

*A Framework for Higher Education Labor Market Alignment:  
Lessons and Future Directions  
in the Development of Jobs-Driven Strategies*

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## Abstract

The Great Recession and several other factors have heightened concerns among policymakers and the public at large about higher education's role in employment, leading to a renewed wave of pressures, policies, and incentives to create job-driven strategies at all levels. Policymakers and the public often assume that aligning higher education with the labor market is a simple effort, an act of engineering. However, alignment is a complex endeavor involving numerous stakeholders. And, scant evidence exists to link job-driven strategies to outcomes and to provide concrete guidance on how to effectively approach higher education-labor market alignment (LMA). This paper provides a framework for understanding LMA efforts across postsecondary education, providing a common language and key insights for practitioners, policymakers, and researchers to develop better policies and practices. Further, this paper assesses what is known based on current research and practice on LMA to provide guidance on moving from policy to action, as well as charting out priorities to future research to guide on-going LMA efforts.

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Higher education's role in preparing students for the workforce is a mounting concern among policymakers and the public at large. The majority of Americans view a college education as essential to getting a good job (Gallup, 2014), recognizing that the wage premium for a college degree has risen in recent decades (Pew Research Center, 2014; Baum, Ma, & Payea, 2013; Autor, 2014). At the same time, press reports have highlighted the struggles of recent college graduates finding well-paid jobs that use their education (Arum & Roska, 2014). These concerns about post-graduates' employment are particularly troubling given the rising price of college and high levels of student debt (Fry, 2014; Lee, 2013). Further troubling are employer reports of difficulties finding enough skilled workers among college graduates, reflecting potential, though debatable, skills shortages in certain fields (Holzer, 2013; Rich, 2010; Salzman, 2013; Sherrill, 2013; Weaver & Osterman, 2013; Beaudry, Green, & Sand, 2013).

Given this context, recent federal policy developments demonstrate a commitment to ensuring the nation's postsecondary systems are connected to the needs of the labor market. Vice President Biden clearly articulated the importance of ensuring that education is jobs-driven to create a better match between graduates' training and the needs of employers (Biden, 2014). Likewise, the newly passed Workforce Innovation and Opportunities Act emphasizes the importance of engagement between education and employers (Workforce Innovation Opportunity Act, 2014). These recent policy developments add to growing policy attention at the federal level and among states about how higher education prepares its graduates for employment (National Governors Association, 2013; United States Department of Labor, 2014).

While this call for improved labor market alignment (LMA) in higher education is not new, stakeholders are still conceptualizing the proper role for higher education in employment. This lack of clarity likely exists because of broad changes in employment practices as well as student expectations. Many employers have reduced the amount of training for entry-level workers while raising expectations that students will develop more work readiness skills while in school (Cappelli, 1999, 2011, 2012; Tejada, 2000; Bishop, 1994; Reich, 1992). Students, parents, and other funders of higher education, however, increasingly expect that a college degree will lead to a well-paying job (Mourshed, Farrell, & Barton, 2012; Pew Research Center, 2014). These changes represent shifting social expectations about a college education — which many higher education institutions have not yet fully agreed to support (Capelli, 2014).

The ease with which LMA can be accomplished is often vastly underestimated. Many policymakers and employers see higher-education LMA as a simple input-output process (Capelli, 2014). As this paper will explore in detail many other factors that make LMA a complex and challenging endeavor that many higher education institutions lack the experience and resources to execute. While the policy and scholarly literature offers some insights on how higher education aligns with the labor market, little agreement exists on how to comprehensively define the concept and fewer resources are available to guide implementation or outcomes measurement.

To address this gap, this report offers a roadmap for conceptualizing LMA in higher education, offering a framework for understanding the multiple ways that higher education systems, institutions, and programs engage with and respond to the labor market. The broad framework proposed in this paper links a wide variety of existing LMA efforts and identifies the core elements that all LMA efforts share in common. These common traits allow stakeholders to

conceptualize LMA broadly, providing a language for major components of the LMA process while also describing the significant variation that occurs in the complex and wide-ranging LMA process. The proposed framework can provide a rubric for empirical researchers developing descriptions of LMA efforts, as well as allow policy stakeholders to build a richer understanding of LMA as it evolves across higher education.

In this paper, we first propose a comprehensive definition of higher education LMA that analyses and synthesizes observations from the current literature. We then discuss alignment activities, including the areas of higher education where alignment occurs, the types of actions that promote alignment, and the actors that are involved in promoting alignment. Next, we examine possible ways alignment outcomes can be measured. Finally, in light of this framework, we provide recommendations for policymakers and practitioners and highlight areas where future investigation is most necessary to advance the field and inform practice.

## I. Defining Labor Market Alignment

Many areas of the scholarly and policy literature provide important insights for understanding higher education LMA within a broad framework that includes a range of institutions and settings. Literature on workforce and economic development, career pathways, work-based learning, vocational education, labor markets, higher education institutions, student employment outcomes, student career choice and career development, and several others offer myriad examples that can be described under the umbrella of higher education LMA. Among these, the

career pathways literature provides systemic and holistic frameworks for examining the relationship between education and the workforce with a specific approach that connects multiple “stackable” credentials across institutions (Kozumplik, Nyborg, Garcia, Cantu & Larsen, 2011; Jobs for the Future, 2014). In particular, career pathways provide a strong roadmap to guiding alignment activities that is student-focused, particularly on low-income students (Center for Law and Social Policy, 2014). Our framework builds on many of the concepts outlined in the career pathways literature and expands the focus to a range of students and postsecondary institutions. It also includes a closer examination of engagement with employers and the labor market.

The most significant work that directly addresses LMA in the context of higher education has focused on community colleges. The U.S. Department of Education’s Community College Labor Market Responsiveness Initiative produced several key reports examining the characteristics of responsive community colleges, the key steps to creating a responsive institution, and some key labor market outcomes related to responsiveness (MacAllum & Yoder, 2004; Harmon & MacAllum, 2003; Jacobson, Yudd, Feldman, & Petta, 2005). This initiative proposed the following

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Strategies for **higher education labor market alignment** include:

*Career Pathways and Stackable Credentials*

*Sector Strategies*

*Employer Engagement*

*Work-based Learning  
(apprenticeships, internships, co-operative education)*

*Competency-based Education*

*Active and Problem-based Learning*

*Learning Outcomes Assessment*

*Career, Academic, and Support Services Reform*

*21<sup>st</sup>-Century Skills*

*Some College Industry Partnerships*

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definition for labor market responsiveness in community colleges: “A labor-market-responsive community college delivers programs and services that align with and seek to anticipate the changing dynamics of the labor market it serves. These programs and services address the educational and workforce development needs of both employers and students as part of the college's overall contribution to the social and economic vitality of its community.” (MacAllum & Yoder, 2004, p. 5). More recently, Adams, Edmonson, and Slate (2013) developed a “Model of Market Responsive Institutions” that further explores characteristics of labor market-aligned community colleges and the internal and external influences affecting how colleges approach alignment.

Based on our analysis of the existing research and practice on the topic, we propose a more comprehensive definition of LMA that can be applied to different types of institutions and to different levels of implementation: ***Higher education LMA includes activities and related outcomes with the goal of ensuring that higher education institutions graduate the correct numbers of graduates with the necessary skills for the job market in a way that supports students’ career goals and is consistent with institutional mission and economic conditions.***

This definition encompasses a normative idea about a goal of higher education that includes many different approaches and competing interests. No standards currently define how to assess and achieve the “correct” number of graduates and the “necessary” skills for the job market (Froeschle, 2010), and there is little evidence regarding which approaches work optimally for different stakeholder groups and levels of implementation (Harmon & MacAllum, 2003). As a result, LMA can be operationalized in numerous ways depending on the institutional context and program type— from traditional vocational education programs at community colleges, to efforts to reform career services and academic advising at liberal arts colleges and universities, to graduate-level professional education, competency-based education and career pathways initiatives that seek to connect multiple levels of postsecondary education.

Rather than define the “best” approach to LMA, we lay out a range of possibilities for implementation and provide a roadmap to better understand these possibilities. We examine each of the concepts included in the definition in further detail below, including the ways LMA can vary widely in approach while pursuing similar, but distinct goals.

### **Labor market alignment includes two intertwined goals: “job vacancy” alignment and “skills” alignment.**

Stakeholders interested in higher education LMA focus on one or both of two often intertwined but conceptually distinct goals. The first goal, which we call ***job vacancy alignment***, involves matching the number of graduates from particular programs with the quantitative demand for workers with these credentials. Job vacancy alignment involves “getting the numbers right.” It seeks to answer the question: do the number of graduates match with the number of job openings? For example, several reports suggest that higher education should align with the labor market by increasing the number of college graduates, in general, or in specific areas such as science, technology, engineering, and math (STEM), to meet future national demand for workers (Carnevale, Smith, & Strohl, 2010, 2013; Carnevale, Smith & Melton, 2011; Cooper, Hersh, & O’Leary, 2012; Wilson, 2014).

The second goal, which we call *skills alignment*, involves aligning the skills, competencies, and credentials offered in higher education with those most in demand in the labor market. Skills alignment is a measure of the extent to which the skills and credentials gained in a program match the needs and preferences of employers. It seeks to answer the question: do the skills graduates possess match with the skills sought for related jobs? A number of reports and initiatives define LMA in these terms, urging colleges to ensure that graduates possess the basic workplace skills and /or the technical competencies employers require, either instead of, or in addition to, ensuring that the right numbers of graduates are available (The Jobs Council, 2014; The Aspen Institute, 2014; Hart Research Associates, 2013; Splitt, 2003; Cleary & Fichtner, 2007; Boyer Commission, 1998; Colby, Sullivan, Sheppard & Macatangay, 2008; The Secretary's Commission on Achieving Necessary Skills, 1991). Like job vacancy alignment, skills alignment is complex; the skills employers seek may reflect essential requirements for the job while others may reflect preferences that can shift depending on labor market conditions or the preferences of particular employers (Capelli, 2014).

### **Specific labor market alignment goals and approaches result from a dynamic process of balancing complex stakeholder needs, economic conditions, and other factors.**

Achieving the goals of “job vacancy” and “skills” alignment is not a straightforward task given the complex reality of modern higher education. This reality involves balancing the needs of multiple internal and external constituencies, as well as working to accomplish several missions, all within the context of an ever-changing external environment (Harmon & McAllum, 2003; McAllum & Yoder, 2004; Adams, Edmonson, & Slate, 2013). The “correct numbers” and “necessary skills” may mean something different for policymakers, students, and employers. For example, employers may have an interest in producing an over-supply of students with particular credentials required for entry-level employment, while students and policymakers may have an interest in closely matching production to demand and including broader skills to allow for career advancement. Defining goals and activities related to alignment involves taking into account the needs of numerous stakeholders, including students, employers institutions, and others, while dynamically responding to changing labor market conditions.

*Students* approach higher education with several distinct needs relative to the labor market. Most students, for example, seek to earn a good wage upon completion of their educational program (Accenture, 2013; Godofsky, Zudin, & Van Horn, 2011; Bothelo & Pinto, 2004; Pryor, Egan, Blake, Hurtado, Berdan & Case, 2012). On the other hand, many students also seek to find majors and careers that match their interests and abilities, which, in turn, may or may not align with labor market needs (Malgwi, Howe, & Burnaby, 2005; Pritchard, Potter, & Saccucci, 2004). However, different types of students also have distinct needs based on their relationship to the labor market. Adult students are more likely than younger students to be interested in education that is more work-relevant (Kasworm, 1990; Knowles, Holton, & Swanson, 2011). Students’ needs vary depending on whether they are entering the labor market for the first time, changing their career, seeking to advance within their existing career, and/or combining work and learning.



Thus, they vary in the extent to which they seek immediate preparation for the workforce and are prepared to make and follow through on a career decision.

**Employers** also have distinct needs that reflect their preferences. From a job vacancy perspective, employers may seek to have skilled graduates to fill their open positions. With regard to skills alignment, employers increasingly seek to hire graduates who are ready to work immediately. The concern about preparation for immediate work may entail a narrower education pathway that limits flexibility for students and conflicts with the goal of providing a broad-based education (Cappelli, 2014; Jacobs & Grubb, 2005). Further complicating the issue, not all employers share the same needs, which depend on a variety of factors, including size, sector, and industry, as well as whether the labor market is tight or slack (Cappelli, 2014).

**Higher education institutions** must balance LMA efforts with other missions and priorities at the system, institutional, and program levels. A key goal of higher education has traditionally been general and civic education, and mission statements vary significantly across institutions. While there is some emerging support for an approach that blends broad-based education with more specific technical skills education, many higher education stakeholders, especially those in the liberal arts, may still view too much specific technical skills education as having the potential to marginalize other goals, including general and civic education (Gallup, 2014; Myers, 2012; Association of American College and Universities, 2007; Knight Higher Education Collaborative, 2002). In addition, higher education institutions are also concerned about their own financial survival, as they have increasingly been under pressure to generate tuition income as public funding decreases (Desrochers & Hurlburt, 2014).

**Other external stakeholders** have interest in supporting various LMA goals of these primary stakeholders, though they have a less direct interest in it. National, state, and local policymakers, accreditation bodies, and public and private funders often seek to promote particular approaches to LMA that align more closely with the needs of one or more of the primary stakeholders noted above. They may also promote LMA for political reasons such as demonstrating their responsiveness to business (Dougherty, 2004). Recent performance funding initiatives in some states tie student employment to institutional funding in an effort to promote alignment (e.g., Kelderman, 2013; Dougherty & Reddy, 2011; Dougherty & Reddy, 2014). Parents, alumni, and donors may also have an interest in promoting particular LMA approaches.

Aggregate labor markets and other dynamic factors provide an important basis for understanding LMA. The characteristics of the global and national economies, as well as regional, state, and local labor market dynamics provide factors for consideration with regard to LMA (Adams, Edmonson, & Slate, 2013; Harmon & McAllum, 2003; McAllum & Yoder, 2004; Bosworth & Rogers, 1997). Colleges pursuing LMA must consider factors ranging from demographic changes in the workforce to the geographic boundaries of targeted labor markets, which may range from local to international, as well as the degree of economic certainty in target industries given the time horizon for degree completion (Fernandez & Su, 2004; Froeschle, 2010). Fast-changing economic conditions and labor markets with new and emerging industries, as well as transitional economies will require different approaches to address the uncertainties of these labor markets compared to more stable labor markets. The long time horizon of many academic

programs raises the question of whether it is possible to predict demand in a complex, ever-changing global economy.

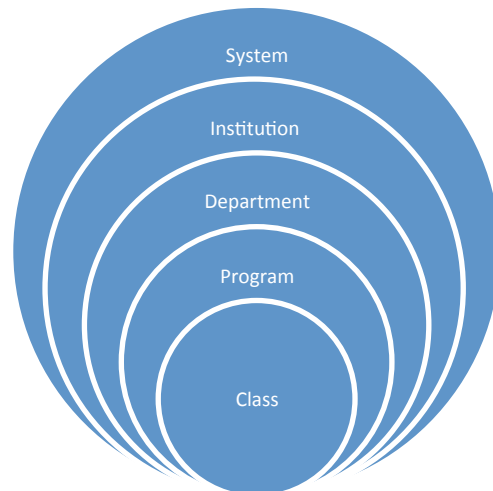
## **Labor market alignment may be pursued at different institutional levels and across different institution types.**

While prior alignment frameworks have focused on the institution as the unit for alignment, we recognize that alignment can occur on many levels — from the very macro to the very micro. Thus, the concepts in this framework are intended to apply to these different institution levels including: the system level, including groups of institutions, such as a specific higher education sector or all institutions within a state or a region; an institution, such as a single college or university; a department, including several related programs in an institution; a program of study within an institution; and a class within a program of study within an institution. LMA may be carried out in these various levels simultaneously as actors within each level take action to align educational programs and services with the job vacancy and skill needs of employers. Figure 1 illustrates these possible levels of alignment.

Furthermore, this framework is intended to apply to a range of institution types, including two- and four-year institutions. While these institutions vary in their missions and corresponding mix of programs, the general principles of LMA apply to both. Namely, there are examples of each institution type taking action and pursuing outcomes related to job vacancy and skills alignment goals. It may also apply to continuing education efforts within these institutions.

Just as we do not know which LMA approaches work best for particular stakeholders, no research is available on which approaches work best for certain groups at different institution types or levels of implementation. As partnerships develop across levels and institutions, it is also possible that the needs of different groups may further conflict. For example, aligning higher education with the labor market based on statewide labor market information may disadvantage local areas that have different demand and worker supply profiles.

**Figure 1. Institutional Levels for Labor Market Alignment**



## II. Alignment Activities

Alignment can be examined based on what program, department, institution, and system-level “alignment actors” do to meet job vacancy and skills alignment goals. Many, though not all, of the stakeholders also function as “alignment actors,” carrying out various alignment activities and providing funding and policies to promote LMA. Depending on the institutional level, alignment actors include a range of individuals including higher education system leaders, college leaders, department and program administrators, faculty, staff, students, employers, government officials, foundations, policy advocacy organizations, and non-governmental organizations. Alignment actors engage in a variety of activities across numerous areas of higher education. In this section, we discuss the areas within higher education where LMA may occur, the set of activities that typically promote LMA in these areas, and the external factors that support LMA.

**All areas of higher education, including curricular and co-curricular, can support alignment goals, but there is no “one-size-fits-all approach.”**

Regardless of the institutional level in which alignment occurs, multiple areas within higher education can have a role in supporting alignment. Table 1 summarizes typical areas – both curricular and co-curricular – within higher education and whether each area is likely to support job vacancy alignment and /or skills alignment goals. In curricular areas, higher education actors can pursue alignment through program selection and enrollment management, program content and curriculum development, and instructional strategies. In addition to curricular areas, higher education actors may consider how co-curricular activities support alignment goals, including work-based learning activities as well as student advising and support services.

**Table 1: Higher Education Areas for Alignment, by Goal**

	Job Vacancy Alignment	Skills Alignment
<i>Curricular</i>		
Program selection and enrollment management	√	
Program content and curriculum development		√
Instructional strategies		√
<i>Co-curricular</i>		
Work-based learning activities		√
Student advisement and support services	√	√

***Program Selection and Enrollment Management.*** Selecting programs and determining their levels of enrollment based on what is known about labor demand is most directly related to job vacancy alignment. At minimum, these efforts seek to ensure that the programs offered lead to jobs in demand among employers in the target labor market. Colleges and college systems may also manage enrollment within programs so that the number of graduates matches the job openings for workers in these occupations to ensure that there is not a severe under- or over-supply of graduates with particular credentials (Sparks, Waits, Heidkamp, Van Horn & Fichtner, 2011; Aspen, 2014; Wilson, 2014; Turner, 2002). However, the adjustment of degree production

based on job openings may take on a different priority depending on the strength of the linkage between the credential and particular occupations, which varies considerably.

***Program Content and Curriculum Development.*** Higher education officials commonly tend view skills alignment as adjusting program and curriculum content based on labor market needs. This raises a central tension of LMA in balancing the needs of stakeholders in determining labor markets and employers with which to align and whether to pursue a broad or tight approach to skills alignment. Higher education systems, institutions, and programs vary significantly in how tightly they seek to align their curricular content with the immediate, or technical, or anticipated future needs of employers versus maintaining broader content that supports students' long-term learning goals and overall flexibility in the labor market (Jacobs & Grubb, 2004). For many institutions, general learning outcomes as part of a liberal education are a core goal that may also meet broad employer needs (Association of American Colleges and Universities, 2008; Pellegrino & Hilton, 2014).

***Instructional Strategies.*** Once program content is defined, how institutions convey that content to students is an essential step in achieving alignment. A growing set of initiatives and literature on teaching strategies supports the notion that active and applied learning as well as problem-based learning are effective ways to engage students in deeper learning (Hewlett Foundation, 2014; Lumina, 2014; Fain, 2013; Prince, 2004; Freeman, Eddy, McDonough, Smith, Okoroafor, Jordt, & Wenderoth, 2013). Reform efforts such as competency-based education, contextualized learning, and accelerated learning models may provide promising approaches to deliver instruction that promotes work readiness (e.g., Perin 2011; Cho, Kopko, Jenkins, & Jaggars, 2012; Klein-Collins, 2012, 2013).

***Work-based Learning.*** Work-based learning opportunities have long been viewed as a way to gain learning experience that develops skills relevant in the labor market. They include a range of activities, including internships, co-operative education, apprenticeships, job shadowing, practicums, clinical rotations, on-the-job training, school-based enterprises, business simulations, guest speakers, student competitions, career academies, career days, apprenticeships, and school-to-apprentice programs (Alfred, Charner, Johnson & Watts, 2013; Stasz & Brewer, 1998; United States Congress, 1995; Bragg & Hamm, 1995; Bragg, Hamm, & Trinkle, 1995). Likewise, activities that engage students in real-world projects such as service learning and civic education can provide analogous learning opportunities.

***Student Advisement and Support Services.*** Higher education systems, institutions, and programs can promote LMA through student advising and support services. Most higher education institutions have career services offices that help guide students but some institutions are considering ways to improve these services by re-thinking how they interact with other higher education structures (Chan & Derry, 2013). At the simplest level, institutions and programs provide students with information about labor market demand as part of traditional career advisement sessions. Alignment activities in this area can also take the form of blending academic and career advising in new ways or they can broaden the reach of career services by having more advising take place at the department level. A number of higher education systems and institutions are also focusing on ways to reach students earlier for career and academic advising, including conducting outreach to high school students and parents, creating for-credit

career courses for all first- or second-year students, and sometimes mandatory career development activities for students (Dominus, 2013; Chan & Derry, 2013).

LMA approaches across these areas vary on a couple of key dimensions. First, LMA approaches vary in how they conceive of the labor market including the geographic boundaries of target labor market(s) (i.e. international, national, regional, state, local); the scope and specificity of targeted industries/jobs (i.e. specific job title, occupation group, all jobs in an industry, etc.); and the scope of targeted employers (one employer vs. multiple employers, diversity of composition of employers). Second, LMA approaches vary in the degree of response to the labor market in terms of the “tightness” of program approaches--that is, how closely programs and services are matched to the skill and job vacancy priorities of employers. For example, some institutions, especially those with a liberal arts mission that are less likely to change curricula and instructional strategies that closely align with employer needs, but rather may rely heavily, even exclusively, on co-curricular activities to achieve their alignment goals. Table 2 illustrates a range of possible LMA approaches at different organizational levels with varying approaches based on these dimensions.

**Table 2: Examples of LMA Approaches**

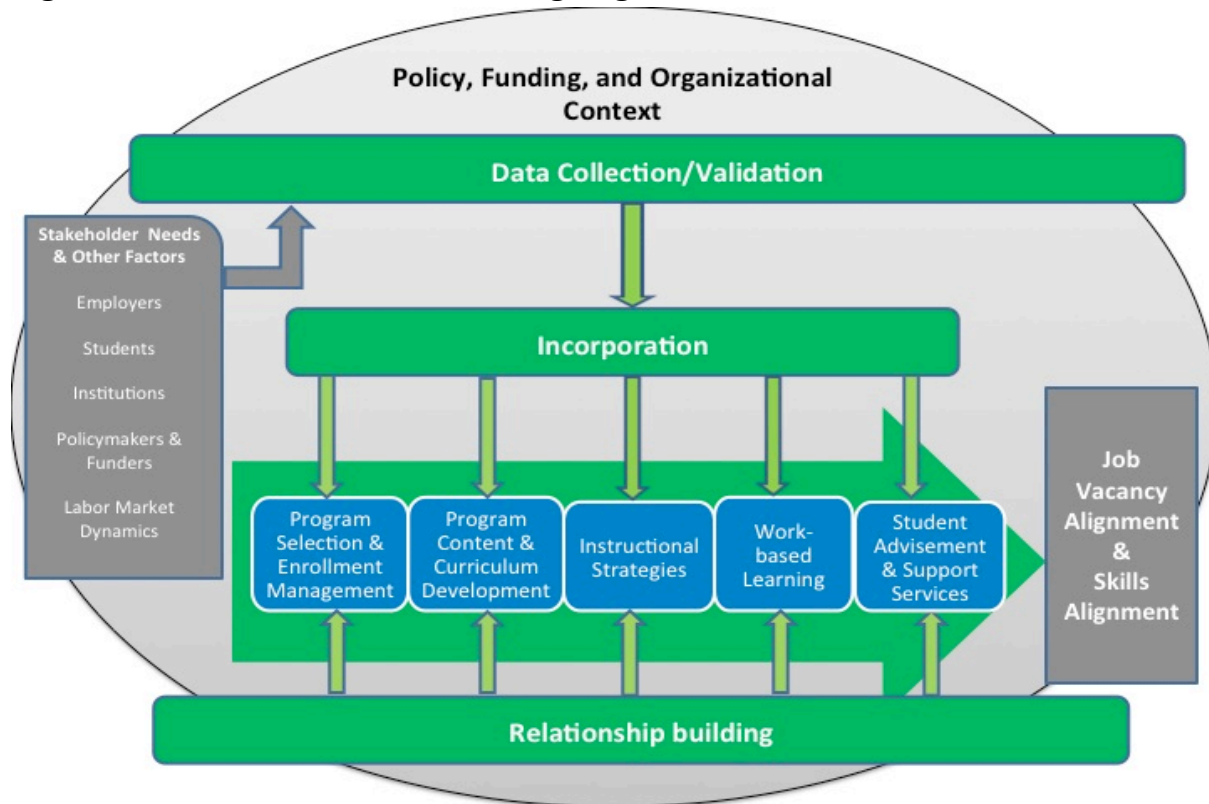
Career pathways system reform at the state level	4-year liberal arts college	University business department	Community college workforce program	Short-term professional development course
<ul style="list-style-type: none"> <li>- State labor market assessment to determine programs to expand and/or add</li> <li>- Employers provide input on skills</li> <li>- Contextualized learning</li> <li>- Connections to workplace learning fostered</li> <li>- stackable credentials</li> <li>- On-going career counseling</li> </ul>	<ul style="list-style-type: none"> <li>- Local, regional or national labor market assessment to inform broad enrollment levels</li> <li>- Employers provide broad input on general skills</li> <li>- Problem-based learning and intensive writing</li> <li>- Internships and industry exposure strongly promoted</li> <li>- Mandatory early and on-going career counseling,</li> <li>- Required career course</li> </ul>	<ul style="list-style-type: none"> <li>- National or state labor market assessment to determine majors to expand and/or add</li> <li>- Employer advisory groups provide broad input on skills</li> <li>- Problem-based learning</li> <li>- Required strongly promoted</li> <li>- On-going career counseling, required career course</li> </ul>	<ul style="list-style-type: none"> <li>- State or local labor market assessment to determine specific enrollment levels</li> <li>- Employer panels to identify specific skills for curriculum</li> <li>- Hands-on applied learning</li> <li>- Required internships</li> <li>- On-going career counseling</li> </ul>	<ul style="list-style-type: none"> <li>- Local labor market assessment to determine specific enrollment levels</li> <li>- Employer panels to identify specific skills for curriculum</li> <li>- Problem-based learning</li> <li>- Job shadowing experience for all</li> <li>- Integrated career advising</li> </ul>

**The process of promoting alignment involves three main activities: data collection, incorporation, and relationship building.**

In order to promote alignment across these areas of higher education, institutions and individuals undertake actions to ensure that these areas reflect their desired alignment approach. In general, they engage in three broad activities: data collection and validation of key stakeholder needs, incorporating results into educational programs and services, and building relationships. Organizational learning theory provides insights on data collection and incorporation activities

and a framework for examining the strategies that colleges adopt to transform their educational programs and services from non-aligned to aligned (Huber, 1991; Levitt & March, 1988). Relationship building is an additional activity that is closely related to the other two, but a distinct goal and sometimes a distinct activity, so we discuss this separately. Each of these concepts is explained in more detail below. Figure 2 provides an overview of the three activities and how they relate to the previously discussed alignment areas.

**Figure 2. Framework for Understanding Alignment Activities and Outcomes**



*Activity #1: Collecting information on the skill and job vacancy needs of employers in the target labor market, as well as on the needs of students and other critical stakeholders, is an essential LMA activity but little is known about how to best collect and use these data.*

In order to align programs and services with labor market demand, systems, institutions, and programs engage in a variety of activities to collect and or validate information on these needs. Much of this data collection, however, is focused on assessing job vacancy and skill demand in target labor markets. Despite its importance, little agreement exists in the literature regarding the best data sources and indicators to use. As a result, stakeholders implementing alignment activities use a variety of public and private data on labor market demand and supply, as well as focus groups and other forms of qualitative input from employers. Multiple types of data are available for these efforts, including those that are publically available, those that must be purchased, and those that must be collected. Each data collection/validation method has unique opportunities and challenges.

Publicly available data used includes data produced by the U.S. Department of Labor Bureau of Labor Statistics, labor market trends data from state departments of labor, and data on graduation rates from state departments of education (Sparks et al., 2011; Wilson, 2014). The Occupational Outlook Handbook and O\*Net, both produced by the Bureau of Labor Statistics, provide information on skills and credentials required in specific occupations that some alignment stakeholders may use to collect information on skill demand. Traditional labor market data produced by the Bureau of Labor Statistics and states have been faulted for not producing employment trend data that are current enough to assess job vacancy demand, for being of limited use and accessibility to practitioners, or for including job growth projections that often end up being false (Capelli, 2014; Van Horn & Corre, 2010; Froeschle, 2010). Froeschle (2010) has also pointed out that publicly available data, including data on recent graduates, are not sufficient to assess skilled labor supply in an area.

Several companies offer a new source of demand, as well as skills data, known as “real-time jobs data” that are available for purchase. These data are gathered by scraping and analyzing online job postings, so it provides a more up-to-the-minute picture of hiring trends and skill requirements for local areas not previously available. A number of community colleges have reported using “real-time jobs data” to align their workforce programs (Altstadt, 2011). Real-time jobs data, while more current than traditional labor market information, relies on proprietary systems to collect and analyze unstructured data. As a result, the data validity and reliability in terms of representativeness of real-time labor market information is not well known (Dorrer & Milfort, 2012).

Employer surveys and direct engagement with employers are other ways to collect information on job vacancy and skill demand in target labor markets. State- and region-wide surveys of employers are a common way to collect labor market information (e.g. Washington Workforce Training and Education Coordinating Board, 2013). Direct engagement with employers can range in approach. The Systematic Curriculum and Instructional Development (SCID) and Developing a Curriculum (DACUM) methods provide a structured, in-depth, way to identify and/or validate specific skills and knowledge needed for particular occupations (Ohio State University, 2014). On the other hand, many institutions rely on one-time advisory groups, or other methods that provide broad feedback but do not generate detailed knowledge (Harman & McAllum, 2003). Little is known about the effectiveness of various approaches to advisory board and employer outreach, and how this type of feedback can be obtained for programs with more general learning outcomes. Many obstacles also exist for higher education institutions interested in surveying or otherwise engaging with employers, including a lack of capacity or interest among faculty/staff or difficulties getting employers to respond to requests for engagement (Barnow & Spaulding, forthcoming; Hewat & Hollenbeck, forthcoming).

There are no current standards that indicate which data indicators and sources provide the most reliable and valid information for colleges on job vacancy and skill demand. Given the uncertainties of labor market data and the difficulties of employer engagement, multiple data sources may provide the best mechanism to assess demand and supply, and inform program selection and enrollment management (Bosworth & Rogers, 1997; Aspen Institute, 2014).

*Activity #2: Incorporating the results of data collection into curricular and co-curricular areas and connecting and re-organizing the delivery of multiple program components is common but doing so in a way that leads to organizational change and learning is a challenge.*

Incorporating information into programs is a large and complex area of LMA, as alignment stakeholders can vary widely in which areas they seek to focus their LMA activities. Furthermore, incorporating information varies depending on the institutional level that is the focus of LMA activity—class, program, department, institution, or system.

***Program Selection and Enrollment Management.*** Colleges have processes for adding new programs, eliminating existing programs, and adjusting the enrollment levels. Four-year institutions in some states have begun adding and subtracting programs and adjusting enrollments based on statewide labor market data (Sparks, et al, 2011). In program reviews, community colleges may document labor market demand for their graduates to justify program renewal. Some college systems also have processes for program approval that involve documenting labor market need. The process for considering how to adjust the selection and enrollment is less clear for programs that are not directly linked to a specific job, including many programs at four-year colleges, particularly those with a liberal arts focus.

***Program Content and Curriculum Development.*** Efforts to articulate learning outcomes, such as the Degree Qualifications Framework, provide a framework to guide institutions in designing programs using agreed-upon general competencies about what students should know and be able to do upon completing a college credential (Adelman, Ewell, Gaston & Schneider, 2011). By articulating learning outcomes and developing processes to measure them, these efforts provide an opportunity to consider how these outcomes align with employer needs (Kuh & Ikenberry, 2009). Institutions that seek a tight LMA approach may use processes, such as SCID, to incorporate employer skill priorities directly into curricula and assessments (Ohio State University, 2014). Depending on the field, professional organizations and state agencies may provide important structure to guide curriculum alignment activities (Latticia & Stark, 2009).

***Instructional Strategies.*** Data and information collected on student learning needs and employer skill needs can inform how instructional strategies are deployed for job vacancy and skills alignment purposes. Based on program content and curricular development efforts, certain instructional strategies may be more or less relevant. For example, contextualized learning may be most relevant in a tightly aligned workforce program, such as the I-BEST program in Washington State, which prepares low-skilled workers for entry-level career pathways jobs (Wachen, Jenkins, & Van Noy, 2011). Problem-based learning is potentially helpful for students to develop skills and knowledge in a range of disciplines (e.g. Dochy, Segers, Van den Bossche & Gijbels, 2003).

***Work-based Learning.*** Depending on how institutions seek to align with the labor market, different types of work-based learning may be more or less relevant. In particular, the level of intensity of the work-based learning strategy will vary. Many institutions do not have resources to support active work-based learning programs, so creative solutions to this challenge are likely needed to promote employer engagement (Leahy, 2014). The incorporation of work-based learning activities is closely linked to employer engagement efforts and related relationship building activities, discussed further below.



***Student Advisement and Support Services.*** Many efforts are underway to convey labor market information to students and help guide their decisions to enter programs and transition into careers. New online e-advising programs at some institutions begin to integrate career and academic advising, though it is not clear to what extent they help students understand and evaluate labor market information (Herndon, 2012). How institutions can best convey this information and how students will use it is still not well understood though evidence is beginning to emerge (e.g., Ruder & Van Noy, 2014). Furthermore, the degree to which online advising systems need to be combined with conventional advising and support is not well known.

***Activity #3: Relationship building with employers and other stakeholders helps support LMA but little is known about effective ways to engage with employers and keep them involved.***

Relationship building, especially with employers, is an important component of higher education LMA (Harmon & McAllum, 2003; de Castro & Karp, 2009; Brewer & Grey, 2007). Employers are more likely to hire workers from a trusted intermediary, and relationships can help college staff to gain access to the information and assistance needed to collect information and incorporate it into curricular and co-curricular areas. Relationship building can be both a by-product of other alignment activities and a standalone activity. For example, relationships with employers can be built organically if a college is using intensive employer contact to collect data on skill and workforce needs. On the other hand, programs that rely on secondary data sources for data collection and that have limited engagement with employers may need to invest more time and effort into building relationships as an additional activity.

Those implementing alignment may also engage in relationship-building activities with other internal and external stakeholders to strengthen connections among program components, such as building in new types of meetings for staff from different areas to interact, or creating activities for staff, faculty, and students to interact. Alignment may also involve multiple partnerships beyond the institution that may include employers.

**Policies and funding incentives, as well as organizational structures play an important role in promoting labor market alignment.**

Policymakers and funding entities can offer incentives that promote LMA activities. At the national level, Obama's Higher Education Scorecard initiative to provide data on student employment outcomes for all higher education institutions may prompt institutions to focus their efforts on LMA (The White House, 2014). Federal agencies, including the U.S. Department of Labor, the U.S. Department of Education, the U.S. Department of Health and Human Services, the National Institutes of Health, the National Science Foundation, promote LMA approaches such as career pathways models, sector strategies, employer engagement, and contextualized basic skills. At the state level, some states are using student employment outcomes data to determine funding levels for some community and technical colleges (Doughery & Reddy, 2011; National Conference of State Legislators, 2014; Fain, 2012), providing strong incentives to improve job vacancy alignment. States also fund specific programs with LMA goals, such as the I-BEST program in Washington State (Wachen, Jenkins, & Van Noy, 2011). City governments are increasingly setting goals for LMA that are designed to improve economic development in their areas (National League of Cities, 2014). Foundations, such as the JP Morgan Foundation,

and private donors are also providing funds for institutions to pursue LMA that fit their goals (JP Morgan, 2013; Hitachi Foundation, 2014; Dominus, 2013).

Within institutions and systems, leaders can create organizational structures that promote a fertile environment for LMA efforts. Research on community colleges identifies organizational characteristics that support LMA, although these might differ in other institutional settings. Key characteristics include committed leadership and a mission statement with an emphasis on labor market responsiveness (Adams, Edmonson & Slate, 2013; Harmon & McAllum, 2003; McAllum & Yoder, 2004). Other characteristics include an integrated approach to traditional academic education and workforce education, a culture of using data to inform decisions, and an expanded approach to funding LMA efforts through partnerships (Adams, Edmonson, and Slate, 2013). The structures and activities identified in this literature are broad at the institutional level — not at the program or system level — and do not distinguish among the goals that these activities intend to serve or the outcomes. However, these structures, or characteristics, are adaptable to different scales and form the infrastructure within which more targeted institutional- and program-level alignment activities can occur. For example, emerging evidence suggests that four-year colleges and universities, as well as system-level actors, are taking steps to change mission statements, policies, and organizational culture to include a focus on LMA (Chan & Derry, 2013; Dominus, 2013; Jones, 2005). In addition, sub-institution-level actors may have established new policies and missions for departments and programs that promote LMA that may not be present at the institution or system level.

### III. Alignment Outcomes

To understand whether higher education institution alignment efforts are meeting the needs of students, employers, and local economies, outcomes measures are essential. Given the multiple goals and activities related to LMA, identifying clear measures of alignment outcomes is complex. In this section, we review existing approaches to measuring LMA outcomes and provide guidance on how to understand these and think about novel approaches to evaluation.

#### Several measures of job vacancy and skills alignment exist, but each has important limitations.

Multiple measures of LMA outcome are possible and are currently in use amongst those interested in LMA including policymakers, funders, and researchers. Table 3 displays five common measures of alignment outcomes and the alignment goal each most closely reflects.

**Table 3: Alignment Outcomes, by Goal**

	Job Vacancy Alignment	Skills Alignment
Graduate production compared to job openings	X	
Attainment of credential with labor market value		X
Earnings, employment, and retention rates	X	X
Direct assessment of student/employer experiences	X	X
Real-time jobs data on turnover	X	X

***Measure #1: Graduate production compared to job openings provides a broad measure of job vacancy alignment for geographic regions but suffers from methodological problems.***

A number of studies compare graduation production from credential-based programs (number of graduates) to the number of jobs created or expected to be created to measure the extent of *job vacancy alignment* in a labor market (Froeschle, 2010). These studies have generally been performed at the higher education systems level in several states (e.g. Leigh & Gill, 2007), cities and regions (e.g. Stern, 2013; Washington Workforce Training and Education Coordinating Board, 2010;) and even at the national level (e.g. Bardhan, Kicks & Jaffee, 2011; Carnivale, Smith & Strohl, 2013, 2010). In addition to providing a performance metric for LMA efforts, this method appears to be used quite often to get a baseline reading on the level of alignment between supply (recent graduates) and demand (job openings) in a labor market in order to inform or advocate for the development of LMA efforts.

There are many weaknesses inherent to this method of determining alignment, which often uses a nationally developed crosswalk of Classification of Instructional Programs (CIP) and Standard Occupational Classifications (SOC) to match graduates to occupations. First, this method assumes that the relationship between credentials and jobs is strong and that recent graduates from the college system being studied make up the only supply of workers, but connections between college majors and content-related jobs are often not direct, especially in the liberal arts. As Froeschle (2010) notes, there are also many other sources of labor supply for which no data are available (past graduates, incumbent in-state workers, in-flows of out-of-state workers) that are not accounted for in this method. In addition, this approach can be too simplistic in that it specifies a causal link between the programs and outcomes. That is, it is not possible to know that a program, institution, or system is truly responding to a labor market need just from seeing a category match in the data; many other factors are at work in the labor market that are not accounted for in this approach, such as changes in demand, that may affect this match.

***Measure #2: Attainment of credential with labor market value provides an indication of skills alignment at numerous levels but validation of credentials is not universal.***

Generating credentials with value in the labor market is the stated goal of many current LMA reform efforts. Often, the increase in production of “employer-recognized” credentials is used to measure the level of skills alignment within LMA efforts. But what does “employer recognized” mean? How do we know if the credential has real value in the labor market? Validation of the labor market value of credentials may be approached in several ways. Credentials can be validated by industry in the form of industry certifications where employer standards are adopted by industry associations at a national level (e.g. Manufacturing Institute, 2011). Licensure is also another means to validate learning based on industry standards. Professional accreditation boards certify some college programs and ensure that curricula adhere to industry standards (Crawford & Sheets, 2014). A major challenge in using the number of credentials attained as a measure of skills attainment is that the mechanisms to validate credentials are not well established; many credentials exist without any labor market validation (Crawford & Sheets, 2014). Furthermore, employers’ actual use of credentials in hiring can vary by organization and labor market (Capelli, 2014; Van Noy & Jacobs, 2012).

***Measure #3: Graduate earnings, employment, and retention rates provide a general indication of job vacancy and skills alignment at many levels but are not widely available.***

The economics literature has had a long history of examining the wage returns to higher education based on human capital theory. Many researchers use student employment outcomes data — including job placement, retention, and earnings — to provide an indication of LMA in higher education (Carnevale, Rose, & Cheah, 2011; Jepson, Troske, & Coomes, 2009; Jacobson, & Mohker, 2009; Schneider & Vivari, 2013; Schneider, 2013). Initial placement and wages can indicate both job vacancy and, to a lesser degree, skills alignment. If graduates earn more after completing postsecondary education, then human capital theory infers that students have had the requisite skills (skills alignment) needed by employers (Becker, 1993). Current accountability initiatives, such as the Obama scorecard, use wage data as a measure of graduates' employment outcomes, while US Department of Labor's community college initiatives requires the collection of job placement, retention, and earnings indicators.

There are several benefits and challenges to this commonly used outcomes measurement approach. One of the key advantages is that it provides evidence of change for both students and employers. These indicators can also be applied at the systems, institution, and program levels. However, this approach uses placement and wages as a proxy for both job vacancy and skills alignment, and may not fully represent the motivations underlying student and employer behavior. In addition, these outcomes indicators do not, in and of themselves, allow researchers to determine whether LMA efforts caused the changes. These outcomes represent high-level indicators based on employer behavior, but it is difficult to parse out the degree of job vacancy alignment or the specific ways that skills alignment has occurred or could be improved. Few studies attempt the experimental or quasi-experimental methods needed to do this. To the extent that data on student outcomes may be valuable for LMA planning and advising students, jobseekers and others, another drawback is that these data are not always available in all states or to all institutions and programs in states.

***Measure #4: Direct assessment of student/employer perceptions provide specific information on job vacancy and skills alignment but are time consuming to collect.***

Fewer studies directly attempt to measure the extent to which a given program or set of programs aligns with the skill expectations or needs of employers or other stakeholders. Employer or participant satisfaction would be a direct measure of skills alignment. To the extent that skills alignment is measured as an outcome, it is often done through surveys of students and or employers regarding the quality of preparation. Several researchers document mismatches between the skills taught in particular programs and the skills employers require for jobs closely associated with the credential (e.g., Alssid, 2013; Colby, Sullivan, Sheppard & Macatangay, 2008; Sullivan, Colby & Wegner, 2007). Research on skills matching in the labor market addresses the question of whether workers, including college graduates, have skills that are needed in the labor market. This literature raises numerous questions about how skill matching can be properly assessed to determine if worker skills match actual job requirements, and raises many serious methodological concerns that need further research to overcome (Handel, 2003).

***Measure #5: Real-time jobs data on turnover provides a new possibility for assessing job vacancy and skills alignment but more information is needed on its use.***

Data from job postings, also known as “real-time jobs data” offer some additional approaches to measure both job vacancy and skills alignment. Some researchers are using this data to compare skills content in course curricula to skills requested in job ads (Alssid,2013), while others are using analyses of the length of time that job postings for particular jobs remain posted as a proxy for both job vacancy and skills alignment (Rothwell, 2014). The underlying assumption is that jobs go unfilled because employers are unable to find skilled workers, indicating that existing workers in the occupation do not possess the right skills or enough workers in the occupation do not exist. However, it is not clear that job postings are the best source of data on employer skill needs, and there are other explanations for jobs to remain posted on-line for long periods besides difficulty filling the position, such as the length of time the employer paid to post the ad. In addition, there is evidence that employer skill requirements change as labor market conditions change (Capelli, 2014). Overall, real-time jobs data are still under development and more information is needed to fully understand their strengths and weaknesses.

**Multiple measures of outcomes are necessary to assess LMA.**

Given the complexity of LMA and the inherent limitations of each measure, no one measure provides a full understanding of LMA outcomes. In addition to the weaknesses inherent in each of these methods, there is little agreement in the scholarly and policy literature regarding which methods and specific indicators are appropriate for use at the systems, institution, program, and course levels or to assess different types of institutions with unique missions. As noted above, several studies compare graduate production to current or future job openings to assess LMA at the systems level, but this assumes that all colleges in the system have similar job vacancy alignment goals and approaches. Student employment outcomes have been used to assess LMA at the system, institution, program and course levels, but there is little agreement on how indicators should change based on the implementation level, institution type, target labor market, or labor market conditions.

**LMA metrics and targets vary considerably and reflect a balance of interests amongst stakeholders.**

Establishing LMA goals and objectives amid varying stakeholder priorities at different levels of LMA across multiple types of postsecondary institutions is complex. Given this complexity, it is not likely that one set of metrics will apply well in all of these circumstances. Furthermore, the lack of consensus about LMA metrics and targets may reflect the lack of consensus regarding the broader goals for LMA. While a large number of LMA stakeholders and actors are involved in implementing LMA approaches, fewer are generally involved in determining and measuring LMA metrics. Some actors, such as policymakers and funders, are most strongly interested in measuring the outcomes of LMA efforts, and may drive the decision-making process about LMA outcomes metrics and targets, to the exclusion of others. Without this involvement, stakeholders implementing LMA, such as higher education institutions, may not adopt the goals being set and measured by funders and other groups.

## IV. Recommendations

Policymakers and practitioners need a better understanding of higher education LMA to create effective higher education programs and job-driven strategies. However, there is a lack of consensus and research to guide LMA actors and policymakers in the development of approaches and metrics for different types of institutions and levels of implementation. Based on prior research and practice, we make some broad recommendations for policy and practice, as well as for future research.

### *Recommendations for Policy and Practice:*

Current knowledge about LMA exists in a variety of domains, which all contribute important insights. Based on our review, we observe that LMA efforts share broad characteristics in common. They include:

- Goals related to achieving job vacancy and skill alignment outcomes in a target labor market with a target group of employers, and
- Leveraging organizational learning activities (data gathering and / or validation of stakeholder needs, incorporation, and relationship building) to implement changes in a variety of curricular and co-curricular areas for the purposes of achieving these goals.

With so many LMA policies and efforts already underway, there is an immediate need to take key actions to improve current implementation and accountability efforts. As such we provide some key recommendations to inform current for policy and practice.

### **Recognize the variety of LMA approaches and metrics for different institution types, levels of implementation, and stakeholder goals.**

Community colleges vary significantly from four-year institutions with regard to their educational scope and mission, as well as many other factors, including the incentives they receive to pursue LMA goals. It is not surprising, therefore, that community colleges may require an LMA approach, and a set of outcomes, that is distinctly different from that which administrators at a four-year institution would adopt. Similarly, the activities and outcomes one can expect from a system of institutions may be distinct from those that would be expected at a different level of implementation, such as the institutional or program level. Even within institution types and units of analysis (levels of implementation) that are compatible, local stakeholder needs and other factors lead to a wide variety of different LMA goals. These unique goals, actors, and implementation settings place boundaries around the specific activities that LMA actors pursue. As a result, there are likely to be sets of LMA activities and outcomes that apply better in some settings than in others.

### **Recognize that LMA implementation and measurement is more of an art than a science.**

LMA in higher education may seem like an easy-to-implement policy solution to large economic challenges, such as high unemployment, employer concerns about skills shortages, and high student debt levels. As this report demonstrates, however, it is much more complex. The variety

of institution types, levels of implementation, stakeholder perspectives, and a lack of reliable data on supply and demand make LMA an issue without a precise, engineered solution. LMA does not lend itself to a simple, “one size fits all” approach. Rather, it involves many alignment actors across multiple institutions and organizational levels in a complex and dynamic process that seeks to balance multiple — and sometimes competing — stakeholder needs amid shifting labor markets and policy environments. LMA efforts share broad characteristics in common, but vary significantly in their goals, implementation and measurement.

### **Use multiple metrics to assess LMA policies.**

Practitioners are being held accountable to metrics set by funders. However, without consensus on the specific goals for LMA, or research that clearly links strategies to outcomes, practitioners are at a disadvantage, left to experiment with untested strategies under the pressure of potentially losing funding if certain metrics are not met. Multiple barriers exist to understanding the skill and workforce needs of employers, from problems of data reliability and validity, to shifts in employer needs caused by changing labor market conditions, to a lack of agreement among employers regarding skills standards, priority skill needs, or job vacancy estimates (Capelli, 2014).

### **Promote a dialogue across stakeholder groups to develop a clearer consensus regarding LMA goals, approaches, and metrics for different institution types and levels of implementation.**

Given the range of goals, approaches, and metrics for LMA, it is not surprising that the concept is not well understood or agreed upon amongst stakeholders. This paper is not meant to advocate for one form of alignment over another, nor even to suggest that alignment, in the engineering sense of the word, is an achievable goal. Rather, our hope is to increase awareness of the complexity and difficulty of attempts to align higher education and a dynamic labor market, as well as to provide additional rubrics that build upon models used in the scholarly literature to describe the many forms of LMA across higher education. Given the language in this framework and its examples of approaches and outcomes, stakeholders may benefit from engaging in discussions to clarify their priorities and identify LMA approaches and metrics that are most appropriate for their needs. Without better dialogue and consensus across the many stakeholder groups involved in supporting and implementing LMA regarding the goals and objectives for LMA in different settings, it will continue to be difficult to reach consensus on appropriate outcomes metrics and methods.

### ***Recommendations for Future Research:***

Despite these lessons, numerous several gaps remain in the knowledge of higher education LMA. Several areas of research are essential to help guide policy and practice with deeper evidence on how to effectively approach and measure LMA. Ultimately this research can promote better policy and practice, leading to improvements in the way higher education prepares students for the workforce.

## **Conduct comprehensive outcomes research tied to activities on both job vacancy and skills alignment.**

Without rigorous outcomes-based research, it is hard to know if LMA efforts have a meaningful impact for students, employers, and others. There is also no evidence regarding which approaches, at which levels of implementation, balance the needs of stakeholders and alignment actors well. A comprehensive understanding of higher education LMA must start first with a consideration of the entire set of goals and priorities that programs seek to balance when they start an alignment process. Research is needed to identify particular models of LMA, and their constituent parts, that are linked to multiple outcomes measures. This research would identify the actual mix of program practices that lead to credentials with real value in the labor market as quantified through multiple measures. This type of rigorous research will be complex, reflecting the complex nature of LMA, but is much needed by the field. More evidence on how higher education can address the issue of LMA will help policymakers and practitioners develop strategies that make sense given their unique stakeholders and alignment goals and priorities.

## **Identify alignment approaches that balance well with other core higher education missions, particularly for liberal arts institutions.**

Research needs to further examine how institutions have sought to balance the goal of LMA with other institutional goals such as civic education and students' academic advancement goals. Since little work has been done on LMA for liberal arts programs and some of the greatest concerns relate to this population, this is an area that is ripe for new research. How much skills alignment is too much? For which types of students? In which types of labor markets? What skills are the most critical to align closely with to ensure successful outcomes? Helping liberal arts students prepare for careers does not have to be inconsistent with the goal of a liberal arts education. More information on and discussion of potential models might help colleges better integrate these approaches into liberal arts programs.

## **Uncover the organizational learning processes that support alignment implementation in different settings.**

The activities related to the implementation of alignment are not well understood. Organizational learning provides a framework to begin to understand these processes. Different types of institutions (i.e., two- and four-year, workforce, and liberal arts) may use different processes as a result of their differing missions, and more understanding of these is necessary. While much work on activities related to labor market responsiveness has been done in community colleges, much less has been done to study LMA in four-year institutions, university graduate and professional programs, and other settings. Even in community colleges, a great deal is not known about specific approaches, such as how college faculty and staff use labor market data and advisory board feedback in program development and reform, or how colleges reconcile conflicting data or interests among parties.

## **Identify approaches to integrate career preparation for all students.**



A major challenge to implementing alignment activities is a lack of understanding around students' needs and how they can be best supported. While students broadly seek education to promote success in the workforce, how to best guide them toward that goal is not well understood, especially given the unprecedented economic context. Greater general knowledge is needed on students' decision-making processes and how higher education can provide the right supports at the right time to promote students' career preparation. More specific research is needed on how students access and evaluate labor market data and whether particular interventions, such as providing more data, requiring classes on careers, or providing more advising and counseling, may improve students' decision making and ultimate career success.

### **Improve understanding of employer perspectives in engagement and hiring practices.**

Employers play an important but often understudied role in LMA. A better understanding of how employers understand and engage with higher education is needed to answer numerous questions. How do they engage with higher education and why? How much should higher education change based on industry versus try to engage and shape industry? How can employer advisory boards be conducted to best support alignment goals? A deeper understanding of the hiring process is needed to answer questions around employer behavior that explains particular outcomes and the role of credentials in hiring. What meaning do employers assign to credentials, and how do they form these meanings? This may be a particular issue in fields with emerging credentials: How do they take on value and meaning among employers?

### **Evaluate and validate several sources of demand- and supply-side data for use in job vacancy and skills alignment.**

LMA actors across different organizational levels rely on a range of labor demand and supply indicators from traditional labor market data, "real-time" jobs data, and higher education graduation data sources, among others. However, there is little understanding about which of these indicators, or combinations of indicators, has the best predictive power for the purposes of job vacancy and/or skills alignment. In particular, many alignment actors are moving to use "real-time" jobs data as an indicator of job vacancy and skill demand. However, no research or evaluation has been done on these data to validate their accuracy and utility, or identify their potential limitations. For example, it is possible that certain occupations or regions may have more or less accurate job posting data and this will need to be used with greater caution than data for other occupations or regions. In addition, further research may reveal a method of triangulating data to help LMA actors maintain a grasp on broad trends, to help avoid significant under- and over-supply issues.

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