world, most developers work in teams, writing and maintaining code that's collectively owned. And many developers' jobs require them to work closely with users, juggle competing pressures from different departments, and occasionally deal with internal politics. These interpersonal skills, which can make the difference between success and failure, aren't taught in most tech classes.

And for prospective students, training is often expensive. You have to pay for the training, and you may only be able to work either part time or not at all.

This isn't a new problem. One solution that's worked well in several industries: apprenticeships.

Apprenticeships are rare in the tech world, but it may be time to start experimenting with them. Apprenticeships address both employers and trainees needs:

* + Trainees get paid as they learn
  + Employers end up with an employee with real-world experience

Make Job Description Work Requirements More Realistic

Today, many IT managers -- or their companies -- create job descriptions that don't fit their actual needs.

* + **Credentials Creep.** In the field of machine learning, for example, it's not uncommon to see job listings that require a PhD even though the work the person would do in that job would almost never require that level of skill.
  + **Expertise Inflation.** It's not uncommon for employers to ask for more years of experience than is needed -- occasionally for more years of experience than the tech has existed.

None of this is surprising. Managers and companies often don't have the knowledge or experience to know what level of expertise their organization needs, and they don't have an easy way to find out.

Inflated job requirements are a problem for all employees, but it's especially a problem for people who've taken a nontraditional path to obtain the skills employers need. They don't come from the kind of background most employers are most comfortable with. On top of that, whether they are white working class from the country or people of color from the inner city, they may face employers who consciously or unconsciously underestimate their abilities.

In short, if we want as many people in every community to have a real shot at emerging tech jobs, we need to start exploring how to ensure employers get the help they need so they don't ask for more expertise or experience than their jobs require.[[3]](#footnote-1)

Foster Informal Connections

Many jobs are never advertised; people find out about them through informal networks. Although there are some structural solutions that might be worth considering to reduce the importance of these informal networks, we should also explore strategies for using networks to our advantage.

For example, as we discussed in the previous chapter, if we build a rich support ecosystem that spans community and work, we could use it to foster informal connections that could make employers more comfortable hiring people with nontraditional backgrounds and/or training.

Key Features of a Good Solution

As communities begin to experiment with solutions, here are a few things to keep in mind:

* + **Don't Reinvent the Wheel**. We should always ask, what can we learn from other efforts to solve these problems? For example, what can we learn from union hiring halls and apprenticeships in other industries?
  + **Address the User Experience of Trainees *and* Employers**. Efforts like these often don't grapple with what it'll be like for trainees to go through this process. And they almost always ignore the user experience of frontline managers. Even managers who want to do good in the world are often so overwhelmed with the rest of their job that idea of taking what they perceive to be a significant risk may be hard to do. Making it as easy and painless for both employers and would-be employees to participate can make the difference between success and failure.
  + **Start with Low Risk, Expand the Circle**. Start experiments with employers who can afford to take some risks -- e.g., it's a lot easier to experiment with hiring if you're frequently hiring developers. But plan to invite in a wider range of employers as the project gains traction.
  + **Focus on Diversity**. Although the tech world talks a good game about democratizing coding for all, most tech companies have made remarkably little progress in creating a workforce that is diverse as the society where they work. Therefore, any solution should designed so it makes diversity a top priority.
  + **Engage the Whole Public**. To have the greatest impact, we should tackle these problems as part of broader efforts at civic engagement (see Part 3). There may already be an initiative in your region to tackle these questions that most people in the community -- including many employers -- don't know anything about because the project didn't decide to deeply engage with the public.

# What to Do If There Aren't Enough Jobs/Business Opportunities

The above strategies assume there are enough jobs or opportunities for creating small businesses in the region surrounding the community. But what if there aren't? What about, for example, rural communities where there may be few if any good paying tech jobs? The following are some strategies that might be worth exploring.

Use Large Tech Companies and Multinationals to Bootstrap the Process

Large tech companies and some large US multinationals have an almost insatiable need for tech staff. They couldn't supply enough jobs for every community that needs them. But they could certainly create pilot projects that might open up new opportunities.

For example, a few companies could begin by hiring small numbers of individuals and/or hire a fledgling consulting company from these communities. If these efforts were successful, they could experiment with scaling them up.

Over time this approach could help to bootstrap local tech scenes. For example, if a few large tech companies pave the way, showing that rural and other overlooked communities have the technical chops and the business/interpersonal skills needed to do a great job, other firms might be more willing to take a chance on hiring them.

There's no way to know in advance if this strategy would succeed on a scale that would be effective. And this approach would have to be careful not to substitute one problem for another -- e.g., making these communities overly dependent on large outside companies, whose needs could easily change. But given the needs of both parties, it's well worth trying.

Use the Government to Bootstrap the Process

If large tech companies and multinationals can't play this role in enough communities, we should explore having the government step in.

* + When Silicon Valley first took off, it greatly benefited from strategically targeted government intervention. DARPA, other defense agencies, and intelligence agencies were often "early adopter" customers who were eager to buy new tech products before almost anyone else. In doing so, these federal government agencies created demand that helped kickstart new tech markets. There's no reason it couldn't use a similar approach aimed at marginalized communities.
  + Like large corporations, the government has an enormous need for developers.

To figure out an effective role for the government, we would need to run some pilot projects. And there are number of potential dangers we would need to address -- e.g., to reduce the danger of corruption, political favoritism, nepotism, etc., we would need an approach that was fully transparent. But given the impressive track record the federal government has in helping underwrite the rise of the tech industry, if the private sector can't give rural communities a leg up, there's no reason why the public sector can't help.

Part 3

Integrate Tech Training

and Civic Engagement Training

# 

3.1 WHY TRAINING IN CIVIC ENGAGEMENT?

Neil Gershenfeld, director of MIT's Center for Bits and Atoms, oversees a wildly ambitious 50 year research project in digital fabrication whose ultimate goal is to create the equivalent of Star Trek's replicator. A few years ago, he had a surprising revelation: they'd figured out the technological roadmap to build replicators, and although it would take several decades to work their way down that road, it wasn't as technically daunting as he'd expected.

Now, the biggest surprise for me in this is I thought the research was hard.... Lots of work to come, but we know what to do.... That's humming along nicely. It's that we're finding we have to build a completely new kind of social order, and that social entrepreneurship—figuring out how you live, learn, work, play—is hard.[[4]](#endnote-4)

As result, in 2017 he and his brothers Alan and Joel decided to write a book to kickstart a public debate about the impact of digital fabrication on society. They wanted to make sure we didn't make the same mistake we'd made with the Internet and personal computing.

As early as 1965, the signs of the coming digital revolutions [the Internet and personal computers/smartphones] were there for anyone to see. And yet most of the world missed them. As a result, few were prepared for the deep economic, social, and cultural impacts of the first two digital revolutions....

The negative aspects of the first two digital revolutions are not simply accidents. Nor were they driven by some unseen hand. Decisions made (and not made) and priorities set (and not set) early on, as the technologies were being developed and introduced to the market, have had lasting effects.

And if more than a handful of people are going to be involved in making those decisions about the digital fab revolution, we need to start a public debate now.

The best time to shape the destiny of transformative, accelerating technologies is early, before changes have become both widespread and entrenched. This is when the embedded assumptions in the technology and the initial market instantiations are in the early stages of formation and still negotiable.[[5]](#endnote-5)

Digital fabrication isn't the only field that's going to create unprecedented change. In the next 20 years, robots and AI, augmented reality, and other emerging tech will begin to fundamentally transform our society and economy.

Imagine a future in which robots and AI, augmented and virtual reality, digital fabrication, wearables, and other emerging technologies have become ubiquitous. Because we've implemented the strategies described in Part 1 and Part 2, many people in every community are now working in emerging tech, developing designs for digitally fabricating sneakers or creating robot "recipes" for painting a home's interior. In this new economy, the answers to questions about how emerging tech markets should be structured could have a deep and profound impact on which communities and individuals prosper.

Today, only a handful of people have a say in answering questions like these. Equally importantly, few people understand the issues well enough to meaningfully have a say. This is particularly a problem given that many of these decisions won't get made in public by politicians, they'll be made behind the scenes by people in the tech world as they create standards, informal norms, etc.

If we want more than a handful of people to shape the rules of the emerging tech road, we must ensure that as many people as possible in every community learn not only the technical skills but also the civic skills needed to truly participate. In Part 3, we will draw lessons from Citizenship Schools' experience teaching civic engagement, explore the implications of these lessons for emerging tech civic training, and provide a brief overview of some of the economic questions emerging tech will raise in the coming years.

One final note. While civic training must be rooted in specific values such as freedom, equality, and justice, it must also be designed so it can assist people from a wide variety of political ideologies and perspectives learn how to shape the direction of emerging tech, our communities, and our society. The goal of this training is not to push a specific political viewpoint, it's to help revitalize our democracy in an era of rapid technological and economic change.

3.2 WHAT CITIZENSHIP SCHOOLS CAN TEACH US

In the 1950s and early 60s, one of the major challenges the Civil Rights Movement faced in the Deep South was that voter suppression laws barred anyone from voting unless they could read and write. How could the movement help enough African-Americans become literate quickly enough to build political power -- especially in an environment where any efforts by African-Americans to win the right to vote might be violently suppressed? The solution: Citizenship Schools.

Citizenship Schools had a deep and profound impact on the Civil Rights Movement, which is why Dr Martin Luther King Jr called their creator, Septima Clark, the "mother of the Movement." Citizenship Schools taught their students the basic literacy needed to overcome voting restrictions. But they also taught them the civic literacy skills needed to win the struggle for voting rights and to understand how the political system worked so they could make their voices count.

# A Community-Oriented Approach

Some of the strategies Citizenship Schools used were very similar to the best traditions of Extension Services:

**Harness the Power of Community**.

By being deeply embedded in communities, Citizenship Schools were able to leverage a community's strengths, including the bonds of friendship and support. For example:

* When recruiting a school's teachers, they targeted people who Civil Rights activist Dorothy Cotton described as "people with Ph.D. minds who never had the chance to get an education who were the natural leaders in their communities"
* Teachers often mobilized people in the community to help set up the physical space of the school, which could be located in the back room of a local store, a church, a beauty parlor, or other community institutions, which also allowed them to hide the school from local white elites
* Teachers used local social networks to recruit students, who might be leery of taking a class not only because of the fear of white reprisals but also because of the stigma of illiteracy
* When students' training was over, teachers encouraged them to recruit their friends, neighbors, and other people from their community to take the next class

**Be Responsive to Local Needs, but Operate at Scale**

Citizenship Schools were grounded in helping people develop more self-sufficiency in their daily lives and gain an understanding of how they could help change their local community. At the beginning of the first class, for example, teachers would ask students what they wanted to be able to do with reading and writing -- e.g., being able to read documents you had to sign -- which were then incorporated into the class. Classes also often discussed local community issues and how they might be addressed.

Although Citizenship Schools were designed to incorporate the unique circumstances and needs of an individual community, to play an important role in changing the South they had to operate at scale. According to historian J. Douglas Allen-Taylor,

The Citizenship School Movement trained more than 10,000 community leaders from 1957 to 1970 through nearly 1,000 grassroots, independent schools that operated at one time or another in every county in South Carolina, nearly 90 counties in Georgia, and in all of the heavily-Black areas of the rest of the Deep South. At one point in 1964, almost 200 schools operated simultaneously. Former Atlanta Mayor Andrew Young… said that the Citizenship Schools were the "foundation" of the civil rights movement, "as much responsible for transforming the South as anything anybody did."[[6]](#endnote-6)

# Civic Training in the Service of Justice

Although some Extension Services traditions embraced more moderate forms of civic engagement, Citizenship Schools were designed from the ground up to combine technical and civic skill training in order to fundamentally transform the economy and society, helping African-Americans win their freedom in the South.[[7]](#endnote-7)

As we will discuss later in this chapter, Citizenship Schools faced a set of educational and political circumstances very different from our own. But we can still learn some useful lessons from some of the strategies they used to achieve their goals.

Blending Technical and Civic Training

Citizenship Schools didn't treat basic literacy and civic literacy as two separate subjects. They intertwined teaching reading and writing with understanding how the political system worked, from understanding their rights to learning the nuts and bolts of lobbying for better local services. The curriculum was designed to develop both the skills and the confidence to use them on the half of themselves and their community.

This intertwining of basic and civic literacy occurred in every facet of the training. For example, in the Citizenship School workbook for students in Georgia, here's what it had to say about learning to write:

As you improve your writing, new worlds of pleasure will open and old fears will pass away. You will enjoy writing your friends. You will be able to write to your newspaper and express your views on the events of your community. You can write your Congressman or Senator to help him to vote for things that will help your people, and you will not be shy about filling out job application blanks, signing your name to your checks or registering to vote.[[8]](#endnote-8)

Similarly, students would begin by learning to read simple words in the workbook and use them to write brief stories about their lives, then read more complicated stories about the lives of African American political heroes such as Crispus Attucks -- whose story included the discussion question, "how is the problem of [British] taxes like Negroes problem of voting?" -- and Harriet Tubman. Other readings included passages on the political philosophy of nonviolence.

Learning by Doing, Developing Leaders

The workbook ended with a section on "Freedom Songs to Read and Sing." But right before it was a section entitled, "Planning a Voter Registration Campaign," which asked students for a substantially bigger commitment than singing:

A good citizen must be a registered voter. But the job does not stop there. We cannot rest until every citizen is a registered voter. You have been helped to register through this citizenship course. It is now your turn to help your neighbors. Plan a registration drive for your neighborhood or community:

This call to action was followed by a planning sheet, which include questions about a student's neighborhood such as:

* "What is the size of the Negro population?"
* "How many can we get to register?"
* "Number of Volunteer Workers needed to cover area"
* "Organizations to take part in the drive"

Next came a template to "Canvas your Neighborhood" as well as a list of "Suggested Steps for a Block Party" about voter registration, which included the following:

* "Plan a meeting for next week to give help to each other (if possible, arrange to start a Citizenship School)"
* "Have someone contact the persons who did not show up at the [block party] meeting."

There were 2 reasons for this approach. First, according to Clark,

*The basic purpose of the citizenship schools is discovering and developing local community leaders.* One of the unique practical features of the concept is the ability to adapt at once to specific situations and stay in the local picture only long enough to help in the development of local leaders. These are trained to carry on an ever growing program of community development. The secret stems from the emphasis and the reliance on local leadership. It is my belief that creative leadership is present in any community and only awaits discovery and development.[[9]](#endnote-9)

The other reason behind this approach was the belief that there is a limit to what you can learn in a classroom. Action in the real world is needed both to fully learn these lessons and to build the confidence to act.

Citizenship Schools use a similar approach for training its teachers. In addition to being required to take a 5 day workshop on how to run a Citizenship School, teachers were expected to research the hours and location of the voter registration office, election dates, the names of local politicians, and the location of the nearest Social Security office. Workshops ended with a discussion of how they would use what they learned to make a difference in their community when they got back home. Many people who became local civil rights leaders started out as being trained to run Citizenship Schools classes.

3.3 APPLYING THE LESSONS OF CITIZENSHIP SCHOOLS

We can't simply replicate what Citizenship Schools did. For example:

* Basic literacy could be taught in just one course. Emerging tech training almost always requires multiple courses, so it requires a different strategy -- e.g., if you incorporated civic education into every tech skills class, it would drive even the most civic minded students up the wall.
* Citizenship Schools were part of a large, well coordinated pre-existing movement, the Civil Rights Movement. In contrast, we are just at the beginning of a wave of tech civic engagement, so there is no pre-existing national, coordinated infrastructure whose goals and strategy can help guide each community's solution.

But the biggest difference between the circumstances facing Citizenship Schools and the ones we face is that Citizenship Schools were part of a movement that at that point in its history had a very clear adversary: defeat white supremacy and Jim Crow. That's a very different circumstance than the one we face as we attempt to make coding's economic benefits accessible to many people in every community. In fact, we're at a moment where there are many competing ideas and ideologies about what the real obstacles are and what we need to do to move forward.

So, how do we apply the lessons of Citizenship Schools to emerging tech education?

There's no simple answer. In fact, one of the central tenets of Citizenship Schools is that the best answers for serving the unique needs of a community come from the community itself. Outside experts and ideas from other communities can be extremely helpful -- it makes no sense not to take advantage of others' experience and knowledge. But there's no simple, one-size-fits-all solution that will work perfectly for every community.

So instead of offering a definitive answer, here are two thought experiments to help kickstart a conversation about the best way to combine technical and civic education.

# Rebuilding the Training Road As They Walk It

In this example, a tech course and the surrounding ecosystem are designed so they help students learn how to "make the road as they walk it," engaging in rethinking the training/job pipeline as they go through it. Although it undoubtedly would also include some discussions of the issues raised in the next chapter, its focus is on giving students the nuts and bolts skills of a very simple form of civic engagement

At the beginning of a selected community tech class, the teacher would say to their students, throughout this course I want you to keep asking yourself the question, how can we improve this course for the next group of students?

Every few weeks, the teacher asks the students to briefly reflect on their experiences so far. For example, they might discuss which concepts they had the hardest time understanding. They might also brainstorm how to teach those concepts so they're easier to understand -- e.g., metaphors/examples from everyday life to clarify the concept, or a quick and dirty exercise to make it easier to understand. They might even split into pairs or small groups and briefly practice using one of the strategies they'd come up with. Then together they would write up their suggestions for future trainers.

At the end of the cohort's class, the teacher could lead them to an exercise where they discussed questions such as:

* How we can make this training better for the next group of students?
* Can we make it easier for people to get their feet wet before they take this class?
* How can the people who are developing the programming language and tools we are using make them easier for beginners?
* Are any of the changes we're proposing small and manageable enough that interested students could take on some or all of the work needed to make or advocate for these changes?

A similar approach could be used as students work their way through the rest of the training pipeline and continue to develop their skills, finding ways to help people reflect and act on their experience together.

Then every few trainings or once a year, the group or groups teaching the course might host a community dialogue and working session with the students, teachers, and others who have been involved. They could discuss what worked, what didn't, and how both the training and the ecosystem it is a part of might be improved. This could include:

* Tweaking the pace of the course
* Creating better on-ramps
* Holding a weekend hackathon in several communities across the country to brainstorm ideas about how to make the programming language/library taught in the class easier to use, concluding with plans to advocate for these changes with the tech community that's developing the language/library
* Discussing potential fixes for some issues that have come up with some apprenticeships and paid internships that several students participated in after taking the course
* Listening to feedback from students who recently got their first tech job to see if there are any issues they wish the class had better prepared them for, and brainstorming potential solutions
* Strategizing about how to get the resources to increase the number of classes and identify and develop more teachers from community

Finally, these efforts could serve as opportunities for students to get more involved in tech activism in the community -- helping to make some of the changes that had been discussed, becoming class teachers, or joining efforts to create the equivalent of Extension Services for coding in their community.

# Telling Stories, Crafting Code

What if we interweave the art of creating stories in AR/VR, learning the craft of coding, and learning the beginnings of tech civic engagement skills? Here's an example of what it might look like.

Story circles are a strategy some community groups use as part of building community and exploring issues within a community. According to Roadside Theater, an Appalachian community group that pioneered the concept,

The stories we’re able to tell ourselves and others, those we can understand and imagine, define not only what we believe to have already occurred, but what we believe to be possible in our individual and collective lives.[[10]](#endnote-10)

The basic idea of a story circle is simple: a small group of people set in a circle and share stories about their experience on a given topic or theme. But given that many people in communities written off by society aren't used to having their story and their voice taken seriously, this simple act can have a profound impact.

Here's how story circles might be intertwined with learning to code:

1) In the first workshop, a group of adults meet for a Friday night and half of a Saturday.

* On Friday night, first they participate in a story circle, then they learn how to use one simple coding technique to try to very simply express their story in AR/VR. For example, each participant comes up with 3 words that sums up their story, then creates a VR page that displays their 3 words using a simple special effect that requires a tiny bit of coding -- e.g., having the 3 words fade in (exactly what they would do would depend on the tool & coding environment they were using).
* On Saturday, they add a few tools to their storytelling toolbox -- e.g., code for adding a picture and allowing users to interact with it -- so they can create the first version of their story. The workshop alternates between a little instruction, a lot of playing and experimenting with code, and reflecting on the experience of using the tools and how they might be designed differently to make them easier to use for folks in their community.

2) The group continues to meet for a few shorter Saturday sessions that take place every other week.

* Each time they learn one or two more coding techniques, a little more about VR/AR design & how to tell a story, and reflect about the experience so far. In doing so, they also build the trust and community they need to help them get over any fears, which is often half the battle.
* In between these sessions, they work on their own or with coding buddies on their coding skill and their story
* After the first few sessions, they would also begin to discuss how AR/VR could be used to help their community, what the future of emerging tech might look like, and how that future could be shaped so it benefits all communities (see the next chapter for some topics they might discuss).

3) Then they would start the second part of the course: learning the basics of creating very simple tools they can add to their toolkit. Depending on the coding library/framework they are using, before the course was taught some coders might need to add a library that made it a little easier to create very simple tools.

As they gradually gained some confidence around the idea of being tool makers as well as tool users, they would also be asked to start having discussions, brainstorming sessions, and story circles around questions such as:

* Imagine this system was designed for people you know who spent most of their lives working with their hands and feel uncomfortable/nervous about the idea of making a living from coding. Tell me a story about what it would be like to use this system if it had been designed from the ground up by everyday folks who were used to working with their hands?
* Suppose the people who built this system wanted home care workers to become augmented/virtual reality "power users." Tell me some stories about how they would use it and what their experience would be when they first got started, as they began to become skilled, etc.? Next, imagine there's a way they can make some money on the side through what they create. What might that look like? What are some values we might want to design it around? What are some issues you think such a market/system might need to overcome?

By the end of the class, those who want to continue should be able to start meeting on their own as a group (a.k.a. a Band of Brothers and Sisters). Their group could not only begin to get help from but also begin to help others through a network of other folks around the country who've gone through a similar experience and who -- with occasional help from world-class techies from around the globe -- have been helping to shape the path people take to keep improving their skills. Perhaps a few of them will decide to help teach the next set of workshops. And perhaps their group will join others in their community and in other communities in helping to begin building the equivalent of Extension Services for emerging tech and begin having conversations about how we might begin to shape the emerging tech economy so that every community would benefit.

3.4 HOW EMERGING TECH WILL TURN THE ECONOMY UPSIDE DOWN

The way our economy is organized and the rules by which it operates are based around a core set of assumptions. And over the next 20 years, some of those assumptions are going to be challenged or undermined by emerging tech. As a result, our society will face some very big decisions about the rules of the road for this new economy.

In this chapter, we'll discuss how emerging tech is likely to challenge some of the assumptions that underlie our economy and outline a strategy for thinking about our future while focusing on the problems we face today.

# Robots, AI, and the Future of Labor

Without a working crystal ball, there's no way to know what impact robots/AI will have on work. For example, we have no way to know:

* How many jobs will be automated?
* Will robots and AI will destroy more jobs than they create?
  + Of the new jobs created by robots and AI, how many will be good paying jobs?

The one thing we can be pretty sure of is that robots and AI are going to break some of the assumptions that our economy has been based on.

For example, our economy is based on the assumption that when businesses grow, many people will benefit because of the jobs the businesses will create. But in the future, even if robots and AI don't create mass unemployment, there is a very real danger that many growing businesses won't create enough good paying jobs.

As a result, we need to start asking questions such as:

* How do we ensure everyone has financial security in a world where people may not be able to depend on having work?
* Should people whose work is being automated away have some say in the process, and if so how?
* Should we try to create incentives so we automate away much of the work that no one wants to do?
* As a society, do we want to ensure that the enormous profits and wealth that are being produced by automation help everyone? For example:
* Should we try to move towards an economy where most people don't have to work full time unless they want to?
* Do we want to try to give everyone a real opportunity to express their creativity and explore their full potential?

For most people, these questions don't have simple or easy answers. That's why it's crucial that we start creating space in our society to begin exploring them. As the Gershenfeld brothers argue at the beginning of Part 3, if we wait too long before asking these questions, it may be too late for our answers to matter.

# Creative Works

In an economy increasingly dominated by emerging tech, often the greatest economic value won't come from physical objects but from the creative works that power them:

* A robot’s operating system and its "apps" that let it cook food
* A recipe that tells a robot how to make an apple pie
* A virtual pet in augmented reality
* Code that can create different types of forests in virtual reality
* A design for digitally fabricating a comfy chair
* The patent for sensors that allow a robot to etch innovative patterns on glass -- and the design and code that lets anyone digitally fabricate that sensor

Unlike physical objects, the cost of making a copy of a digital creative work for someone else is close to zero.

We can already get a glimpse of the potential of an economy where digital creative works are central and are easily available:

* If you want to learn a new skill, odds are there dozens of tutorials freely available on YouTube.
* Many recent AI breakthroughs have been driven by techniques known as "deep learning," which spread rapidly because both the ideas behind it and the open source programming libraries for implementing it are freely available.

Now imagine a world in which millions of people in communities across the globe are contributing to a body of emerging tech that is accessible to anyone. The potential of that pool of creative works is staggering.

But in a world where digital creative works are either freely or cheaply available, how do its creators make a living? If digital creative works are increasingly central to our economy, the experience of many musicians and newspaper reporters today may be our canary in the digital coal mine.

In short, one of the central economic questions we will need to grapple with in coming years is, how do we reward creative work while ensuring that the creative bounty it generates is widely shared?

Answering this question will be important regardless of the impact AI and robots have on employment. Even if AI and robotics destroy more jobs than they create, there will still be an abundance of opportunities for making creative works that many people value. The big question is how the new rules of the road will shape who benefits.

# Digital Fabrication

As we discussed in Part 3's introduction, MIT's ambitious plans for digital fabrication are just beginning to take off. So far, they've created a global network of over 1,000 community-based "Fab Labs," filled with 3D printers, laser cutters, and other fabrication and electronics tools, as well as people who can teach you how to make an amazing array of objects. Fab Labs all use the same tools and processes, so if someone in the global network creates a design for a beautiful chair they build in their Fab Lab, anyone else in the network can also make it.

MIT's Center for Bits and Atoms believes that in the coming decades, between conducting primary research and testing out some of its ideas through the Fab Lab network, it will be able to accomplish a dramatic technological transformation:

From machines in a Fab Lab that make things,

to machines that make parts of machines,

to machines that self-reproduce,

to building with digital materials,

to materials that are programmable and can turn themselves into parts.[[11]](#endnote-11)

In short, they are confident that by the end of journey, they will create a personal version of something like Star Trek's replicators.

Even if they're only partially successful, this transformation could have a wide range of effects. As some members of the Fab Labs movement like to ask, what if instead of having to take a job you don't like to make money to buy an object, you could just make the object yourself? Even if it's only true of some objects, it raises deep and profound questions about how we shape the rules of this new economy so everyone benefits.

As a result of those questions, spearheaded by Barcelona, there's a growing network of "Fab Cities" dedicated to experimenting together to see if they can leverage Fab Labs to build a more just, democratic and sustainable future. Their goal: by 2054, to move

from ‘Products In Trash Out’ (PITO) to ‘Data In Data Out’ (DIDO). This means that more production occurs inside the city, along with recycling materials and meeting local needs through local inventiveness. A city’s imports and exports would mostly be found in the form of data (information, knowledge, design, code)...

We need to reinvent our cities and their relationship to people and nature by re-localising production so that cities are generative rather than extractive, restorative rather than destructive, and empowering rather than alienating, where prosperity flourishes, and people have purposeful, meaningful work that they enjoy, that enables them to use their passion and talent.[[12]](#endnote-12)

It's anyone's guess as to whether this movement will come anywhere close to achieving its ambitious goals. But regardless of what you think of their approach, one thing is certain: the questions they're raising and the scale of answers they are proposing is exactly the kind of work communities across the globe need to start engaging in if we are to take advantage of these potential opportunities.

# Thinking Ahead While Focusing on Today

Given the impact emerging tech will eventually have on the economy, we need to begin raising the kinds of questions laid out in this chapter. We also need to start asking broader questions such as:

* What role should work play in our society?
* What are our needs as human beings?
* What are our deepest values, and how can our economy help support them?

But there's a limit to how helpful it is to wrestle with these questions today. The most profound impacts of emerging tech probably won't affect us until two decades from now. In the meantime, given that so many communities are currently suffering, we need to spend the bulk of our energy on solving problems in the here and now.

Moreover, even if we could come up with detailed answers today as to how we want to influence the impact of emerging tech on our future economy, we couldn't build a realistic roadmap to get to where we think we want to go. The endpoint is too far away to have any confidence as to how we'll get there.

But if we do it right, it's still extremely useful to think and debate about the future. Perhaps the best way to manage the tension between today's immediate needs and tomorrow's potential is to keep asking:

* How can we use our answers to these long-term questions to shape today's plans?
* How can we design today's plans so they open up space and create opportunities to build the future we want?
* How can we use our work in the next few years to test out the ideas and assumptions we have about the future we think we want to build?

It is a rare and precious gift to have a glimpse of the dangers and opportunities we'll face over the next 20 years. Let's not squander it.

Conclusion

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# Getting Started

If you agree with some or all of the vision laid out in this report and you want to try it out in the real world, where do you begin? Start from where you are.

Social change is a team sport; if you're going to succeed, you'll need to form a group. Perhaps you could start with people you know from church, your union, where you work, places you volunteer, or your friends. If you have the kind of contacts to do something more ambitious such as convening people from across your community, go for it -- but it isn't necessary to get started.

Then begin having discussions, asking questions, figuring out what you agree on and don't, what you know and don't know, and educating yourselves. And start small, but keep your eye on the prize. Bringing about a transformation on the scale that's necessary is about a dance between big goals and little steps, about dreaming big without ever letting your group's ambitious goals overwhelm you.

When you first get started, there are 3 steps your group will need to take: envision, map out the terrain, and start learning by doing. Odds are you'll end up cycling through these steps more than once.

1) Envision

* What would your community or region look like in 10 or 20 years if you succeeded? What would it feel like?
* Roughly how many people in your community would need to work in emerging tech to improve the overall economic opportunities in your community? And how would you know that enough people had found a home in emerging tech to make a real different in your community or region? This is a crucial step. Too many people who want to democratize tech will count how many individuals they're reaching but will never take a hard look at whether they are having a major impact on specific communities.

2) Map

* What groups or individuals are already attempting to make tech more accessible in your community? For example: community groups, tech activist meetups, colleges and universities, vocational education efforts, sympathetic local or state politicians, people inside tech companies who care about empowering people with tech. Are there any existing efforts your group should join?
* If you're from a thriving middle-class community, are there nearby communities who are looking for help? If there are opportunities to help out, it's extremely important to enter into these communities with respect and more than a little humility; from Harlem to Harlan County, nobody likes well-meaning but patronizing outsiders.
* What else can you plug into nationally -- e.g., churches, unions, and other national networks of civic organizations?
* Does your community have enough resources or the right resources to help democratize emerging tech? For example, what kind of support do the groups who are already trying to democratize tech have and what do they need?
* How inclusive are your efforts? And if they aren't inclusive enough, are there networks in your community you could partner with in your efforts to become more inclusive?
* What major obstacles does your community face, such as lack of broadband access or literacy issues? When and how can your group attempt to make some progress overcoming these obstacles without bogging down the entire project?

3) Try

* What is the smallest step your group can take to get your feet wet and start testing out your ideas and assumptions?
* Once your group has gotten your feet wet, how can you keep taking incremental steps that move you forward without feeling overwhelmed?
* How do you get comfortable with the fact that this process inevitably involves trial and error? How does your group build a culture of being open and honest about your mistakes so you can learn from them?

Some Initial Issues You May Encounter

* **Don't Sweat What You Don't Know, Ask for Help.** As soon as you start this journey, you're going to run into issues that you don't know how to address. That's perfectly normal; just track down some help. For example:
* **Job Stats**. For the question of how many people need to end up getting jobs to make enough of a difference in a community, odds are there are people who work for your state who are responsible for making projections of what the "workforce" of your state will look like in the future. There are also probably academics who have wrestled with this issue. And there may be some national policy shops who have experts who would be happy to come up with a rough estimate. To find and connect with them, start by searching online or asking librarians at your local library.
* **Emerging Tech Coding**. If no one in your initial group is fluent with emerging tech, odds are there are people in your community who are experts and who would be happy to help you figure out how to get started. Just make sure to follow the example in Part 3 and use your group's experience learning the tech to ask, what would the tech look like if it were designed from the ground up to be accessible for people like you?
* **Civic Engagement.** Many of the ideas in this report will be familiar to community organizers and others who are experts in community-based strategies (including some extension agents). If your group doesn't include anyone who has these civic skills, there are certainly people in your community who do and would be happy to share them. As your group begins to learn the basics of civic engagement, you should think about how these ideas and skills could be incorporated into tech trainings.
* **Community Networks**. If you hope to help nearby communities, odds are there are people you can connect with in your community who may not be knowledgeable about tech but who are knowledgeable about those communities' networks and have some contacts in those communities.
* **Focus on Diversity From the Jump.** One of the painful lessons of tech is that if a starting group is mostly white, male, and middle class, odds are it's going to stay that way as it grows. If your group has diversity issues, it's critical that you focus on becoming more inclusive from the very beginning.

# Setting Goals Without Setting Ourselves Up

Setting goals is critical to success -- especially when you're dealing with a problem where the solution may require orders of magnitude more resources than are currently engaged. Your group also needs goals so you have a very rough idea of how far you are along the path to success.

But it's easy to get tripped up by goals. A few thoughts on how to set goals that make your work easier rather than harder:

* **At the very Beginning, Numbers Matter Less.** Don't focus too much on numbers at the very beginning; otherwise you'll end up feeling so overwhelmed you give up. Realistically, you've probably got 8-10 years to hit your most ambitious goals. The point of asking these questions now isn't so you'll worry about nailing your numbers right away, it's to ensure you take advantage of the luxury of having that much time.
* **How Many Zeros?** Similarly, exact numbers aren't important early on. What you need to know is, are enough people getting trained and either getting good paying jobs or creating small businesses to boost your community's economy, or does your community need to train 10 times or 100 times as many people?
* **Track Diversity**. As the tech world has demonstrated, if organizations don't track their diversity they aren't likely to improve it. Once you're starting to make progress, make sure you think through how you will break down your goals by race, gender, income, urban vs. rural, etc. to ensure that everyone in your region will have a fair shot at jobs and co-ops/small business opportunities in emerging tech.
* **Don't Juke the Stats.** As soon as stats are treated like grades, institutions will get creative in figuring out how to manipulate the numbers so it looks like they are succeeding -- what the TV show *The Wire* called "juking the stats." So if politicians or funders start hammering on exactly how many jobs should be created and setting unrealistic expectations, push back hard.

# Expanding Your Efforts

Once your group has made some progress, you'll need an iterative approach that helps you stay on course:

* **Expand the Circle**. As your project begins to rack up some small successes, what other parts of the community do you want to invite to become partners? Or you may do the reverse -- for example, develop some proofs of concept that will help others wrap their heads around what you are trying to accomplish, then bring in more facets of the community and encourage them to assume leadership roles.
* **Stay Inclusive**. How do you ensure that as you grow all facets of your community are represented?
* **Develop Leaders**. As Part 3's overview of Citizenship Schools demonstrated, identifying and training new leaders is a crucial part of building a vibrant grassroots movement. As you grow, you'll need to start incorporating leadership development into your plans if you haven't already.

# Scaling Up

As crucial as local action is, at some point efforts in individual communities won't be enough. If we want to ensure that no communities will be left behind and that every community will have the resources it needs to succeed, we will need to develop something similar to Extension Services for emerging tech.

We can't know in advance what the right solution will be -- for example, whether it can be funded primarily through private means, a balance of public and private, or through largely public means as was required for agriculture. The only way we'll know what works and what doesn't is through experimentation. But regardless of the details of the solution, one thing is clear: we will need a solution that's up to the scale of the problem.

To create the equivalent of Extension Services, we will also need to build a national network for civic action -- a project that Makers All, which sponsored this report, hopes to facilitate. Part of what such an effort will require is building connections between community experiments and creating dialogues across communities so we can organically develop the solution. But it will also require that communities work together to bring pressure on government, large tech companies, and other large institutions so they mobilize the resources necessary to ensure every community shares in the opportunities and abundance created by emerging tech.

As we attempt to mobilize these resources, one of the advantages we have over some other civic efforts is that we may be able to mobilize the self-interest of one of the biggest players: the tech world. Although there will undoubtedly be resistance in some parts of the tech world to truly democratizing emerging tech, in the long run it's a no-brainer:

* If we succeed, we will greatly expand both the pool of talented people and the market opportunities in emerging tech. Big tech companies will have a smaller slice of the pie, but the pie will be much, much bigger.
* And if we don't succeed? What's behind Door Number 2 is too scary to contemplate, but it'll undoubtedly include some version of "peasants with pitchforks" bent on destroying the Frankenstein of robots/AI they see as a threat to their community.

The need for bold action isn't news to anyone in the tech world -- that's why discussion of radical ideas like Universal Basic Income are now commonplace. The issue isn't whether we need to act, it's what the right action is. This shared understanding in tech doesn't mean action on the scale we need is inevitable, but it greatly improves the odds of success.

# Special Considerations

The Role of Tech Companies

Although tech companies will need to be involved in community-wide efforts, they also have a distinct role to play. If you work for a tech company that wants to make the tech you develop more accessible, here's what you and other people at your company can do.

**Building Relationships to Develop Community-Oriented UX**

The first thing you'll want to do is to start exploring how to implement community-oriented UX.

* If you work in a large company, odds are there already community groups that your company has a relationship with -- e.g., community groups your company has given grants or donations or groups where some of your staff volunteer. Using these pre-existing relationships, you can see if these groups might be interested in building a partnership.
* There's a good chance your community partners aren't familiar with community-oriented UX, so you'll need to explain what you're trying to do and why. But if the group has trainers who are skilled at training folks in the community to use tech, there's a good chance that once they understand what you're trying to do and why, they'll be interested in at least trying a short experiment.

There are 2 keys to making this partnership work:

* **Pick the Right Tech**. If you have more than one framework/library/etc. to choose from, pick the tech that's easier to make accessible. Right now, for example, if you're developing tools in augmented and virtual reality, these are a pretty safe bet.
* **Find The Right Partner**. It may be that the community groups you already work with aren't ready to make the leap. Or it may be that they aren't a good fit right now -- e.g., they just don't have the time given their other priorities. There may be other community groups you haven't worked with who make more sense as partners -- perhaps even groups that haven't traditionally engaged in tech training but have a lot of capacity and experience training in other areas.

Once you've figured out the right Tech and the right partner(s), you want to start your collaboration with a pilot project. The goal of the pilot is to get your feet wet and start learning how to do community-oriented UX in a way that works for everyone involved. If you're ready, it also might be worth considering using these first baby steps as a chance to begin conversations about the possibility of hiring one or more community groups as community-oriented UX consultants in an ongoing basis once they've gained some expertise.

**Small Startups**

For small startups, the situation is more complicated. Most startups don't have the kind of resources that a larger shop has -- and there's a good chance they don't have any relationships in the community to start from. But it's still worth exploring to see if there are ways you can build a partnership.

**Be Flexible**

All of the above is meant only as a guide; you'll need to adapt it to your circumstances. For example, it may take some time before you'll figure out the right community partners. In the meantime, there's no reason you couldn't start working on smoothing the learning curve. In the experience of this report's author, many emerging tech frameworks, etc. have glaring UX shortfalls -- issues where anyone with experience teaching coding to non-techie adults could point out a number of problems that could be fixed even before you start using formal UX techniques.

Using Economic Leverage To Help Others

Although making the wealth of emerging tech accessible in every community is a critical part of confronting the robots/AI employment threat, it isn't the only issue we'll need to address. One pressing concern is that even if huge numbers of jobs aren't eliminated, too many of the remaining jobs may not pay well. For example:

* **The Paradox of Automation's Last Mile**. Researchers Mary Gray and Siddharth Suri have shown that for every round where AI automates away work, humans play a critical role in developing or cleaning up the data needed to train AI and handling the behind-the-scenes work that AI can't yet manage (e.g., responding to a customer complaint).[[13]](#endnote-13) Most of this work can be done by just about anyone, so it rarely pays well.
* **Care Work**. It's not clear if robots will be able to take care of children or the elderly, but even if they could, we might not them want to. But care work has never paid well because it's been considered "women's work."

Given that people who obtain full-time jobs or create small businesses/co-ops in emerging tech will be in an economically advantageous position, over the long run we will need to see if there are ways they can use their position to help people who end up in lower paying jobs. Sometimes this may simply be a matter of supporting their organizing efforts. Other times it may involve helping them to bring the economic benefits of emerging tech into their jobs. For example:

* Pushing companies to develop the emerging tech home care aides use so that it enables some home care aides to become power users, gaining more skill and making it easier to advocate for better pay
* Helping organized nursing home aides gain a say on the direction of efforts to automate their work so their jobs become less physically demanding and more mentally and emotionally fulfilling over time

It's unrealistic to expect this kind of support early on -- emerging tech activists will already have their hands full. But as they dream about when their efforts could lead 20 years from now, it's worth at least beginning to ask questions about how successes with emerging tech might be leveraged to help all people in their community.

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# Forging Bonds Between Communities

Although this report is focused on using the opportunities of emerging tech to help communities heal themselves, this work might also provide an opening to heal the divides across communities.

We live in an era where much of our politics are polarized -- and in a democracy that’s necessary at times. But in such a polarized time, we also need ways to rebuild the bonds between us.

There are few better ways of reforging our bonds than in the crucible of working together. Working together and learning from one another is an efficient and effective means of operating. But if our work is structured properly, it can also build connections among people and communities that have a deep and profound effect on how we see others and how we see ourselves.

In short, as we work together, helping one another as we struggle for a better future for all of our communities, black and white, rural and urban, red state and blue, we may also find our way to rediscovering our common humanity.

APPENDIX: FREQUENTLY ASKED QUESTIONS

Isn't Coding Too Hard to Expect Most People to Do It?

Today, there's no way to know how many people could become skilled enough at coding to make a living either as a full-fledged developer or a power user or blue-collar coder. The reason we can't yet answer the question is that we haven't tried with the degree of commitment and the amount of resources necessary to find out.

It's quite understandable that many people today think coding is too hard for lots of folks to do it. But that's because for all the hard work that's gone into our coding effort so far, compared to Extension Services, we've still got a long way to go:

* The tech world has never been focused enough on making programming languages, libraries, and frameworks accessible to the community in the way that Extension Services translated modern agricultural practices. All you need to do is go to a typical yearly conference on Python, JavaScript, or some other language or framework, and look for talks or workshops about the nuts and bolts of making coding tools easier for everyday adults; you'll be lucky if you find one or two. Or to put it another way, when tech hiring sites have dozens of job postings for community-oriented coding UX experts, then we can start asking whether coding is truly too hard.
* As hard as folks in the community are working on making tech more accessible, the resources they have are a drop in the bucket compared to Extension Services. For example, as the report notes, by 1948 New York State's Extension Services had built a network of 32,000 trained volunteer local leaders and committee members, who were supported by 383 agricultural and home economics staff who were affiliated with colleges and universities. That's an impressive number by any standard, but it's stunning considering that it was approximately 1.5% of New York State's rural population.[[14]](#endnote-14) Given the communication tools we have at our disposal, we won't need that many volunteer activists. But we will certainly need far more resources and people that are currently invested.

Moreover, it's important that we don't conflate 3 issues: how much formal training you need to be a skilled coder, how hard coding is to master, and whether many people could learn to do it. You don't need to have taken classes in chemistry to know how to bake cookies. That doesn't mean that becoming a truly skilled baker isn't hard. But we don't assume becoming a skilled baker is too hard for most people to get a job doing it.

The real issue isn't whether coding is hard, it's whether we can break down coding and provide enough support so millions of people can do this hard work. The only way to find out is to step up our game and try.

Finally, it's worth keeping in mind that the goal of Makers All isn't to train all adults to become coders. Not everyone is going to become a programmer or designer. The goal is to train enough people in every community so that a big enough slice of the wealth created by emerging tech is invested in every community so it can act as a foundation for ensuring all communities prosper.

Extension Services Was Helping People Who Already Knew How to Farm. Isn't That Much Easier Than Teaching People How to Code from Scratch?

It's easy from our vantage point to assume that farming is basically farming and that if you already know the basics of farming, learning modern agricultural techniques wasn't that great a leap. But history shows otherwise.

The first major effort to train farmers in the skills of modern agriculture was the Morrill Act, which created the Land-Grant College system, was passed in 1862. Before that, there were several decades worth of volunteer efforts to train farmers. Cooperative Extension Services were created by the Smith Lever act in 1914, which drew upon the experiments of many states. In other words, it took at least 50 years to figure out how to train millions of farmers in modern agricultural techniques -- not exactly a sign that it was easy.

Part of the reason it was so difficult to bring about the modern agricultural transformation is that farming is an incredibly risky business. If a beginning coder is trained in a new tool for handling bugs in their programs and it turns out that this isn't as effective as the previous tools and techniques for handling bugs, it isn't hugely expensive to recover from that mistake. But if our former switches to a new technique for handling bugs on their wheat crop and the new technique doesn't work, they could lose most or all of their crop. They could go bankrupt. Their kids might go hungry.

In short, if you look at the totality of the experience of 19th century farmers switching to new techniques vs. learning to code from scratch today, the gap is far smaller than it might appear at first glance.

Notes

1. Aaron E. Carroll, "What Barbershops Can Teach About Delivering Health Care," New York Times, May 21, 2018, https://www.nytimes.com/2018/05/21/upshot/what-barbershops-can-teach-about-delivering-health-care.html [↑](#endnote-ref-2)
2. Jay Hanlon, "Stack Overflow Isn’t Very Welcoming. It’s Time for That to Change," Stack Overflow blog, April 26, 2018, https://stackoverflow.blog/2018/04/26/stack-overflow-isnt-very-welcoming-its-time-for-that-to-change/ [↑](#endnote-ref-3)
3. Some argue certificates are the solution. There are two problems with certificates: 1) for most employers, real-world experience is a far more useful gauge of a job candidate's skills, and 2) you can't create meaningful certifications for many emerging technologies because their standards and best practices are still in flux. [↑](#footnote-ref-1)
4. "A Conversation with Neil Gershenfeld," Edge, January 23, 2015, https://www.edge.org/conversation/neil\_gershenfeld-digital-reality [↑](#endnote-ref-4)
5. Neil Gershenfeld, Alan Gershenfeld, and Joel Cutcher-Gershenfeld, "Introduction," *Designing Reality: How to Survive and Thrive in the 3rd Digital Age*, Basic Books, November 14, 2017, http://designingreality.org [↑](#endnote-ref-5)
6. J. Douglas Allen-Taylor, " Septima Clark: Teacher to a Movement," http://www.safero.org/articles/septima.html [↑](#endnote-ref-6)
7. For more on the distinction between Extension Services and Citizenship Schools, see the Introduction's last endnote. [↑](#endnote-ref-7)
8. Southern Christian leadership council conference workbook, https://www.crmvet.org/docs/cit\_schools\_workbook.pdf [↑](#endnote-ref-8)
9. Septima P. Clark, "Literacy and Liberation," Freedomways, 1st Quarter, 1964, https://www.crmvet.org/info/cs.htm [↑](#endnote-ref-9)
10. Roadside Theater, "About: Story Circles," https://roadside.org/asset/about-story-circles [↑](#endnote-ref-10)
11. Fab Foundation, "What Is a Fab Lab?" http://www.fabfoundation.org/index.php/what-is-a-fab-lab/index.html [↑](#endnote-ref-11)
12. Tomas Diez, "Fab City Whitepaper: Locally productive, globally connected self-sufficient cities," https://fab.city/documents/whitepaper.pdf [↑](#endnote-ref-12)
13. Mary Gray and Siddharth Suri, "The Humans Working Behind the AI Curtain," Harvard Business Review, January 9, 2017, https://hbr.org/2017/01/the-humans-working-behind-the-ai-curtain. They also have a great book coming out in May 2019 about this subject, called *Ghost Work*. [↑](#endnote-ref-13)
14. Ruby Green Smith, The People’s Colleges: A History of the New York State Extension Service in Cornell University and the State, 1876-1948 (Cornell: Cornell University Press, 1949), pp. xxxi-xxxii; Department of Commerce, 1950 Census of Population Advance Reports, https://www2.census.gov/prod2/decennial/documents/41028710p8ch2.pdf [↑](#endnote-ref-14)