Skills Brokers in the San Francisco East Bay:

Challenges and Opportunities for Creating Equitable Cross-Sector Collaboration Through Workforce Intermediaries

CENTER FOR CITIES+SCHOOLS
UNIVERSITY OF CALIFORNIA BERKELEY

Jeremias Herberg

BERKELEY IURD INSTITUTE OF URBAN AND REGIONAL DEVELOPMENT

The Center for Cities + Schools in the Institute of Urban and Regional Development at the University of California, Berkeley works to create opportunity-rich places where young people can be successful in and out of school. CC+S conducts policy research, engages youth in urban planning, and cultivates collaboration between city and school leaders to strengthen all communities by harnessing the potential of urban planning to close the opportunity gap and improve education.

citiesandschools.berkeley.edu

UC Berkeley's Institute of Urban and Regional Development (IURD) conducts collaborative, interdisciplinary research and practical work that reveals the dynamics of communities, cities, and regions and informs public policy. IURD works to advance knowledge and practice in ways that make cities and regions economically robust, socially inclusive, and environmentally resourceful, now and in the future. Through collaborative, interdisciplinary research and praxis, IURD serves as a platform for students, faculty, and visiting scholars to critically investigate and help shape the processes and outcomes of dynamic growth and change of communities, cities, and regions throughout the world.

Jeremias Herberg, Institute for Advanced Sustainability Studies (IASS) Potsdam, Germany
Herberg is a postdoc researcher at the Institute for Advanced Sustainability Studies (IASS) Potsdam, Germany. This research is part of a German-speaking doctoral dissertation, successfully defended in January 2017 at Leuphana University Luneburg, Germany. The report is a result of 5-months' research conducted in 2015 as visiting scholar at the Center for Cities + Schools in the Institute of Urban and Regional Development, University of California, Berkeley. He can be reached at jeremias.herberg@iass-potsdam.de

Aknowledgements: Thanks to Luther Jackson, Deb McKoy, Sandra Mukasa, Bruce Simon, Julie Sinai, and Jeff Vincent for reviews of drafts. All errors herein are the responsibility of the author.

Skills Brokers in the San Francisco East Bay:

Challenges and Opportunities for Creating Equitable Cross-Sector Collaboration Through Workforce Intermediaries

Working Paper, Center for Cities + Schools, UC Berkeley, April 2018

Abstract

This study provides a critical appraisal of intermediaries in demand-driven workforce development. In San Francisco East Bay, an emerging set of workforce intermediaries – here called the" Skills Brokers" – recently take issue in alleged Skills Gaps to create a cross-sector reform agenda. They seek to connect the supply and demand for STEM skills to mediate between the booming technology industries and educational crises. Against the backdrop of structural education-industry interconnections, however, the report suggests a shift in focus: It is argued that the Skills Brokers are valuable in facilitating boundary-crossing collaboration, but their orientation towards employer demands may perpetuate educational inequities while downplaying employer responsibilities. An altered focus on supporting upward-mobility pathways requires a more proactive role by Skills Brokers that scrutinizes and shapes employer demands.

Executive Summary

This paper critically reviews the regional contexts, strategies and effects of industry-education intermediaries in workforce development in the San Francisco East Bay. It provides a prospective look at the unintended consequences of demand-driven workforce development. The report addresses an emerging group of intermediaries, here called "the Skills Brokers", as its audience and subject of analysis, focusing on STEM skills (science, technology, engineering, math) and the technological industries and their overlaps with manufacturing in particular. After several years of practice and with the California Career Pathways Trust (CCPT) ending, the Skills Brokers are discussed in relation to the primary goal of providing upward mobility to workers and students. The report has three interrelated purposes:

1. Analyzing the regional contexts that may be a central target for the Skills Brokers.
2. Assessing the Skills Brokers' strategic assumptions against regional contexts.
3. Discussing the potential effects of the Skills Brokers' assumptions within regional contexts.

As depicted in the graphic below, the report contrasts the regional contexts (left column) and strategic assumptions (right column) of the Skills Brokers and, based on that contrast, lays out the potential effects of demand-driven workforce development within the regional contexts (right column and center). The main argument is that while many crises in the Bay Area's educational landscape can be traced back to industrial development, the Skills Brokers tend to perpetuate the asymmetric industry-education interplay themselves by following an industrial development agenda. They maintain that workforce development can serve both regional growth and educational equity once educational and career pathways are consequentially oriented towards employer demands, especially with regard to STEM skills.

The report seeks to encourage cross-sector alliances and a shift in the Skills Broker's approach. In contrast to orienting towards employer demands, Skills Brokers may better facilitate upward mobility. They can do so by helping to relieve educators from the many socioeconomic inequalities that challenge their work, and by prompting employers and economic policy makers to re-assess their workforce demands and to create secure mid wage jobs.

Literature Review Regional contexts	**Interview Research** Strategic assumptions and effects
Educational Landscape • Employment driven by degrees rather than skills • The educational impact of STEM-related job markets is expanding [Educational Insight 1-2]	**Brokering a STEM Landscape** [Effect 2] *The Skills Brokers* defragment the region's educational landscape – affording regulators or industry stakeholders more encompassing influence. [Educational Assumptions 1-2]
Industrial Landscape • Income inequality prevails mainly due to a lack of mid-wage jobs • Tech industries not the most likely sector to create mid-wage jobs • Upward mobility requires education, and a critical discussion of employer demands [Industrial Insight 1-3]	**Brokering STEM Supply and Demand** [Effect 3] *The Skills Brokers* rely on a supply-demand scheme – questioning educational 'supply', supporting employer 'demands'. [Industry Assumption 1-3]

Brokering a Cross-Sector Reform Agenda [Effect 1]
The Skills Brokers translate labor market dynamics into educational programs – synchronizing educational and industrial landscapes.

Table 1. Executive Summary

I. Introduction

The San Francisco Bay Area's industrial development is famously based on a particularly collaborative work ethic both among firms, and with educational organizations like Stanford and UC Berkeley (Saxenian 1996). This report scrutinizes how the collaborative ethic shapes demand-driven workforce development as a political arena between technology industries and education.

While cross-sector relationships have largely been confined to particular firms and institutions, the interest and pressure to collaborate is broadening across sectors. Particularly in vocational training and workforce development (Blair et al. 2016; Jain et al. 2017; Terplan et al. 2014), regional planning and policy agencies call for more cross-sector partnerships (Benner and Pastor 2015; Chapple 2005; Giloth 2002). Numerous stakeholders support this call: community colleges, community-based organizations, universities, foundations, the federal government[1], or the state of California through California Investment and Development Boards and the "SlingShot" initiative.[2]

While collaborative interests are spreading, cross-sector relationships in the San Francisco Bay Area are hampered by a "perfect storm" consisting of educational crises and technology boom. However, a new group of cross-sector intermediaries is currently emerging seeking to establish a more collaborative education-industry interface in workforce development (for the East Bay: Public Consulting Group 2015). Also tackling some root causes of the "perfect storm," those groups aspire to mediate between students looking for jobs, educators looking for industry collaborators, and employers looking for employees and public outreach opportunities. As a corresponding funding strategy, the California Legislature in 2014 launched a one-time competitive grant, the California Career Pathways Trust (CCPT). Recently completed, CCPT has invested $500 million over a three-year period to facilitate the design of career pathway programs that strengthen the local connection of schools, colleges, and businesses (California Department of Education 2014).[3] In the Bay Area, CCPT has been picked up as a workforce development opportunity interconnected with other partnerships such as SolarTech Workforce Innovation collaborative, the Bay Area Consortium for Water and Wastewater Education, or the Loyd E. Williams Pipe Trades Training Center. Many of these efforts primarily focus on employer demands for skills in science, technology, engineering and math (STEM). With such STEM partnerships on the rise, this report focuses on the regional role of STEM skills.

This study analyzes the structure and purpose of demand-driven workforce development using the example of Skills Brokers (SBs), an emerging group of intermediaries, in the San Francisco East Bay. The research question is as follows:

[1] On the federal level consider the Workforce Innovation and Opportunities Act, or the Workforce Investment Act; Obama's TechHire initiative, the report "Managing the Talent Pipeline: A New Approach to Closing the Skills Gap", as well as the strong communication of the Trump Administration with regard to workforce development and vocational training.
[2] See: https://cwdb.ca.gov/initiatives/slingshot/
[3] See: https://www.cde.ca.gov/ci/ct/pt/index.asp

What are the regional contexts, strategic assumptions, and potential effects of intermediaries in workforce development when they mediate between employer demands as well as educational curricula and career pathways?

The report lays out how SBs broker a "reform agenda", an educational landscape, and the industrial relationship of supply and demand for STEM skills. The report aims to contribute to recent debates on whether STEM education can and should be seen as a synergetic instrument to promote both technology industries and their overlaps with manufacturing on the one hand, and upward mobility for workers on the other (Giloth 2002, Chapple 2005, Cappelli 2012, Terplan et a. 2014, Jain et al. 2017).

Methods and Structure

A qualitative inquiry was conducted to study and map a political arena of new intermediaries in workforce development. For the construction of an empirical case four selection criteria were used in identifying these intermediaries: (1) the self-identification of the actors as brokers who mediate between employer demands and educational supply, (2) their commitment to creating a shared understanding of cross-sector collaboration, (3) the social connection to educational and economic organizations, and (4) the geographic location in the San Francisco Bay Area. A sample of seven initiatives were analyzed based on at least two qualitative interviews per initiative. In sum, the study relies on 28 semi-structured interviews. Other initiatives were not incorporated, while respective interviews were used to study the wider context. The interviews and initiatives are anonymized and cited as letters A-Z to guarantee confidentiality. In order to contextualize demand-driven workforce development, policy reports in industrial development, education, regional planning and workforce development were reviewed and respective insights were linked with the qualitative inquiry.

The paper is organized as follows: first, I portray the regional context of educational crises and technology booms and how they gave shape to the rise of the Skills Brokers. Next, the findings section explains how the Skills Brokers approach the Bay Area's educational and industrial landscape. Third, I discuss the potential effects of demand-oriented workforce development and suggest a shift focus towards upward mobility for workers.

II. Educational Crises and the Tech Boom: A Perfect Storm

The interplay between education and the technology industries is a largely uncharted field of research. But in the Bay Area, recent developments clearly point at a set of three converging crises, a "perfect storm," as one interviewee called it.

First, it is important to acknowledge, as some interviewees do, that the Bay Area experiences a rampant income inequality that also shapes the industry-education connections. In the 95th percentile of the Bay Area's population the median income is $353,483, as opposed to $31,176 median household income in in the 20th percentile. With a 15% income growth at the top and a

4% income decrease at the bottom (between 2007 and 2014), income inequality in the larger Metro Area is growing (Holmes and Berube 2016). What is more, so-called middle wage jobs (pay $18 to $30 per hour) are increasingly scarce, or inaccessible to less educated workers. In 2013, Terplan and Bhatti at the San Francisco Bay Area Planning and Urban Research Association (SPUR) estimated that until 2020 there will be only 30,000 middle wage jobs opening each year, while top and low income jobs are estimated to grow by 50,000 positions (Terplan and Bhatti 2013).

Second, educational crises parallel and represent the increasing income inequality seen in the San Francisco Bay Area region. Although excellent universities and a large workforce bolster the region's educational landscape, socioeconomic inequities and financial problems in education prevail, especially affecting low-income populations. Their upward mobility hinges on the underfunded and fragmented areas of community colleges, workforce investment boards, housing[4], and transportation (Terplan et al. 2014). Based on a complex spatial interplay between housing and education, school budgets reflect and perpetuate socioeconomic inequities thus rendering schools across the Bay Area very unequal, hindering their success to provide access to college and career pathways.

Third, the region's economic landscape is booming. But particularly technology companies that benefit the most and feature prominently in the skills debate fail to effectively tackle looming equity issues (e.g., company taxes, outsourced jobs, workforce diversity). What is more, housing and transportation additionally exacerbate income inequality, while in turn housing costs are rising as a consequence of job seekers that move to the Bay Area to benefit from the tech boom (e.g., Terplan et al. 2014, Holmes and Berube 2016). That means that before even considering educational or career pathways, many job seekers addressed by workforce developers are struggling to afford the increasingly high living costs and to benefit from the economic boom. Hence, housing and transportation, but also workforce development buttress the asymmetric interconnectedness of the tech boom and educational crises. To further complicate that interplay, there can be a temporal mismatch between education, vocational training, and the needs of the regional economy. Amidst this "perfect storm," several competitive relationships are intensifying:

- Students, families and workers compete for the proximity to affordable housing, good schools and well-paid jobs. They are attracted to well-paid jobs in STEM-related industries in particular.
- K-12 and community colleges are struggling to graduate job-ready skilled individuals, and seek to signal their achievements in a way that resonates with employers.
- School districts compete to attract families to boost their state revenues.
- Companies, especially technology companies, compete for well-educated workers and a public perception as a community-friendly employer.

[4] As Bierbaum et al. pointed out (Bierbaum et al. 2011) housing is affected by education in several ways, for instance: families' housing choices centrally focus on school quality; a broad variety of housing units are necessary to attract families; students may use transit to get to and from school and after-school activities, but public transport options are unequally distributed across local populations (Terplan et al. 2014); The combination of modest teacher salaries and high housing costs form a constant challenge for many education professionals and school districts in the Bay Area.

Hence, the regional equity issues reflect in cross-sector relationships, and intersect in the crisis-ridden field of workforce development. A recently founded group of workforce intermediaries, the Skills Brokers (SBs), seek to mediate between economic boom and educational crises with a particularly communicative agenda: They seek to help students and workers prepare for future jobs and benefit from the economic boom. They attempt to support school districts and educators to collaborate with companies and to communicate in a business-oriented language. And they address companies assisting them to find and develop skillful workforce, while ensuring their regional reputation. Most SBs thus adhere to a demand-driven agenda by interconnecting employer needs with educational, vocational and socio-economic concerns.

The "perfect storm" especially foregrounds the problem of providing upward mobility to students and workers. Therefore, the report primarily scrutinizes workforce development with regard to upward mobility. The assessed assumptions, contexts and effects as well as the advocated strategy are oriented towards this goal.

The Rise of the Skills Brokers in the San Francisco East Bay

A group of workforce development initiatives here coined the "Skills Brokers" (SBs), recently emerged from the "perfect storm." Not as a causal factor, but as key actors in between education and economy, the SBs can be assessed as part of the political dynamics in the region. While employing different strategies and relying on diverging sets of resources, they all answer to pressing needs in both education and industry. To understand the perspective of the SBs, it is worthwhile to account for their origin in a narrative way as provided in the interviews.

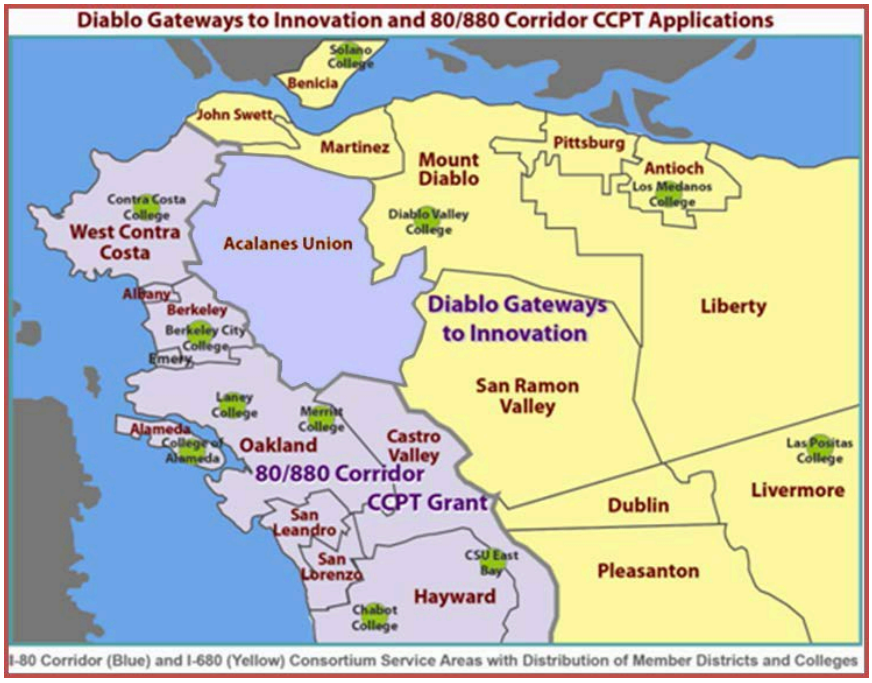
In the East Bay, one first impulse for cross-sector coordination in workforce development was a shared concern among regional planners, educators and businesses: startups in renewable energies that originated from UC Berkeley laboratories migrated to Silicon Valley in the South Bay. In order to hold companies in the East Bay a partnership emerged between the town halls of the four east bay cities of Emeryville, Berkeley, Oakland, Richmond and local universities and colleges. The concern to locally attract and retain businesses was taken as a common denominator in order to bundle the employment policy cooperation of the neighboring educational institutions into so-called academies.

With the California Career Pathways Trust (CCPT) an additional acquisition success was accomplished and served as the main resource for workforce development efforts that help to shape the pathway of school-age students into post-secondary education. In the East Bay, based on CCPT and additional grants[5], a scene of cross-sector alliances emerged. While most interviewees perceive the acquired grants as deficient – CCPT is limited in time and distributed across districts where the new grant runs the risk of only compensating for pre-existing deficits – the grants enabled otherwise unusual coordination efforts.

[5] Under the title "Design it, Build it, Ship it", Contra Costa County and Peralta Community College District successfully applied at the Federal Department of Labor for $15 million to help integrate the ten community colleges with the regional transportation sector.

First of all, CCPT provided the opportunity for the aforementioned actors to be convened in meetings both in the East Bay and in Sacramento, the state capital. In the course of multiple meetings, the collaboration resulted in two successful applications for the CCPT grant: one grant for over $8 million dollars for the eastern sub-region and a $15 million grant for the western sub-region. This split also led to a division of the educational landscape into the so-called "I-80 corridor" in the west, marked red, and the "I-680 corridor" in the east, marked in yellow (Figure 1). Hence, although CCPT does not fund an educational landscape per se but rather represents a mediating element between local and federal administrative units, local school districts were convened on a regional level. In response to funding, the emerging alliances widened their function as intermediaries. They operated not only horizontally, but also vertically, in order to reorganize local school districts in the light of regional stakeholders. As a result of this formation, the network of education providers and economic promoters, linked by A. and others, has been consolidated on basis of the approval of a further grant.[6]

Figure 1. Extracted from a presentation shared by Skills Broker interviewee



It is the practice of convening diverging demands, actor constellations and policy levels that gave rise to this new group of cross-sector intermediaries. With CCPT ending, it is a good moment to assess some of the demand-driven workforce development strategies that were primarily funded so far.

[6] SB 1070: http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201120120SB1070

STEM Skills as a "Lightning Rod"?

The SBs seek to re-connect educational and business development concerns and try to convene groups from both contexts. As all interviews clearly showed, the SBs understand themselves as carriers and mediators of boundary-spanning link between economic growth and education, poverty and technology. In their shared conviction – as epitomized by the popular motto "convene, measure, broker, connect" – the SBs see a need for more communicative and data-driven interconnections. The deficient and competitive relationships among and between educators and employers may, when facilitated effectively, represent an underutilized leverage point for both regional growth and equity. As Table 1 indicates, the groups vary in strategy; Some SBs act as cross-sector conveners, others rely on a data-driven matching approach, and yet others explain their strategy in analogy to supply chain managers. Yet, by different means they all seek to facilitate career pathways that traverse education, vocational training, workforce systems and job markets. In their eyes, a synergetic opportunity has opened up more recently, as workforce needs of technology companies and the large number of job-seekers together suggest a demand for STEM career pathways. Through this lens, training and educational services and professionals can simultaneously contribute to socioeconomic mobility and economic growth.

Table 1. Exemplary Skills Brokers (anonymized)

The Platform	The Cross-Fertilizer	The Supply Manager
Convene teachers from Community Colleges and High Schools to map career pathways leading up to industry demand as represented in policy documents.	Seek to create an IT-platform that supplies a data integration and one-to-one matching of educational data on alumni as well as employer demands.	Create a constantly renewed program of stackable certificates for job seekers to secure jobs in collaborating ICT firms despite the lack of college degrees.

The synergetic focus of the SBs entails underlying educational and industrial assumptions: First, STEM skills are seen as the regionally most effective focus to connect and balance employer demand and educational programs. Moreover, the current boom of the tech industries, among other sectors, represents a critical opportunity once workers receive training and qualifications in STEM skills. These and other assumptions portrayed below provide a useful orientation for the interviewed intermediaries that are part of the "perfect storm," but seek to overcome it. One exemplary interviewee even describes the onset of the SBs as a "lightning rod", a unique opportunity to simultaneously deal with economic boom and employment issues:

> [...] what is happening right now in Oakland is this big emphasis on software development and coding jobs. It is becoming a lightning rod for a lot of these issues. Community colleges try to figure out how they are developing curriculum around that. Workforce Investment Boards are thinking about who they are going to fund to get more jobs here. Community-Based Organizations are saying, how are we collaborating better to make this happen.
> So I feel like almost what you have [...] for the first time is a lightning rod issue that is creating a lot of cross-talk between these systems. [...] Because it is technology, these

> are really good paying jobs, because we have all these big companies around here that you know, and because we actually, some of the grants that came out have said: these are traditionally jobs for degreed people but we can't turn the college system around fast enough so we have to find a way of getting non-degreed people into this. They are forced to do it. [...] We have for the first time a market demand for low income people to be skilled up. (C)

Similar to many other interviews, this quote illustrates how the SBs appropriate the crisis-ridden contexts that are only loosely connected, by producing mutual audience roles. The SBs combine the availability and the cultural prestige of information and communication technology (ICT) jobs with struggling and underfunded schools and community colleges on the other hand in order to instigate an encompassing "reform agenda" (C.).

The connectivity of this agenda goes back to the "perfect storm" introduced above. Against the background of increasingly converging crises, the educational institutions and companies in their respective competitions become increasingly aware of respective educational or industrial actors as relevant stakeholders. This mutual attention, which only increases with tech booms and educational reforms, is used by SBs to point out the lack of coordination and to establish themselves as coordinators.

III. Findings: Educational and Industrial Premises of Skills Brokering

The notion of a "lightning rod" suggests a synergetic solution to economic and educational problems. But, how conciliatory is the SBs agenda from an upward mobility standpoint? By further interconnecting employer demands and educational services the SBs have the opportunity to ease the socio-economic effects of the "perfect storm." Yet, they are themselves confronted with diverging requirements from industry and education, and grapple with interdependent, mostly unforeseen consequences. In order to provide a basis for a strategic assessment, the following sections present the SBs' approach to the Bay Area's educational and industrial landscape.

Educational Landscape and the Skills Brokers' Assumptions

Education is an obvious domain to help qualify local workforce and to provide access to good income and fulfilling jobs. The interviewed SBs address education along these broader lines. However, as some interviewees point out, the educational side of the industry-education relationship is particularly crisis-ridden and fragmented. In many interviews, SBs bemoan the lacking communications network with schools, within districts, within counties, within regions, or across systems. In addition, many SBs stress that collaborative efforts are difficult to sustain when educational organizations and policy domains usually do not communicate on a regular and somewhat institutionalized basis. The following section contrasts the SBs educational approach with corresponding socioeconomic insights.

How do the SBs approach the Bay Area's educational landscape? The central goal of the SBs is the facilitation of a STEM landscape. That is, the SBs employ a localized and networked approach to re-orient educational organizations towards STEM-driven employers. One interviewee expresses that vision as follows:

> *All these discussions that are kind of happening try to figure out from K-14 to higher out, how can we break down all the silos so that students experience the sameness to that extent. Getting all those different perspectives, sitting at the table, the thing that is interesting here, is not just getting economic development and industry and education, but also the different wings of education. So it is a whole lot of cross-fertilization! (A)*

As demonstrated in this quote, many other interviewees express the concern of "silos" that fragment the Bay's educational landscape so that collaboration and communication across schools is hampered by misaligned curricula, closed data systems, and other factors. Educators are thus seen as willing, but unable to collaborate across educational and sector boundaries. The SBs therefore express the goal to shape educational services and vocational pathways as a relatively seamless and, if necessary, standardized educational system that leads up to promising and sustainable careers. As a result, the educational landscape would appear as a dense network of educational and career paths from the perspective of job seekers, and regulators.

The specific goal is to streamline STEM career paths: In Y's words, the collection of various needs and possibilities serves a primary goal: "You need to figure out what it is that we need to teach" (Y). This means that the SBs seek to reassess educational organizations and services with regard to a more encompassing goal. During their emergence due to CCPT, the SBs particularly adopted the goal of an educational landscape that is geared towards employer demands. On the premise that the recent boom of the technology industries represents an opportunity for employees and students, the SBs prioritize so-called STEM skills (Educational Assumption #2).

Educational Assumptions under Scrutiny

How robust are the SBs' assumptions against the backdrop of recent educational crises? As depicted in Table 2 and illustrated in the following section, the two key assumptions presented above can be contrasted with prevalent research. The SBs' effect on the educational landscape may even be anticipated on basis of their own approach on the one hand, and current research on the other.

Table 2.

Educational assumptions	Educational insights
The SBs focus on STEM skills as they are in demand among employers and as they are taught in educational organizations.	While large parts of the Bay Area are driven by a STEM-focused job market, employment is driven more by advanced degrees than STEM skills.
The SBs assume from a spatial perspective that the region's educational development should be defragmented to better align with the region's industrial development.	With a so-called Job Sprawl, the educational impact of STEM-related job markets is expanding, while the STEM-related industries remain focused on particular locations.

Educational Insight #1: Degrees Matter

With notable exceptions, most SBs focus on skills in so-called STEM subjects rather than degrees (Educational Assumption #1). In line with a wider discourse, they maintain that the tech industries shape the Bay Area's educational domains mainly by a rising demand for STEM "talents". Which educational focus seems advisable for SBs to correspondingly promote upward mobility?

On first sight the so-called STEM economy, as analyzed by Brookings, seems to be a reasonable focus when seeking to prepare students for well-paid jobs. STEM jobs pay more (Rothwell 2013), and indeed a corresponding workforce is more in demand than in other sectors (Hathaway and Kallerman 2012). Conclusively, many SBs use employer data to argue that STEM-prone industries represent job growth in the region, have career ladder and growth opportunities, and are likely to lead to living wage jobs. With regard to the educational impact on STEM careers, however, it is important to note that corresponding career pathways are driven less by specific skills-sets, but typically require college degrees.[7] One interviewee even argues that employers usually require bachelor degrees for jobs that could be accomplished by means of certificates, too.

Well-educated populations thus benefit largely from the regional industries while skilled workers with less education find fewer opportunities, additionally suffering from rising housing costs that intimately relate to industrial development (cf. Terplan et al. 2014). Hence, employer demands that call for training in STEM skills are misleading from the standpoint of upward mobility: While the tech industries may indeed increasingly impact the education that is desirable from an employer's perspective, the employment benefit of the regional tech industries is less a function of the STEM degrees as such, but of advanced degrees in STEM, and beyond.

The SBs' focus on STEM skills is too narrow. Nonetheless, also a focus on four-year colleges would not suffice to foster upward mobility pathways. When looking at particular colleges, it turns out that they vary widely in their effect on educational attainment and bottom-to-top mobility (Chetty et al. 2017). Therefore, some colleges need further assistance while others can be relied upon as agents of upward mobility. An additional focus on community colleges, as endorsed by most SBs, is important to lay out pathways to middle wage jobs (while acknowledging the lack thereof; cf. section II.2).

Hence, when aiming for upward mobility, the primary focus may still be access and attainment of college degrees and the provision of alternatives aside from college careers.

[7] 63.5 % of all STEM jobs call for a Bachelors degree or more, while the lower qualifying share of STEM jobs is ranking 98 of 100 metro areas, only making up for 36.5 % of all jobs (Rothwell 2013). Recent data on California shows that among the fastest or largest growing occupations below college degree are a only few STEM jobs, such as web developers, computer user support specialists (Employment Development Department 2017).

Educational Insight #2: Spatial Fragmentation Prevails

The SBs presume that also from a spatial perspective industrial development of the Bay Area can benefit its educational development (Educational Assumption #2). How can this spatial interplay be understood and what role may the SBs play?

The second educational assumption resonates with increasing spatial and cross-sectoral interconnections across the Bay Area's labor market, housing market, industrial and educational development (Bellisario et al. 2016). The economic hubs South of San Francisco are spreading North, which is likely to strengthen employer-driven agendas of STEM education in the East Bay. Already in 2010, 25.2% of the total of 1,750,000 jobs in the area were within 3 miles of San Francisco downtown, 19.5% between 3 and 10 miles away and a large portion, 55.4%, between 10 and 35 miles away (Kneebone 2013). With the industrial sprawl comes an increase in traffic congestion, housing costs, and political pressures to educate a corresponding workforce (ibid.).

Upon closer scrutiny, however, the assumption of an industrially synchronized educational landscape overplays the Bay Area as an industrial entity. Zooming-in on the sub-regions, knowledge-based and high-tech industries rely on clear centers with Santa Clara, San Francisco and San Mateo accounting for all job growth in information industries between 2010 and 2013. The East Bay even lost information jobs, while manufacturing grew by 2,500 jobs in the larger North Bay, with a particular gain in Alameda County. Moreover, information and manufacturing are not the only sectors that have high location quotients according to the report (Association of Bay Area Governments 2015). These findings illustrate how the labor market of the Bay is spatially expanding while clear centers remain.

Not only do the SBs overplay the labor market's interconnectedness; additional disparities come into sight when focusing on upward mobility. Particularly housing as a factor helps to explain the remaining labor market fragmentation as housing costs vary greatly across the region (Bellisario et al 2016: 28). A Bay Area Council Economic Institute report presents a disparity between educational attainment in the region's center and in its immediate surrounding as a central constraint to the region's geographical expansion (ibid.: 22). The authors even claim that educational attainment levels "prevent[s] companies from expanding across all parts of the Northern California Megaregion." (ibid.: 2) However, a fully-fledged Megaregion is impeded by the fragmented interplay between housing, labor and education.

What are potential effects of the SBs on the basis of their assumptions in the apparent educational context? The SBs of the East Bay seek to defragment the current educational development to better align with the industrial landscape. Recent indications for a geographic expansion of cross-sector ties, however, suggest that the SBs could play a sensitive role: Already in their current practice, they confront local governments and educational organizations with an educational agenda driven by employer demands for STEM skills. When consistently following this agenda, the SBs may fail to unburden students and workers from the expectation to adapt their learning trajectories to industry trends. Instead, and the demand-driven agenda is likely to help employers to legitimize their role in the so-called job sprawl.

The discussion below will summarize the trade-off between the benefits and risks of demand-driven workforce development. The following section contributes industrial insights.

Industrial Landscape and the Skills Brokers' Assumptions

The SBs seek to align educational systems to the industrial landscape. The following section presents this approach and provides an inverse argument assessing the industrial landscape from an educational standpoint. From this perspective it appears that the SBs may perpetuate employer demands with regard to STEM education, while downplaying employers' responsibilities for the lack of middle wage jobs.

Generally, the SBs assume that tech booms represent a workforce opportunity, "a lightning rod" (Industry Assumption #2). The predominant logic that brokering initiatives rely on are essentially supply-demand-ratios (Industry Assumption #1). More specifically, the diagnosis of a skills deficit is widely shared (cf. assessment by Cappelli 2012; Handel 2003), as one SB illustrates:

> *… everything we are trying to do is about preparing workers for jobs that actually exist, and making sure that workers have the skills that employers need. If I would sum up what we are trying to do, that would be it. Our education system and other systems are not doing a good enough job to preparing workers with the skills that employers say they need. (Q)*

This interviewee understands her work against the background of an education system that allegedly fails to provide workers with the skills that are most in demand on job markets. That assumption entails a sometimes prognostic, sometimes diagnostic interpretation of the interdependence of workforce demand on the one hand, and the skills profile of graduates and job seekers on the other. At the federal and regional level, an alleged lack of qualified applicants is seen as a leverage point to simultaneously tackle diverging crises.

However, while all interviewees legitimize their work with the supply-demand logic, most of them are unspecific or one-sided about the underpinning diagnostics. While employers provide the SBs with data on their needs, evidence about the abilities of (high-) school alumni or job seekers is only anecdotal. This is largely because schools and companies, given their respective competitive relationships, are reluctant to publicize their respective data on educational records or human resources. The interviewee quoted above correspondingly cannot rely on robust data. Instead, she and most other SBs are only beginning to measure and consolidate the supply-demand ratios imposed by employer demands. By helping educators to adapt their programs accordingly, the supply-demand diagnostics is, at the same time, articulated and put into action. The popular image of a transactional relationships between educational supply and employer demand thus has very immediate consequences in the practice of the SBs.

The demand-driven agenda additionally comprises of "sector-based strategies" (Industry Assumption #3). In order determine employer needs as educational targets, the SBs motivate cities and counties to prioritize their industrial policy focus and to measure and structure the local education services on the basis of sector-specific employer demands. To inform sector-

based strategies, the SBs themselves provide an analysis of labor market data on occupational job growth over 5-10 years. The corresponding curriculum development is carried out on the basis of "mapping backwards": Educational histories are the starting point for a cross-organizational network and a differentiated orientation towards alleged employer needs.

The supply-demand logic thus undergirds a demand-driven workforce development: In the absence of viable information basis or cross-sector policy, the SBs link interdependent performance expectations to the provision of STEM workforce, while at the same time generating the desired educational programs. In fact, some interviewees personally express concern as to whether or not a systematic surveying and mediation of supply-and-demand is an educationally appropriate and organizationally viable approach. Others highlight how the temporal mismatch between educational administration and regional economies undercuts the concept of an immediate transaction of mutual services and expectations. Nonetheless, the supply-demand-logic prevails and all interviewed SBs can be said to follow the three mentioned assumptions.

Industry Assumptions under Scrutiny

As laid-out in the following section, the Bay Area's job market is driven by industries predominated by STEM jobs. In contrast to the SBs' industrial assumptions, however, the following insights suggest that demands for STEM skills may not be the most effective focus to support upward mobility.

Table 3. Summary of industrial landscape

Industry assumptions	Industry insights
Socioeconomic inequities and unequal access to job markets is due to deficient training and the failure of educational organizations to prepare for jobs.	Income inequality mainly is due to a lack of middle wage jobs and prevails despite the "tech boom".
The current boom of the tech industries represents an opportunity for workers once they receive corresponding training and qualifications.	The tech industries are not the most critical sector to create or educate for middle wage jobs.
A sector-specific focus on the tech industries is an appropriate strategy for educators to forge career pathways.	Upward mobility requires fundamental retraining and general education, but also suggests a discussion of employer demands and job creation.

Industry Insight #1: Middle Wage Jobs Are Lacking

The SBs assume that educational deficits cause the socioeconomic stress for workers and students, as well as the region's industrial development (Industry Assumption #1). Which industry-related causes and effects of income inequality can the SBs arguable help to address?

One major reason for income inequality is a lack of middle wage jobs rather than the assumed lack of appropriate training: "Current projections show 310,000 openings for middle-wage jobs (i.e., $18 to $30 per hour) over the current decade, far less than the more than 1,000,000 openings for both higher- and lower-wage work combined" (Terplan et al. 2014: 51). To make

things worse, employers move middle wage jobs to other regions because labor costs are lower almost anywhere else. Together with other factors, that leaves the region with an increasingly shrinking middle class and thus an increasing inequality that in turn reinforces segregation in housing and transportation (ibid.: 32). The remaining low wage jobs often act as a source of stress as they are part-time, forcing workers to accept multiple jobs in the face of raising living costs.

Especially in the booming information and communication technology (ICT) industries, many middle wage jobs are outsourced, for instance in manufacturing, grounds keeping and security.[8] According to projections, approximately 30,000 middle wage jobs will open in the region per year, for a total of 310,000 between 2010 and 2020. "This number equals roughly one-third of the current lower-wage workforce, which means that the share of regional jobs paying middle wages is expected to shrink." (Terplan et al. 2014: 36)

These insights clearly refute the assumption of a win-win synergy between tech boom and income equality. While the interviewees argue that booming sectors are also likely to provide living wages, mid-level jobs are in fact shrinking despite economic booms in the technology industries. Hence, the aspired synergy currently rests on very asymmetric interplay. The following two insights further explore this argument.

Industry Insight #2: Traditional Sectors Matter

The SBs focus on the currently booming technology industries (Industry Assumption #2). Does this industry focus make sense when aiming for upward mobility? The level of tech employment, although well paid and growing by 18.7% since 2007, is connected to sectors that outside the tech-hubs offer relatively little employment compared to other sectors (Bellisario et al. 2016: 17). With regard to middle wages and from a regional standpoint, the sectors that could actually contribute most to middle wage jobs are educational services, the big sector of professional, scientific and technical services, construction, or transportation and warehousing (Terplan et al. 2014: 53). The biggest growth in employment, more than 20% since 2007, was generated in educational and health services as well as leisure and hospitality (Bellisario et al. 2016: 15).

Thus, a short-term rise in middle wage jobs depends on the growth of those industries and on the worker preparedness for respective positions. This insight shifts the sector-related focus: SBs seeking to facilitate upward mobility may want to widen their focus and especially concentrate on traditional sectors and public employers.

Industry Insight #3: Upward Mobility Requires Sector-Mobility

The SBs focus on STEM skills and seek to tailor sector-specific career pathways (Industry Assumption #3). Is the link between skills and sectors effective when seeking to support upward mobility?

[8] Outsourcing may create jobs for other companies, but renders firms less responsible for the job security, social services and health of the workers on their company grounds.

Upon closer scrutiny, it is clear the SBs run the risk of a too rigid focus on sector-specific career pathways. One critical effect of income inequality on low-wage workers is that they need to move sectors in order to move to middle wage jobs (Terplan et al. 2014). In combination with the spatially expanding job markets, the shift in sectors may often bring a need to commute and a need to re-learn. In short: from a workforce development standpoint, vertical mobility across sectors and spatial mobility across the region are interconnected. Together they are key to the provision of upward mobility. A sector specific kind of Skills Brokering thus needs to go hand in hand with a broader strategy of education and re-training.

However, there is no linear curriculum or career pathway solution for this shift in sectors as re-training relies on a larger transformation in skills sets: "Some skills are harder to train for but are important for middle wage jobs. Other skills are easier to train but are not learned in lower-wage jobs, and still other skills are expected in nearly all middle wage jobs but in a smaller share of lower-wage jobs" (Terplan et al. 2014). And finally, the skills that are in demand change quickly, especially financially rewarding technology jobs. A few SBs already incorporated similar insights by aligning industry needs with education curriculum on the basis of core competencies.

As opposed to the SBs focus on sector-specific career pathways, the difficulty for workers to prepare and qualify for better-paid jobs suggests a focus on broad education and re-training programs. Also, it is questionable which skills employers practically can and ethically should demand from job seekers when at the same time little training and learning facilities are offered as part of employment and hiring.

The following section further elaborates the region's industrial and educational landscape in order to put forward some potential effects and complex trade-offs that characterize the SBs' activities.

IV. Discussion: Unintended Consequences of Skills Brokering

The preceding sections on the educational and industrial landscape make two interconnected proposals: The SBs' assumptions can be explained in a regional political economy and are at odds with the more contextual insights. Hence, although the SBs provide valuable opportunities for cross-sector collaboration, the cross-sector relationships are very asymmetric and therefore require a more explicit trade-off between industry and community interests. The following section first provides a summary, discusses potential consequences, lays-out a risk-benefit analysis and suggests a shift in focus.

The Bay Area's educational landscape as presented in current research contrasts with the SBs' premise that educational development can and should follow the industrial landscape. The

contrast between assumptions and insights also allows for a discussion of unintended consequences of demand-driven workforce development.

STRATEGIC PREMISES:

- The assumptions are indeed plausible within the presented educational landscape: Employers demand more education in STEM than provided in many schools and colleges. And in keeping with the SBs' assumptions, the educational landscape seems rather fragmented and slow as compared to the overall industrial landscape. The SBs therefore aspire to align educational offers more closely to regional industries, thus hoping for a synergetic reform agenda.
- Upon closer scrutiny those assumptions tend to overlook how degrees matter more than skills, and how spatial fragmentation prevails in both education and industry.

UNINTENDED CONSEQUENCES: In downplaying the given educational insights and in forwarding a more synergetic vision, the SBs may unintentionally trigger an asymmetric interplay. This can play out as follows:

- School difficulties currently feed back into unequal access to well-paid jobs, and additionally push schools and colleges to seek collaborative relationships with large employers. In this process, the SBs play a catalyzing role: Their activities may further decrease professional autonomy in education and promote the influence of economic policies or employer demands.

The Bay Area's industrial landscape was depicted with specific focus on the SBs' strategic assumptions. Also in this regard, the demand-driven focus of the SBs may trigger unintended consequences.

STRATEGIC PREMISES:
The SBs make broad assumptions about educational deficiencies, the tech boom as a workforce opportunity, and sector-specific pathways. The given insights directly contradict those three assumptions: The lack of middle wage jobs, the central role of traditional sectors, and the complex task of training for sector mobility represent more pressing needs. These insights clearly suggest that supporting upward mobility requires more than curricular adaptation to employer demands. Beyond assuming a synergy of industry demand and equity needs, the task of cross-sector coordination urgently requires an explicit scrutiny of industry demands. Some hypothetical consequences are the following.

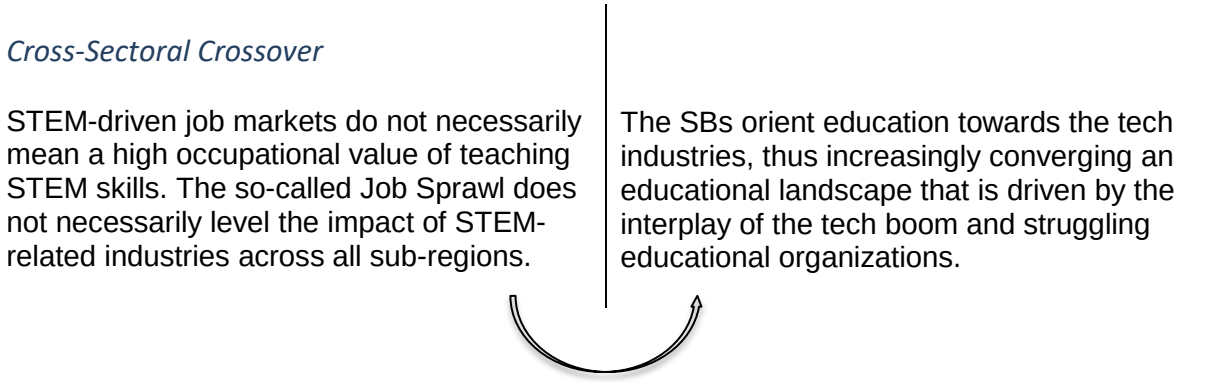
UNINTENDED CONSEQUENCES:

- The industrial insights indicate that the one-sided focus on employer demands and STEM skills may bolster the very factors that constrain upward mobility. By foregrounding educational deficiencies, and by rarely calling upon employers to offer middle wage jobs or on-the-job training, the SBs unintendedly help to consolidate a culture of employer entitlement and one-sided collaboration. This works at the expense of both corporate social responsibility and encompassing educational reform.

Three cross-sectoral goals should be nuanced with regard to these potential consequences: The goal to broker a cross-sector reform agenda, to shape an educational landscape, and to align curricula and career pathways on basis of employer demands.

Brokering a Cross-Sector Reform Agenda?

First, the SBs see the interdependency of the tech boom and socio-economic inequalities as a "sparkling rod" (C.) that gathers sector-specific stakeholders in collaborative initiatives. The contextual insights into the Bay Area's industrial and educational landscape reveal a more nuanced picture, here summarized as a *Cross-Sectoral Crossover.*



The SBs' appropriation of the crisis situation as a brokering opportunity sends diverging signals to educational and industrial audiences:

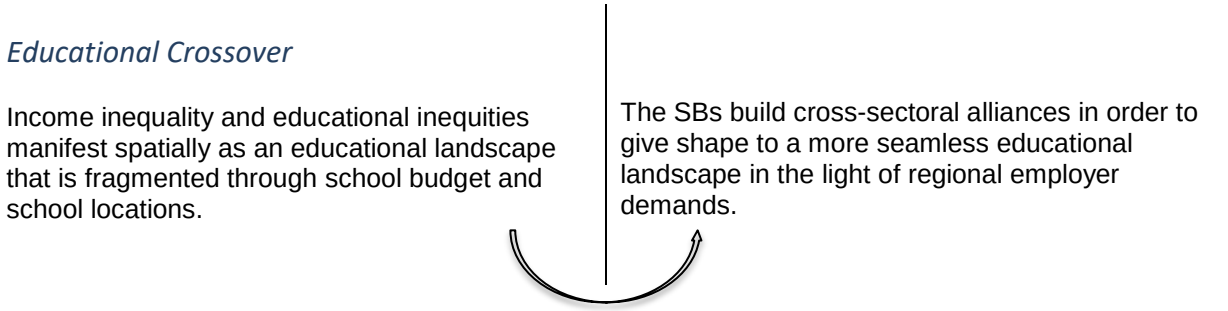
- The SBs signal to students and job seekers that despite an increased pressure to find well-paid jobs, there are new pathways in STEM education. This communication widely ignores that education-industry partnerships already rely on more tacit, and largely problematic interconnections. Only when acknowledging this underpinning, in which industry-oriented policies have originally contributed to dense housing and job markets, a new kind of cross-sectoral partnership can be introduced legitimately.
- Educators in turn are additionally pressured to implement current reforms and reach out to collaborators. However, their financial means are weak and more structural educational challenges accumulate with the rising income inequality.
- Employers are encouraged in asserting their hiring policies and educational demands. Yet, the policies of outsourcing middle wage labor to other regions and the notion of workforce 'from-the-shelf' remain unquestioned (cf. effect 3).

Moreover, the cross-sector reform agenda is too exclusive. With notable exceptions in the wider workforce development system, the assessed SBs rarely collaborate with stakeholder groups other than employers or educators. Especially labor groups, do not register in the regional industry focus as often as one may expect given the workforce development focus. Political movements or socio-economic interest groups are underrepresented in the talks and events convened by SBs. Those groups may just as legitimately be concerned with the dual

strategy of addressing education and employment issues, especially when embracing a welfare-state or social-partnership approaches.

Brokering A STEM Landscape?

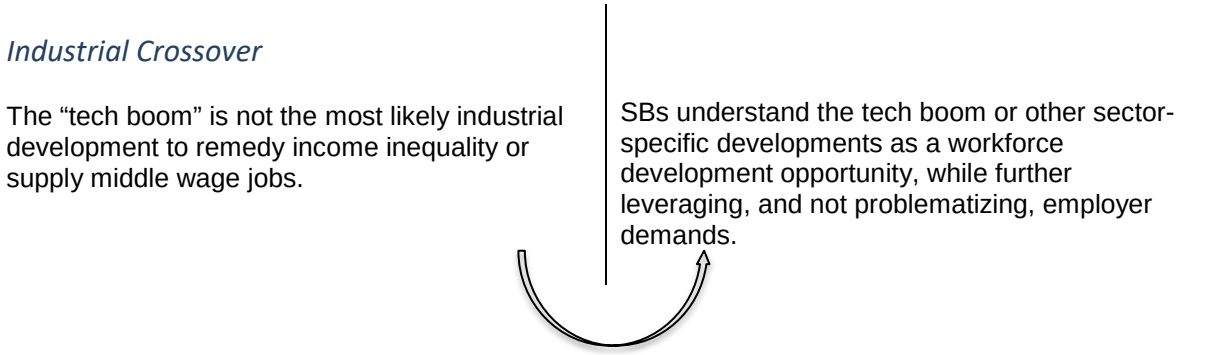
Second, the highly fragmented educational landscape is increasingly seen as a regional entity, and will continue to do so under the influence of demand-driven workforce development. The key cohesive factor is the joint orientation of the otherwise disconnected, local educational organizations towards regional industries. This can be summarized as educational crossover:



The STEM landscape that may possibly emerge from the SBs' efforts would represent an additional interface that connects formal education to the regional industries thus compensating for the lack of educational reform (or its implementation) while further spreading the industrial impact on educational and workforce policies.

Brokering Supply and Demand for STEM Skills?

Third, the SBs follow a supply-demand scheme, supporting employer demands and problematizing educational supply. Assuming an industry-education synergy, the SBs acquire a coordination role that stretches across several sectors and that offers a vital platform for cross-sector collaboration. But, as this agenda resonates most directly with the debate on tech boom opportunities, the SBs' coordination role is conflicting: The SBs attribute deficient job creation and wage policies to students and educators that are henceforth expected to train for increasingly inaccessible and volatile job markets.



The industrial development failure to provide middle wage jobs is reformulated as an educational pressure. The SBs tend to redistribute responsibility away from 'job creators' towards educators, students and workers:

- The basic assumptions of demand-driven strategies tend to downplay the responsibility of employers to secure middle wage jobs by on-the-job training, better hiring mechanisms and broadening their workforce.
- Instead, the emphasis lies on individual responsibilities of workers, students, and educators. They are called upon to be adaptable in their skills set or career pathways, often with the implausible promise of social advancement.

However, despite the tech boom and the large array of educational providers, the preceding lack of upward mobility more critically stems from a shortage of middle wage jobs and a lack of public resources in workforce development, vocational training, transportation and housing.

Advancing Upward Mobility: A Strategic Assessment of the Skills Brokers

Given the intricacies of the Bay Area's educational and industrial landscape, how may the SBs address educators and employers in order to promote upward mobility? The results illustrate that there is a complex trade-off with regard to the regional suitability and viability of demand-driven workforce development. This is indicated in the risk-benefit analysis below.

Table 4. Benefits & Risks of Demand-Driven Workforce

	Benefits	Risks
Short term	SBs may help convene businesses and educators to foster mutual awareness and community development.	Employer demands usually have more political leverage than school interests and educational concerns.
Mid term	A cross-sector alliance is helpful to foster work-related learning experiences despite the pragmatic curricular constraints. In turn, employers are encouraged to provide more access and insight to occupational learning, or even create training and apprenticeship programs themselves.	Educators may be burdened with formal and informal efforts to adhere to employer demands while struggling to provide long-term education and degrees. Employers may use the STEM programs for the increased need to improve public perception while continuing to burden educators or workforce developers with responsibility for ready-for-job training.
Long term	Schools districts may become more attractive partners to employers and employees by means of prevalent STEM programs.	Employers dependent on STEM-skills are not likely to provide middle wage jobs but may attract higher-income residents. Housing costs may continue to rise, in turn increasing the pressure on job-seekers and students to acquire better wages.

A Shift in Focus: From Employer Demands to Upward Mobility

This report proposes a shift in strategic perspective. A demand-driven workforce development strategy poses fundamental risks to the goal of providing upward mobility pathways. The following measures seem reasonable as first steps to explore a strategy that focuses on upward mobility.

Generally, it seems advisable to adjust current strategies:

- to broaden the coalitions,
- to help relieve educators from socioeconomic burdens and direct employer demands,
- and to instigate a more reflexive, methodical and accountable involvement of employers. (cf. prevalent tools in Blair/Michon/Conway 2016)

In the educational landscape, SBs may help ease the financial and socioeconomic pressure on education by encouraging the development of broad vocational programs combined with academic education. They can publicly challenge public budget cuts and college costs, and help to cope with socioeconomic burdens that hamper educators from providing the degrees that remain the most critical factor on the job market. Furthermore, SB's can:

- Acknowledge and more strategically address the difficulty of educational organization to fulfill their basic tasks. Explore strategies to increase access, improve college completion, expand transfer degrees and facilitate college grants.
- Encourage educators to train students with regard to a broader variety of work-related skills. In this effort, provide educators and students with a more complete picture, also accounting for costs in a given career pathways, e.g. work contracts, geographic mobility, the likely need for retraining, etc.
- Take a more reflexive stance in spreading or hampering employer demands as an additional pressure on school development, teaching and spatial planning.

In the industrial landscape, SBs may need to turn away from demand-driven focus to support upward mobility. SB's can:

- Broaden the business focus across all sectors that offer middle wage employment, and help retain middle wage jobs and associated businesses.
- Broaden alliances, involving labor and community organizations and regional planning.
- Provide consultation to businesses regarding to a lack of workforce diversity.
- Provide consultation to businesses regarding to job-training, re-training, apprenticeship programs.
- Provide consultation to businesses on the use, development and reward of skills.
- Develop retraining pathways to prepare workers for changes in occupation sectors.
- Scrutinize alleged employer demands based on quantitative and qualitative data from a broad range sources, including individual workers and labor organizations. Academic research can additionally advance analytic rigor, data confidentiality and community trust.
- Play an advocacy role with regard to middle wage jobs, transport and the rising costs of housing and education.

In short, instead of adhering to employer demands, the SBs may help to shape them.

V. Conclusion

This report pinpoints the political implications of demand-driven workforce development. It depicts the regional education-industry interplay as a "perfect storm", and assesses whether demand-driven workforce development, as currently practiced by a group of Skills Brokers (SBs) in the San Francisco East Bay, represents a synergetic reform agenda.

The central claim is that the current demand-driven workforce development strategy, as it also dominates across the country, may perpetuate rather than reform the root causes for a shrinking middle class. In a reversed and more proactive role, workforce developers may help to shape industry demands, and help educators to forge collaborative STEM curricula despite regional power imbalances.

The results show that the SBs address the double crisis of tech boom and educational inequity by framing both problems and solutions against the backdrop of industrial development. The underlying strategic assumptions largely adhere to alleged employer demands and shift strategic responsibilities to educational organizations and individual students. In the "perfect storm", the practices of opening educational pathways to meet employer demands has hypothetical, but grave consequences: It consolidates a culture of employer entitlement and discourages employers from engaging in on-the-job training and re-assessing their hiring strategies. It may increase pressure on students, workers and educators to adapt long-term pathways to short-term economic needs. Fundamentally, demand-driven workforce development gives way to an asymmetric collaborative culture: a cross-sector collaboration that is oriented to the demands of one stakeholder primarily misses the point of a broad re-consideration of career pathways. The mismatch that is addressed in the alleged Skills Gap, therefore is a mismatch between fundamental business and economic policy problems on the one side, and mere coping strategies in education, on the other.

In a broad political context, the presented observations are even more pressing. Demand-driven workforce development is becoming a central line of policy-making in the Trump Administration. Yet, when employer demands are re-affirmed, when the lack of upward mobility is increasing and when the social security system is defunded, demand-driven workforce development is not the solution, but becomes part of the problem. Workforce intermediaries may be addressed as instruments in the politically sensitive agenda of American manufacturing and American workforce development. In this context, the Bay Area – most affected by a mismatch between economic boom and educational crises – represents a laboratory for a more equitable workforce development. Workforce intermediaries similar to the groups described here are in a privileged position to build broad alliances among educators and employers that also include social services, regional planners, and labor and community organizations.

The report proposes a shift in strategic focus. With the California Career Pathways Trust (CCPT) funding currently running out, funders may facilitate a turn towards an upward mobility agenda. Once appropriately funded, the SBs can play a countervailing role in the asymmetric

interplay between employer demands and educational ambitions. As brokers, consultants or advocates, they could more directly address the lack of middle wage labor, underfunded vocational training, and the rising costs of education. They may help to unearth and communicate possible career pathways by taking a reflexive stance towards employer demands, by exploring the workers' perspective, by supporting teachers' creative capacities, and by playing an advocacy role for student interests.

This inquiry has four limitations: First, it cannot measure the actual effects of demand-driven workforce development in educational or industrial landscapes. Second, it cannot compare their approach and impact by contrast to historical predecessors. Third, the focus on STEM skills, technology industries and the CCPT funding, as induced from the interviews, does not allow for a broader analysis of the industrial landscape and the region's workforce development system. And fourth, the report cannot account for differences among the presented workforce intermediaries. To address these and other limitations, future research may compare international and/or historical workforce systems, assess the educational effects of labor interest and employer interests in the Bay Area, and analyze the regional role of intermediary actors.

Works Cited

Association of Bay Area Governments. 2015. *The State of The Region. San Francisco Bay Area - Economy, Population, Housing 2015*. Oakland. Retrieved April 13, 2017 (http://reports.abag.ca.gov/sotr/2015/State_of_the_Region-lowres.pdf).

Bellisario, Jeff, Micah Weinberg, and Camila Mena. 2016. *The Northern California Megaregion*. San Francisco, CA. Retrieved April 13, 2017 (http://www.spur.org/publications/library/article/mappingthenortherncaliforniamegaregion11012007).

Benner, Chris, and Manuel Pastor. 2015. "Whither Resilient Regions? Equity, Growth and Community." *Journal of Urban Affairs* 38(1):5–24.

Bierbaum, Ariel, Jeffrey Vincent, and Deborah McKoy. 2011. *Growth and Opportunity: Aligning High-Quality Public Education & Sustainable Communities Planning in the Bay Area.* University of California, Berkeley, Center for Cities and Schools, Institute of Urban and Regional Development. Berkeley, CA. Retrieved July 20, 2017 (http://escholarship.org/uc/item/2bm7n1m7)

Blair, Amy, Stephen Michon, and Maureen Conway. 2016. *Communities That Work Partnership Playbook.* The Aspen Institute. Retrieved April 13, 2017 (http://www.aspenwsi.org/communities-that-work/materials/).

California Department of Education. 2014. *California Career Pathways Trust* (CCPT). Retrieved April 2, 2016 (http://www.cde.ca.gov/ci/ct/pt/).

Cappelli, Peter. 2012. *Why Good People Can't Get Jobs: The Skills Gap and What Companies Can Do about It*. Philadelphia: Wharton Digital Press. Retrieved April 13, 2017(http://books.google.com/books?id=IU4CGIQ4D9EC&pgis=1).

Chapple, Karen. 2005. "Promising Futures: Workforce Development and Upward Mobility in Information Technology." *University of California, Berkeley, Institute of Urban and Regional Development*. Berkeley, CA. Retrieved July 20, 2017 (http://irle.berkeley.edu/promising-futures-workforce-development-and-upward-mobility-in-information-technology/)

Chetty, Raj, Friedman, John N., Saez, Emannuel, Turner, Nicholas and Danny Yagan. 2017. *Mobility Report Cards: The Role of Colleges in Intergenerational Mobility*. Palo Alto, CA. Retrieved April 13, 2017 (http://www.equality-of-opportunity.org/assets/documents/coll_mrc_paper.pdf).

Employment Development Department. 2017. *California Occupational Employment Projections Between 2015 – 2017*. Retrieved April 13, 2017 (www.labormarketinfo.edd.ca.gov).

Giloth, Robert P. 2002. "Introduction: A Case for Workforce Intermediaries." Pp. 3–22 in *Workforce intermediaries for the Twenty-first Century*, edited by Robert P. Giloth. Philadelphia: Temple University Press. Retrieved July 20, 2017 (https://muse.jhu.edu/book/4248)

Handel, Michael J. 2003. "Skills Mismatch in the Labor Market." *Annual Review of Sociology* 29:135–65. Retrieved April 13, 2017 (http://www.jstor.org/stable/30036964).

Hathaway, Ian, and Patrick Kallerman. 2012. *Technology Works: High-Tech Employment and Wages in the United States*. San Francisco. Retrieved July 20, 2017 (http://documents.bayareacouncil.org/TechReport.pdf)

Holmes, Natalie, and Allan Berube. 2016. *City and Metropolitan Inequality on the Rise, Driven by Declining Incomes.* Brookings, Washington, D.C.. Retrieved April 13, 2017 (https://www.brookings.edu/research/city-and-metropolitan-inequality-on-the-rise-driven-by-declining-incomes/).

Jain, Ranita, Amanda Newman, and Marcela Montes. 2017. *Investing in Workforce Program Innovation. A Formative Evaluation of Five Workforce Organizations' Experiences During the Human Capital Innovation Fund Initiative.* The Aspen Institute, Washington, D.C.. Retrieved July 20, 2017 (https://www.aspeninstitute.org/publications/investing-in-workforce-program-innovation/)

Kneebone, Elizabeth. 2013. *Job Sprawl Stalls: The Great Recession and Metropolitan Employment Location*. Brookings, Washington, D.C. Retrieved July 20, 2017 (https://www.brookings.edu/research/job-sprawl-stalls-the-great-recession-and-metropolitan-employment-location/)

Public Consulting Group (PCG). 2015. *East Bay Workforce Intermediary Development Initiative – Strategic Plan Report*. Boston, MA

Rothwell, Jonathan. 2013. *The Hidden STEM Economy*. Brookings. Washington, D.C. Retrieved April 13, 2017 (http://www.brookings.edu/~/media/Research/Files/Reports/2013/06/10 stem economy rothwell/SrvyHiddenSTEMJune3b.pdf).

Saxenian, AnnaLee. 1996. *Regional Advantage: Culture and Competition in Silicon Valley and Route 128*. Cambridge, MA: Harvard University Press.

Terplan, Egon, and Imron Bhatti. 2013. *Seeking Prosperity: Middle wage Job Opportunities in the Bay Area.* SPUR, San Francisco. Retrieved April 13, 2017 (http://www.spur.org/news/2013-11-05/seeking-prosperity-middle wage-job-opportunities-bay-area).

Terplan, Egon, Imron Bhatti, and Tony Vi. 2014. *Economic Prosperity Strategy*. SPUR, San Francisco. Retrieved July 20, 2017 (http://www.spur.org/sites/default/files/publications_pdfs/Economic_Prosperity_Strategy.pdf)

Vincent, Jeffrey M. 2012. *California's K 12 Educational Infrastructure Investment: Leveraging the State's Role for Quality School Facilities in Sustainable Communities*. University of California, Berkeley: Center for Cities and Schools, Berkeley, CA. Retrieved April 13, 2017 (http://citiesandschools.berkeley.edu/reports/CCS2012CAK12facilities.pdf).