RE-IMAGINING THE KNOWLEDGE FACTORY:
An alternative role for Attica’s educational institution
By
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Athens, Greece, 2008

Submitted to the Department of Architecture in partial fulfillment of the requirements for the degree of

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Reimagining the knowledge factory
An alternative role for Attica's educational institution
RE-IMAGINING THE KNOWLEDGE FACTORY:
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ABSTRACT

Point of departure for this thesis is a concern regarding educational institutions’
current state and the dialectic that it suggests with the city within which they reside. US uni-
versities and specifically MIT are used as case studies to depict the contemporary conditions
that characterize research and education and their impact in their physical, economic and
social context. Last, using as a test-field the city of Eleusina in Greece, this proposal aims to
destruct the accumulated and concentrated value embedded in the knowledge economies
of universities.

The recent financial crisis in Greece has created conditions in which the state of
emergency defines sovereignty itself. Nevertheless, by seeking to trade on values of au-
thenticity, locality, culture opens space for political thought, and potentially actions within
which alternatives can be both formulated and achieved. Universities as cultural institutions
are taking part in this dynamic process. Educational institutions could provide the platform
for redefining and negotiating the cultural commons. Operating in multiple geographies,
universities are part of the global networks of knowledge. They are also significant nodes of
the knowledge system and its global-local dialectic. The manifestation of these systems in
urban space makes universities ideal places for this exploration.

The restructuring of the Greek University, already an undergoing process, gives the
opportunity to re-imagine education in its contemporary context. This project is sited in the
city of Eleusina; one of the most devastated areas in the country both by the recent crisis
and by its industrial past. On the other hand the city’s unique superimposition of layers
created through the centuries - evident in the urban fabric - in addition with the current
uncertainty, are used as the pivot for the proposal of an alternative educational institution.
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ABSTRACT

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1 MOTIVATION

1.1 THESIS MOTIVATION

This thesis emerges from my personal experience while a student of architecture in the National Technical University of Athens (NTUA) from 2002 to 2008. The six years of my undergraduate studies in Greece coincide with the beginning of the higher education reform that started in Europe in 1999 through the Bologna declaration. Drawing from the Bologna declaration, the first, initially unsuccessfully, constitutional reform was proposed in Greece in 2001. The proposed educational reform had to obey the European Union (EU) guidelines as stated in the Bologna declaration. As it will be explicitly illustrated in the second chapter, the higher education reform put in jeopardy the public and open character of the Greek Universities, a character that identifies the Greek culture and the country's social regime.

The educational reform proposal and its incremental implementation to date, has created academic unrest and the vivid reaction of the wider academic community, including professors and students. My adherence to the massive opposition of the Greek universities' transformation informed my college experience and introduced me to the democratic and collective opposition processes that flourished in Greek academic institutions since the early 2000s. These processes cultivated a collective imagination among students around the educational system’s purpose, ideal, and ethos. This student movement is still very vibrant in Greece and in other European countries experiencing similar educational reforms.

Entrenched in the history and culture of the National Technical University of Athens, located in the center of the city, is a tradition of student and political movements. The NTUA, within which the School of Architecture resides, was the pivotal point of the student rebellion in 1974, which gradually led in the collapse of Greece’s seven-year dictatorship period. The university, to date, continues to resemble a social condenser, and a place where different voices and activities can be heard and expressed.

However, regardless of the current academic community’s ongoing resistance the implementation of the educational reform, that places emphasis among others on research supported by private investments, is still part

1 Declaration, “Joint declaration of the European Ministers of Education.”
2 Μαρίνος, "Το περίβότο άρθρο 16."
of the national agenda. Moreover, the most recent fiscal crisis and financial insecurity in Greece has created stronger political will and has produced a renewed determination among government officials to implement the educational reform and to end the associated political unrest. This recent national fiscal crisis has added another layer of complexity; The increase in competitiveness and attractiveness of the Greek universities’ is perceived as a possible way out of the crisis and has shifted the educational reforms’ importance from an issue that concerned primarily the academic community to an issue of national importance.

The current decrease in public funding has resulted in the merging of existing departments and internal restructuring of departments in universities throughout the country. At the same time, benefits deriving from private investments support research and the founding of new private educational institutions. This potential influences current political decisions, evident in the Greek Prime Minister’s repeated political declarations that the Country’s future relies on the potential created by a robust University system. This shift however, over the role and future of universities, implies an ideological duality almost impossible to resolve. I recognize that keeping universities underfunded is not only an aftermath of the financial crisis but also a way to exercise political pressure in order to inflict political agendas. Yet, the lack of public funds forces institutions to search for resources, other than public, in order to support their operations and their student body needs.

The focus on private resources and the speculation over the implications that the new educational regime may have in the educational system has, logically, generated student reactions. Such reactions have translated to student initiated squatting of empty spaces, when space needs are not adequately provided within the institution, and to protests where students end up claiming the university’s space. These actions although indicative of a political climate and while significant to the culture that characterizes the Greek academic community are unfortunately ephemeral and limited as they do not create a dialogue over the very issue of the ideological duality, and they do not result to a permanent resolution.

3 Λακασάς, "Ε.Ε.: συστήματα αξιολόγησης πανεπιστημίων της Ευρώπης βελτιώνει συνεχώς τα κριτήρια στην Ελλάδα υπάρχουν ακόμη αντιδράσεις."
On the other hand, part of the academic community, more eager to accept the reality imposed by the financial crisis and the promise that has been placed on private investment, has embraced the promises of the knowledge economy and the privately sponsored research. For example, the NTUA alone, the last few years, has undertaken a significant amount of privately funded research. Based on a recent survey sponsored by the European Commission that examines the number of both publicly and privately funded research projects, the NTUA ranks second among all European Universities and fourth among all European organizations, including private enterprises. However, the lack of integration and interaction between the research activities and the educational offerings has further exemplified the ideological duality that characterizes the academic community. Lack of transparency regarding the research selection criteria and the operations of the supported laboratories further inhibit a possible integration and interaction between research projects and wider educational benefits, sustaining a contested terrain over educational reform within the broader academic community.

4Network Management Centrer, "Sponsored Research." 2009
As an MIT student, the last two years away from Greece, I have been faced with an exactly opposite reality. In a private research university such as MIT, I have understood that discussions of the privatization of education have a different point of departure rooted in the history of the US educational system. Long-established conditions may not allow a debate of whether or not there is room for privately funded research within the system of education. Hence, current discussions within the US educational system evolve around the possible compromises of research topics undertaken, the effects on the overall educational experience, and the research findings' implications; all questions imposed by the system at hand.

Experiencing MIT through its everyday life has also made apparent that a university can extend beyond the boundaries of its educational campus. The Institute's presence in the urban environment of Cambridge has made MIT its own city within a city. MIT's everyday experience has provoked a personal transformational experience. One that has forced me to rethink and reframe the European and Greek educational reform's current dilemmas. The NTUA and the MIT experiences propose distinctly different educational settings. However, this can become a point of departure in exploring and imagining how a new setting, informed by realities found in both, can derive.

1.2 THESIS INTENT

Given that the economic and educational implications of privately supported academic research, is a topic far more complex than what an architectural thesis could undertake, for the purpose of this research project and design proposal, I acknowledge both the benefits and the tensions it creates. However, I argue that the physical materialization of privately supported academic institutions in the urban environment is of equal importance as it can contribute to relationships of exclusion or inclusion between a university, the broader academic community, and the city within which it exists. More importantly, I argue that this physical manifestation does not have to be a pure imitation of the economic forces that form knowledge economies' regimes, and they do not have to be considered a panacea.
This thesis, borrows from the lessons learned meandering between the MIT campus and the city of Cambridge and other knowledge cluster settings in the US. It recognizes the urban form implications that the knowledge economy regime presents. Using the potential of economic benefits, that can imply a possible recovery, offered by the creation of a knowledge economy, I speculate an alternative form resolution for Attica’s new Institution in the city of Eleusina in Greece. This proposal is formed based on the vision and the belief that an alternative urban form manifestation for Eleusina’s new institution is possible. The knowledge economy regime that it aims to attracts and by which it will be supported, can form mutually beneficial educational, economic, and hopefully social synergies between the university and the city of Eleusina within which it will reside.

Moreover, the speculation over this urban design proposal intends to blur, maybe debug, the (physical) boundaries that confine the benefits of higher education and to inflict the responsibility of addressing social costs that introverted, partially privatized, educational institutions create, to the entities responsible for their very creation. By doing so in a way that is yet appealing to the market that it intends to attract, may be purely a desire over the economic recovery that it could mean for Eleusina, or for that matter for Greece. Nonetheless, it can provide a new framework for developing privately supported institutions and has the potential to abolish the assumption that the economic dynamics panacea associated with privately supported educational systems also translates to a physical form manifestation or their programmatic operations panacea.
1.3 THESIS ORGANIZATION

This introductory chapter is followed by chapter 2 called “The Shifting Nature of Knowledge.” This chapter seeks to establish the theoretical framework of this thesis and to define key concepts that will be used as methodological channels. Situating the argument in Jean François Lyotard’s The Postmodern Condition: A Report on Knowledge, this chapter investigates the notion of the commodification of knowledge and its impact in the transformations of contemporary societies and cities. The informational capitalism and the network society are used to define the recent patterns of geographically articulated activities within urban spaces related with cultural and educational institutions. The theoretical framework is not developed or used in all its dimensions. It simply provides a foundation to approach the case studies presented in the third chapter.

The third chapter of this thesis called “Institutions as Growth Machines” seeks to investigate the US research universities by observing their operations and transformations during the recent decades. The context is always the bipolar system of the university and its urban context but never an institution alone. The case of MIT is used to illustrate specifically these changes internally in the Institution while focusing primarily in its dialectic with city of Cambridge.

Last the fourth chapter called «Laboratories for Arts and Environmental Sciences in Eleusina» constitutes the proposal for an alternative educational institution in Western Attica, Greece. This chapter seeks to discover the city of Eleusina in Greece and to describe the programmatic and physical decisions, informed by the previous research presented in chapters 2 and 3, and by the specific locality.

5 Lyotard, The postmodern condition.
7 Logan and Molotch, Urban fortunes, ix.
This chapter seeks to establish the theoretical framework of this thesis and to define key concepts that will be used as methodological channels. Situating the argument in Jean François Lyotard’s The Postmodern Condition: A Report on Knowledge, this chapter investigates the notion of commodification of knowledge and its impact in the transformations of contemporary societies and cities. The informational capitalism and the network society are used to define the recent patterns of geographically articulated activities within urban spaces related with cultural and educational institutions. The theoretical framework is not developed or used in all its dimensions. It simply provides a foundation to approach the case studies presented in the third chapter.
The meaning of the university is closely related to and intertwined with the notion of knowledge. Universities foster knowledge, they challenge existing or conventional wisdom, and they ultimately create new knowledge. As physical places universities offer the space where knowledge is produced, proliferated, spread, and most commonly taught to students. However, both the meaning of the university and the notion of knowledge have diverse origins and various founding intentions. European Universities perpetuated a legacy found in the medieval origins of “the idea of a university”. While the medieval university came to be closely associated with the cities within which it was situated, the first universities were not defined by reference to any geographical location, but were rather based on a particular set of intellectual activities. The US universities from their very early stage, due to the American Land-Grant Universities of the 1860s Act, have worked in close partnership with the government and business-industries for various knowledge-related purposes. Embedded in the different origins of the institution of the universities is a different emphasis over spatial territoriality and physical prominence.

The term knowledge implies sharing and exchanging. However, the notion of the ‘knowledge economy’ remains largely an American phenomenon, unfamiliar until recently in most European regions. First started in the U.S after the Second World War, the ‘knowledge economy’ has only a few examples to present in the EU such as the Cambridge University in UK. It was only very recently that the notion of the autonomous European university was put into question. The Bologna declaration legislates an educational re-
form that challenges this very nature of the autonomous European University system.

The Ministers of Education, comprised by 29 European Countries, including Greece, first signed the Bologna declaration in 1999. In the ten years that followed 18 more countries were added to the process. The most important aspiration of the Bologna declaration is to “achieve greater compatibility and comparability in the systems of higher education” (mainly an intra-European issue). The overarching goal was to increase the international competitiveness of the European higher education system by 2010. The objectives as expressed explicitly by the signatory countries intends to deal with the specific challenges of diversification of higher education, the employability of graduates and the expansion of private and transnational education in order to “ensure that the European higher education system acquires a worldwide degree of attractiveness”. Even though the document clearly stated the commitment to a mutual respect regarding the diversity of the participating countries, the rigidity of the commitment and the firmness imposed by the agenda through the year 2010 deadline, led to immediate actions of the signatory countries. The monetary crisis accelerated the implementation of the reform and made its intentions more clear, with the immediate action in creating linkages between the private sector, employment, and the universities. This urgency was based on the premises that by 2010, through changes framed by the Bologna process, Europe would turn into the world’s leading ‘knowledge economy’.

The rise of the ‘knowledge economy’ that the Bologna declaration seeks to achieve has made economic success increasingly dependent on the ability to exploit knowledge and to compete through innovation. Nevertheless the EU has been following the United States’ developments with some delays. Most recently, the emergence of knowledge regions in the EU suggests a certain degree of imitation to the American forerunners. Despite the EU efforts, there is almost no indication that Europe will be able to achieve the goal of founding and establishing the world’s leading ‘knowledge economy’. Indeed, several reports point out the fact that when it comes to Research and

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4Declaration, “Joint declaration of the European Ministers of Education.”
5ibid.
•Neave, “The Bologna declaration.”
7Hinoul, “Creating the Dynamic Technology Region.”
Development the disparity between Europe’s and the United States’ capacity and achievements is not closing. Specifically, according to the international R&D Scoreboard published by the UK Department of Trade and Industry over the past year, Corporate R&D spending in the US rose by 8.2%, compared to a more modest 5.8% increase that was observed in Europe at the same time.

At the same time, the majority of the measures suggested by the Bologna declaration have threatened well-established public higher education social rights, like the open access or low cost access in higher education, in Europe and have faced the resistance of multiple citizen groups and various academic communities. In Greece, the reaction to the rigorous and concrete

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8 Ibid.

implementation of the Bologna process led students to claiming universities, and organizing massive protests, resulting in riots and incidences of police violence. As a result, in 2001 the Greek government’s early attempt for educational reform, which entailed a partial constitutional change of the article 161 (that allowed the founding of private universities and reformed the laws regarding the internal function of universities, research and private funding), failed to pass.

Overshadowed by the general turmoil of the financial crisis, the law supporting the educational reform ultimately passed a few years after the initial attempt. In Greece opposition to the educational system’s reform created community unrest that was often manifested in strikes, a common form of protest action in the country. Similar concerns and reactions occurred in other countries, such as in Germany and in France. Prevailing issues of concern included unease over the autonomy and independence of the educational institutions and the fear of creating inequity of accessing knowledge. Central themes of the discussions evolved around the alarming implications of the production of knowledge, the foreseen conflicts between market-oriented and non-market-oriented teaching and learning (or alternatively between liberal versus vocational/professional education), and implied conflicts between a greater democratization of the learning process and an open access to research.

1 Μαρίνος, "Το περιβόητο άρθρο 16."
In my opinion, it is imperative to examine the universities' reform in accordance with the broader context of political regime and urban governance within which the reform occurs. University organizations are inescapably embedded in the social and political context within which they emerge. The contested transformation proposed by the Bologna process, reflects an emerging post-industrial economic context. In the course of the related restructuring process, the classical definitions of "work" and "labour" are being questioned, while the role of institutions changes dramatically in current societies and cities.

"Since the production of services results in no material and durable good, we define the labor involved in this production as immaterial labor— that is, labor that produces an immaterial good, such as a service, a cultural product, knowledge, or communication."


These policy documents might seem nonfigurative and at a first glance not related with physical space and city form. However, in my opinion, shifts in an ideological framework and changes of a non-material system like that of education, have morphogenetic attribute. They affect the ways space is created, produced and reproduced. Academic institutions do not experience a merely internal restructuring of their system. This internal restructuring also defines and re-defines their role in the cities, which in turn provides the backdrop for their physical organization. Although the Bologna Process was declared in an international level, its implications are being articulated and manifested in the local level through the creation of an associated spatial and physical vocabulary. Direct result of the physical vocabulary that accompanies structural changes is the creation of knowledge clusters in close proximity with universities. These clusters signify the physical manifestation of the knowledge economy. The main focus of this thesis is to question the form manifestation and to explore alternative spatial physical and programmatic manifestations mandated by of the newly formed types and roles ascribed to academic institutions.

Hans Hollein's a mobile office in the form of an inflatable structure for "individualised, nomadic worker", simultaneously safeguarded from the exterior yet connected to it by telephone and telefax.
2 THE SHIFTING NATURE OF KNOWLEDGE

2.2 RE-READING LYOTARD

“The status of knowledge is altered as societies enter what is known as the post-industrial age and cultures enter what is known as the postmodern age.”


Lyotard argues that knowledge and power are ‘two sides of the same question’ and accordingly knowledge has become the major force of production. It will increasingly be translated into quantities of information, with a corresponding reorientation in the process of research. Lyotard notes that ‘the miniaturisation and commercialisation of machines is already changing the way in which learning is acquired, classified, made available, and exploited’. In the computerised societies knowledge is becoming ‘exteriorised’ from knowers and consequently the old notion that knowledge and pedagogy are inextricably linked is being transformed. That shift introduces a new reality; the replacement by a new view of knowledge as a commodity. “Knowledge is and will be produced in order to be sold; it is and will be consumed in order to be valorised in a new production: in both cases, the goal is exchange.”

11 Lyotard, *The postmodern condition*.

The State, Lyotard speculates, will come to be perceived as ‘a factor of opacity and noise’ in the commercialisation of knowledge. The idea that learning falls within the purview of the State, as the mind or brain of society will give way to the notion that society exists and progresses only if the messages circulating within it are rich in information and easy to decode. Knowledge in the form of an informational commodity indispensable to productive power is already, and will continue to be, a major -perhaps the major - stake in the worldwide competition for power. The European effort to establish the world’s leading ‘knowledge economy’ as stated in the Bologna declaration is one of the characteristic examples. In a smaller scale universities and the regions-cities that they exist, seek to promote themselves internationally and to attract investments, indicative of this competition is the example described in the third chapter between the IVY league schools and their urban expansions.
2.3 NETWORKS OF KNOWLEDGE AND THE PRODUCTION OF SPACE

“Urban entrepreneurialism has become important both nationally and internationally in recent decades. By this I mean that pattern of behaviour within urban governance that mixes together state powers (local, metropolitan, regional, national or supranational) and a wide array of organizational forms in civil society (chambers of commerce, unions, churches, educational and research institutions, community groups, NGOs, etc.) and private interests (corporate and individual) to form coalitions to promote or manage urban/regional development of some sort or other. [...] the forms, activities and goals of these governance systems vary widely depending upon local conditions and the mix of forces at work within them.”

David Harvey, The Art of Rent: Globalization, Monopoly and the Commodification of Culture (2002), pg 12.

The neoliberal form of urban centres’ development has been investigated at length, especially under the convention of local-global relations and a ‘space-place dialectic’. The central role played by knowledge, information and communication, explained by Castells in the concept of informational capitalism and network societies, modify the operation and outcomes in processes of production, experience, power, and culture. Networks constitute the new social morphology of our societies and ultimately transform physical space. The various disciplines that research these issues have concluded that it is a definite inconsistency to examine this phenomenon as a causal force in relation to local development. As David Harvey states “it is a rather more complicated relationship across scales in which local initiatives can percolate upwards to a global scale and vice versa at the same time as processes within a particular definition of scale,” interurban and interregional competition being the most obvious examples. Concluding that in the place of an undifferentiated unity is a rather geographically articulated patterning of global capitalist activities and relations.

12 Castells and Catterall, The making of the network society, 8.
13 Harvey, Spaces of global capitalism, 73-82.
Paul Baran, a researcher at Rand Corporation, representing the three types of networks for a commissioned study by the US Air Force. He conceived a distributed network (c) with no central node which could continue to function even if part of the network was destroyed.

- a. Centralized
- b. Decentralized
- c. Distributed
- d. Envisioning to create a non-hierarchical network of educational facilities in the city of Eleusina in Greece. A network that negotiates the maximum possible connections and interactions.
Shifting the focus in the physical-territorial development where the landed capital has an undeniable importance and in contrast with the rest of the processes the long-term investments are geographically immobile. These investments if proven successful result to further waves of investments. This element of circulation and accumulation in metropolitan area investments is a dynamic process functioning in multiple scales. The patterns of local investments as a form of urban governance do not only apply to infrastructure such as communication and transportation systems but in various other forms of social infrastructure, technological institutions, universities, museums (which are transforming or highlighting history, culture, aesthetics, tradition and collective memories). Within this context, the physical and architectural design is playing a significant role in the expression but also in the creation and construction of these notions.

Capitalistic systems lean towards the creation of oligopolies or monopolies and through the intensification of competition the accumulation of capital is perpetuated. The elimination of monopoly protections is a result of the recent term of global market. Informational technologies and pharmaceutical industries are characteristic cases of centralised capital that due to the lack of this protection used additional measures to protect their monopoly status by establishing patents and intellectual properties agreements. As it will be explained later ‘selling’ intellectual property right is also a crucial factor of the entrepreneurial universities’ function and of the clusters of information technologies paradigm, which ultimately constitute a new typology of urban development. These examples are the model for the reform in higher education.

The continuous effort to create these oligopoly or monopoly conditions strengthens the importance of spaces and localities and the singularity of the symbolic capital that accompanies these sites. The ‘urban machines’ synergy is the claiming of uniqueness that allows them to be part of that system. Through this very mark of distinction, the singularity of the symbolic capital becomes one of the most important factors of their urban development.

14 Ibid., 44.
manifestation. The notion of collective symbolic capital is crucial to reveal the intimate link between culture, site specificity and real estate economy, even though collective symbolic capital is accumulated in different ways either as history and social memory of a given locus, or as exploitation of urban subcultures (the example of Berlin and 80's NY) and under the new paradigm of the 'creative cities'.

Nevertheless, by seeking to trade on values of authenticity, locality, culture, collective memories opens space for political thought and potentially action within which alternatives can be both formulated and achieved.\textsuperscript{15} I argue that this open space created requires intense scrutiny and refinement; it requires the exploration of a certain type of cultural autonomy and the reinforcement of cultural creativity. This, hence, become a powerful and necessary aspect in these conditions. Universities as cultural institution are taking part in this dynamic process. Applied in multiple scales of geography this argument might be a response of a way to adjust but also to deviate from the physical outcomes inflicted by the EU higher education reform. The conflicting reality between over-identification and complete homogeneity might be one side of the reality. However, creative responses can aim to destruct the accumulated and concentrated value by exploiting the common domains of culture, of knowledge, and of symbolic capital. Hence, a counterproposal, which is based on the physical manifestation of redistribution, might not be only the other side but more importantly the desired side of the same reality. Educational institutions could provide the platform for exploring and negotiating these possibilities as they are linked in the global networks of knowledge and information but also as the nodes of that system manifest themselves in physical space and interact with specific local conditions.

\textsuperscript{15} Pasquinelli, \textit{Beyond the Ruins of the Creative City}. 
Envisioning the proposal as a dynamic process that operates in multiple scales and adjusts to specific conditions. Not a composition but a system with peaks and absences, profusing and diffusing in the city and with city.
3

INSTITUTIONS AS GROWTH MACHINES

3.1 TECHNOPOLIS
   3.1.1 PATENTS, FUNDS AND THE CREATION OF TECHNOPOLIS
   3.1.2 TECHNOPOLIS SYNERGIES
   3.1.3 CITY AND TECHNOPOLIS DIALECTIC
   3.1.4 CRITIQUING THE TECHNOPOLIS

3.2 THE CASE OF MIT: CONFLICTS AND TRADE-OFFS
   3.2.1 MIT’S IMPACT TO THE CITY’S LABOR MARKET
   3.2.2 MIT’S URBAN DESIGN POLITICS
   3.2.3 MIT BEYOND ITS BOUNDARIES

The third chapter of this thesis called “Institutions as Growth Machines” seeks to investigate the US research universities by observing their operations and transformations during the recent decades. The context is always the bipolar system of the university and its urban context but never an institution alone. The case of MIT is used to illustrate specifically these changes internally in the Institution while focusing primarily in its dialectic with city of Cambridge.
3 INSTITUTIONS AS GROWTH MACHINES

3.1 TECHNOPOLIS

“It doesn’t mean that exploitation is finished, that oppression is finished, that social struggles are finished. It means that networks have replaced the institutional and social organizations of the industrial era. This has two sides to it. On the one hand, we live in an era of extraordinary creativity and innovation. [...] On the other hand, we are also in an era where all who are weak, who don’t have this capacity for innovation or don’t have the means to express it, are being left out, are disconnected. So extraordinary creativity and extraordinary social inequality and social exclusion are hand in hand.”


Knowledge economy is becoming one of the most prominent trends of development globally. As the Bologna declaration implies it has also become one of Europe’s primary goals. The aim of this chapter is to describe (and evaluate) the framework of developments emerging out of knowledge economy regimes and their modus operandi. Nevertheless, as it was mention in Chapter 1, knowledge economy remains largely an American phenomenon. Therefore, trying to trace the birth and evolution of knowledge clusters and the restructuring of universities they imply relies on examples primarily situated in the US. Moreover, the fact that the American knowledge economy cases grow faster than most other global examples (with a few exemptions like Cambridge UK, Oxford UK, Sophia Antipolis) makes them more suitable cases for investigation. It also allows examining conditions not observed elsewhere yet.

The adoption of the 1862 Morrill Act, created a perception of American educational institutions as major sources of knowledge for agriculture and the industrial sector. Universities were established upon donated federal land. Their mission was to support both commercial and basic research activity. The relationship between institutions and industries was established by time of the Second World War, orientted to military research and defense

1 Hinoul, “Creating the Dynamic Technology Region,” 3.
2 Benneworth, “The role of university spin-off firms in strengthening regional innovation” systems in weaker places,” 2.
systems. The technological needs mandated due to the war, along with the determination of people like Vannevar Bush, generated a need to increase university research undertakings.

The commercialization of university research was initially manifested through investments from venture capital firms. These investments first occurred after the Second World War. Since then, they have grown to become a dominant financial source. The location of venture capital firms in relation to university campuses reveals their proximity to high technology labs and molecular biology laboratories. Manuel Castells and Peter Hall use the term Technopolis\(^3\) to describe the areas that host the nexus of high-technology industries with centers of research and development. The exploitation *ratiionale* is based on the synergies created due to the physical proximity of high-technology companies with entities fostering an exchange of knowledge.

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Pedestrians with a microwave dish on a cart in Building 20's corridor during Rad Lab days. The building was constructed in 1943 as a war building and was of a temporary nature to accommodate military research at MIT.

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\(^3\) Castells, *The Rise of the Network Society*. 
3.1.1 PATENTS, FUNDS AND THE CREATION OF TECHNOPOLIS

The role of universities and in directing local development becomes evident in the mid-1980's. Characteristic models are Stanford University in California and the adjacent Silicon Valley area, as well as MIT and the Route 128\(^4\) – the high-tech highway. This new trend was accelerated when the USA National Institutes of Health consented in allowing universities to patent and license their genetic engineering research. This decision liberated government-sponsored research from public claims of ownership and thus began fostering the privatization of previously government-funded academic research\(^5\). Additionally, in the 1980 the Bayh-Dole\(^6\) act of US Congress empowered universities to patent and commercialise state-funded research. This decision, similarly with what Europe experiences, was the aftermath of the re-evaluation of the US economy comparatively to other countries at the frontline of technological innovation. The outcome was an increasing domination of commercial forces over universities, educational and academic missions that ultimately determined, to a large extent, the types of research conducted. The main argument behind the Bayh-Dole Act assumed that commercial private firms had no motives to invest in downstream research and “aimed at developing university inventions committed to the public domain”\(^7\). These changes resulted in the increase of research funding at the US universities, between 1980 and 1998. Specifically, there was annual research finding increase of 8% and an equivalent scale increase in the university campuses and facilities (reaching a staggering 1.9 billion US dollars in 1997\(^8\)).

Nevertheless, nowadays conditions have changed. As the government directs funds to other sectors, laboratories have little choice but to turn to private investors. Universities are also compelled to explore and develop other money making opportunities, such as property management and other financial ventures aiming at creating, developing or supporting research clusters, which extend the physical and cultural reach of universities, their research and influence. Technopolis and new research strategies

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4 Saxenian, *Regional advantage*, 12.
6 Kenney and Patton, “Reconsidering the Bayh-Dole Act and the current university invention ownership model,” 400.
7 Mazzoleni, “JORGE NIOSI/Introduction to the Symposium.”
work within, rather that outside the geopolitical and corporate structures, becoming in this way part of a larger discourse that impacts entities outside the traditional university.

3.1.2 TECHNOPOLIS SYNERGIES

The existence of a Technopolis requires the involvement of three partners: The entrepreneurs, the government-state (local and federal) and the academic world. The networks created can be formal or informal, or as Philip Cooke and Robert Huggins⁹ define them soft (reputational) or hard (contractual etc). In high technology industry or biotechnology, such as in the case of Cambridge, hard linkages mean the sharing of equipment between MIT and the spin-off firms while soft linkages mean the sharing of knowledge, and the synergies created due to reputation. Reputation and network knowledge clusters are not formed by simply a geographical concentration. They require sufficient synergies between the key actors and agencies involved. In knowledge-driven sectors, also known as cognitive capitalism systems, the research output of universities and specialized institutes involved are the core elements.

These commercialize educational organisational forms are driven by product marketability. They do not only express a radical shift in the paradigm of education but they also imply a new urban and economic typology. This shift has multiple implications not only in the internal function of the educational institutions involved, but also in their physical manifestation. Localities view the universities as the infrastructure for industrial and economic growth and correspondingly universities take advantage of this opportunity to reinforce their local presence and constituency.

⁹ Cooke and Huggins, “High-technology clustering in Cambridge (UK),” 22.
3.1.3 CITY AND TECHNOPOLIS DIALECTIC

In the cities where these relationships exist, such as in the case of Cambridge MA, Technopolises are generally perceived as a shared priority objective. The physical proximity of the actors involved increases the production capacity of the network because, among other reasons, it produces a culture of common values between entrepreneurs, local politicians, institutions and certain citizen groups. The creation of Technopolis reveals one of the greatest efforts that contemporary cities make to promote themselves internationally and to attract investment. Cities view the creation of Technopolis as the vehicle for their regional success and a way of offering them global competitiveness. The networks of knowledge and the flows of information emerging for the clusters developed elevates cities to larger trajectories. Moving upward in the geographic scale, new articulated patterns of cluster development occur. The network becomes the unit and its nodes are the specific localities. Despite their flexibility to reconfigure themselves, nodes that do not manage to augment that logic model disappear.

Multiple recent examples demonstrate the ways that universities become key actors in shaping urban environments. It is not only through the creation of knowledge clusters, like in the case of Cambridge -MIT, that universities expand and operate as planning agencies in their surrounding areas. The heightened competition among schools to attract a specific demographic pool of students and the very competitive process of obtaining research grants in order to have better facilities is another important aspect.

The senior vice president for facilities and real estate services of Penn State University, Omar Blaik, justified the university expansion. He describes it as a “natural force resulting from the simple fact” that the university “grows 50 acres every 75 years.”\textsuperscript{10} Along the same lines, Columbia University announced the development Manhattanville\textsuperscript{11}, a 17-acre expansion in Harlem. Harvard undertook an expansion in Allston\textsuperscript{12} with a 589,000-square foot science complex. MIT has recently announced a new plan for Kendall Square\textsuperscript{13}. It is not circumstantial that all these schools plan to expand simultaneously.

\textsuperscript{10} Campbell, “Universities are the New City Planners.”
\textsuperscript{11} Bagli, “Court Upholds Columbia Campus Expansion Plan.”
\textsuperscript{12} Jan, “Harvard slowing Allston expansion, Faust announces.”
\textsuperscript{13} News Office, “MIT moves forward with rezoning petition for Kendall Square.”
It is rather the aftermath of the increasing competition they face and foster that requires a constant rate of growth. This intense growth does not derive only from the need for new space in order to better accommodate new technical equipment or more students, but is also the outcomes of ambition and of the need of each school to maintain and increase its reputation. It can be viewed as a need to manifest its presence and to create an attractive image for both students and the corporate world. Although the cases differ in many ways, the form, the scale, and the intention for expansion, illustrate the increased implications and role of universities within the context of a city.

In the case of Penn State, “safety concerns and high crime-rates” as stated by the university led to revitalization efforts of the surrounding urban area. In the cases of Harvard and MIT, the need to attract private spinoffs and research centres near them promoted development. In the case of Columbia expansion addressed needs for educational facilities and student housing. "Columbia has only a fraction of the space enjoyed by our leading peers across the country," said Lee C. Bollinger, president of the university. Columbia’s expansion plan was sharply criticized by citizen groups and became the focus of a student hunger strike in November 2007 when the

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14 Campbell, "Universities are the New City Planners."
15 News Office, "Novartis announces expansion in Cambridge: New global research headquarters to be built on land leased by MIT."
16 Bagli, "Columbia Wins Fight for West Harlem Campus."
17 SCEG, "How can we stop Columbia’s 7 BILLION dollar plan to bulldoze West Harlem?"
university decided to exercise pressure through the state’s powers by asking to exercise the eminent domain\(^\text{18}\). These examples expose one more aspect regarding physical space and the increased role and impact of universities. By redesigning parts of the city or by expanding (directly with educational facilities or indirectly with business areas for research firms and spin-offs, institutions slowly obtain a direct role in the production of space. Additionally, cities have a keen interest in ensuring the successful completion of university-desired projects. The city’s (and, increasingly, the region’s) economic stability depends on the jobs that are provided around universities and the clusters they promote.

Political influence and planning tools, such as (re)zoning or eminent domain are used to facilitate their expansion plans. Therefore universities become growth machines. Their development plans do not necessarily take into consideration adjacent communities or consider how the new developments may impact them. Moreover, the goals of university-led projects are rather introverting. University-led developments seek to please the academic body and to allure the private investor rather than to respond to the existing community needs and desires. The social externalities generated, as universities become growth machines, are in my opinion direct derivatives of the conditions created internally in the universities and the mandates imposed by the knowledge economy they foster.

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\(^{18}\) Sewell, “Columbia Will Not Seek Eminent Domain to Oust Tenants.”
3.1.4 CRITIQUING THE TECHNOPOLIS

As promising as the concept of the Technopolis may have been for various scholars it has also been equally criticised. “Financial pressures, of course, have always existed. But a series of developments over the last 20 years or so, and a competitive cultural ethos that relies more and more on rankings in many fields of endeavour, including college admissions — are creating new ethical quandaries.”\(^{19}\) Comparable reactions usually refer to a university’s freedom to build autonomously its own curriculum, research undertakings outside the market’s demands and the rise of for-profit colleges. In the Chronicle of Higher Education, Christopher Newfield commenting on the function of universities within the limits imposed by corporate cultures and academic industrial complexes argues that the precarious balance between “the bottom line and the life of the mind,” has been disturbed. Although some colleges have indeed balanced academic concerns with those imposed by the marketplace, others, he argues, “have struck bargains only Faust could love.”\(^{20}\)

While funding is becoming increasingly essential in order to satisfy advanced technological needs and the rising costs of academic research (especially in genetics, medicine, material sciences and the energy sector), the safeguards necessary to mitigate negative or unforeseen influences from sponsors, has called into question the integrity of university research. Additional concerns are also expressed about the defense related research and the secrecy that accompanies it or similarly the lack of access in the research made for corporate world. More importantly, universities in the face of profit potential and driven by profit motives have found strategic means to evade guidelines for best practices. This phenomenon usually occurs among universities that have recently entered knowledge economy networks or that have yet to develop policies that could prevent exploitation. However, best practices and the alleged confidence in the research-industry complex is constantly undermined by evidence exposing the financial pressure that these complexes impose on universities, embedded in the ways in which institutions seek to fund their research projects.

\(^{19}\) Lee, “Academic Industrial Complex.”  
\(^{20}\) Ibid.
Moreover, the increasing price tag associated with intellectual achievement and research, places extreme pressure on institutions to attract qualified faculty and students and to build cutting-edge facilities. This pressure in turn poses institutions a dilemma over academic and marketplace concerns. Hence, the university-industry complex has the potential to compromise the academic standards of research. According to an editorial in the journal Nature (2001), recent publications in biomedical journals reveal that company sponsored research frequently reports results favorable to the company products than the reverse, suggesting a possible or probable bias. Lee cites 2008 survey in The Chronicle of Higher Education reveals that half of the presidents of the 40 largest operating budgets universities sat on corporate boards. In 2006, 52.1 percent of public doctorate-granting institutions had presidents included on corporate boards (up from 47.8 percent in 2001), and 50.9 percent of presidents from private doctorate-granting institutions sat on boards (up from 40.6 five years earlier).21

Prior to the development of the research-industry complex, intellectual property was more likely to be freely exchanged, and knowledge was generated with less bias. Industry sponsored research often requires confidentiality, input by sponsors, sometimes even editorial control. In addition, departments that do not or cannot yield profits — the humanities for instance — are at risk of downsizing. Faculty members of liberal arts are placed at particular risk by the tendency to favor faculty associated with disciplines that present an immediate commercial potential, accordingly these change are depicted in the majors. This is especially unfortunate, as humanistic disciplines, social sciences and liberal arts offer a distinct perspective and critique on scientific processes. According to Hunter Rawlings, former president of Cornell University:

“Humanities disciplines provide serious critique on the influence of science on global culture, enlarge our worldview and act as the keepers and conveyors of culture in a democratic society. Since the time of Socrates, the humanities have been catalysts for social change, providing society with a critical spirit and a mind set upon argument.”

Valentine and Claassen, "'The University-Industrial Complex: A Threat to the Public Funded Institution?'" (2010), pg 37.

Jennifer Washburn22 expresses concerns regarding the actual and potential conflicts of interest. In 1974, when MIT began allowing the use of

21 Ibid.
22 Washburn, "Big Oil Goes to College."
patents on its research, it hired independent, third parties to handle all commercial activities. This was done in an attempt to reduce conflicts of interest and to mitigate profit driven motive. She cautions though that things have changed, noting that “now, instead, all of these universities have set up very expensive patenting and licensing operations on campus and they are trolling the different labs looking for commercially lucrative inventions”.

Despite the criticism, my main question concerns the reproduction of the Technopolis model. The decrease of public funds is one factor that motivates educational institutions to adopt policies that allow them to operate and be attractive to the private sector. The a priori imitation of that type of physical development of educational institutions throughout the world does not have to be considered panacea. Castells and Hall conclude that the factors that influence a cluster development’s success are manifold and many ambitious attempts to create them failed. Geographical location, regional fiscal capacity, and investment attractiveness influence the Technopolis model materialization. In conjunction, different fields of study present unequal flexibility in adapt to such model. Such is the case of the Humanities and the Arts. Lastly, the physical manifestation of these institutions remains rather exogenous, as it needs to comply with a global network or to adhere to a prevailing image-identity regardless of its context.

23 Ibid.
In order to depict physical space benefits and negative externalities of cluster formations I explicitly study MIT's campus and examine its relationship with the city of Cambridge. I chose to focus at MIT for multiple reasons. First, being a student at MIT gave me the opportunity to have a personal experience with its physical space in the everyday life it entails. Second, the university eagerly shared necessary for this thesis research resources and data. Third, as it became evident from preliminary research of multiple campus development cases, MIT has formed variety of policies, adjusted and improved through time, to address the university's desire to promote spin-offs, to attract private real estate investment, and to grow within the city of Cambridge.

MIT is one of the oldest examples in the lineage of the military industrial complex. It is often used as reference and prototype for knowledge-based cluster formations elsewhere in the US and in Europe. MIT has developed sophisticated guidelines to prevent conflicts of interests between the institution and its research sponsors. These are summarized in comparison to other schools by Washburn (2008), as well as the official guidelines of MIT's Intellectual Property Rights office. However, MIT also presents one of the more robust and active systems in creating spin-offs and start-ups, not always subject to the same guidelines and regulations. The MIT Technology Licensing Office (TLO), established in 1945, found means for turning academic research into profit nearly 40 years before the Bayh-Dole act codified the practice. Finally and most importantly MIT has had an immense impact in the economic and physical development of the greater area and hence provides an excellent case of reference and analysis.

3.2.1 MIT'S IMPACT TO THE CITY'S LABOR MARKET

The influence of MIT and its accompanying knowledge-based clusters have implications far exceeding the boundaries of the Institution. This section includes a brief analysis of Cambridge's labor market and intends to identify the implications of that the synergies MIT has fostered
with various private sector entities have for the whole city.

The graphic below illustrates the average monthly employment rates in Cambridge from 2001 to 2009. Evident in that is the recession in the early years of the decade. Between 2001 and 2004 Cambridge lost 13,784 jobs. During the most recent growth period from 2004 to 2008 that preceded the current recession the city gained back 8,953 jobs. In 2009 the City of Cambridge offered a total of 106,405 jobs, which presents a 1.97% decrease from 2008. Overall between 2001 and 2009 Cambridge lost 7,060 jobs, which is a decrease of 6.22%. At the same time the neighboring city of Boston experienced a decrease of 29.2% in total jobs.

Changes in the jobs offered in Cambridge varied among the different industries. Specifically, between 2001 and 2009 the scientific research and development services industry gained 4,871 jobs, the colleges and universities (while followed mildly market cycles) gained 1,117 jobs and the pharmaceutical and medicine-manufacturing industry (although was somewhat affected by market cycles) gained 468 jobs. This reveals the importance of MIT supported industries in the overall economic stability of Cambridge, and their contribution in the lower rate of jobs lost compared with the adjacent city of Boston. Last, between 2001 and 2009, the computer systems design sector lost 2,185 jobs illustrating the shift of the knowledge economy from tech to biotech in Cambridge. The chart below illustrates the average monthly jobs in these industries from 2001 to 2009.
3.2.2 MIT'S URBAN DESIGN POLITICS

MIT's campus physical manifestation illustrates a definite shift in nature from the typical educational campuses associated with purely educational facilities. This shift extends beyond the limits of the educational campus itself and rests partially on MIT's additional real estate properties and adjacent spin-offs. As illustrated in the diagram below these additional properties, often framing the periphery of the campus, are as significant in scale as the educational campus itself. (Diagram of Cambridge/MIT properties, Mass and Lincoln Laboratory and route 128, the campus chronologically with the acquired properties through time.)

As a result of the many additional properties, the physical presence of the institution deviates from that of a traditional university. The real estate acquisitions result in an overstated physical presence that radically alters the definition of the campus' limits and character and results in an overall introvert function and internally focused material organization. Furthermore, additional private firms attracted in the adjacent properties of Kendal Square, Cambridge Center, and Technology Square (partially owned by MIT) exemplify the entrepreneurial character of the expansions. While these expansions result from MIT's research focused system they cannot be classified as extensions of a traditional campus development and they create the cluster economy and physical urban environment that characterizes the institution.

MIT's educational campus physical form and evolution has been investigated at length. In a recent SMArchS thesis (2003) Maria Zafeiriadou traces the growth of the Institution's educational campus and describes it as "an organism that has the ability to change and grow as an independent mechanism" and possesses the "extraordinary ability to accommodate change." Similarly, Jaime Ferrer Fores refers to the qualities of MIT's campus as a "mat-building" a "growing structure of additive elements characterized by a delicate interplay between variations and repetitions of forms." Literature in architecture theory discusses the "mat-building" typologies as realized in large scale institutions such as the Free Berlin or the University of Essex. Nevertheless, I argue that there is a fundamental change in the perception of the physical form when this typology is examined in addendum to the urban

24 Fores, "Mat Urbanism: Growth and Change," 73-82.
25 Ibid.
context and when considering as part of the MIT campus the additional non-
educational buildings owned or related with the institution.

Privately sponsored research-based universities seek a national and
global recognition and reputation that entails networks of a larger trajectory.
Yet, the physical patterns developed when universities seek these global net-
works of knowledge remain cloistered from their immediate physical and so-
cial-context. These system tends to operate autonomously, as an amalgam of
exogenous elements, and manifests its character in the physical space. Hence,
it results in introvert developments that swell and colonize the city.

MIT’s development has not emerged apart from local government
regulations. The City of Cambridge’s zoning districts and regulations, espe-
cially for the area surrounding MIT, reveal the intention for segregation of
uses. The resulting land uses and development patterns create an obvious

MIT spin-off companies

MIT

Campus

Real estate properties

A number of spin-offs
Additionally, the increase in administration is another characteristic of Technopoleis, accordingly the second prevailing space of the institution are the laboratories. When the research laboratories leased by MIT are added to previous ones the overall lab spaces represent the majority of the used space. Assuming that lab spaces have restricted access, the proportion of public to private space differentiates from the conditions of other research institutions that are not part of similar clusters.

MIT's allocation of space
Source: MIT Department of facilities
visual and physical barrier between MIT and the adjacent communities of Cambridge and ascribe clear and assertive boundaries to the Institution. Moreover, despite the Institution’s and its accompanying cluster economy’s benefits to the city’s labor market as presented earlier, the urban development politics associated with MIT’s presence and expansion plans have often become the subject of agony for the city and have generated rigorous debates between the Institute and the city of Cambridge. An open letter from Kenneth Reeves, Cambridge’s City Councilor and former mayor to MIT’s President Susan Hockfield, calls attention to MIT’s real estate undertakings and attitude. In this letter MIT’s managing director of Real Estate is described as someone who “knows the cost of everything and the value of nothing.” MIT’s managing director of real estate is also accused for engineering “the repurchase of Technology Square from the Beacon Companies without ever giving the City Manager or the City Council any forewarning of his actions. [Such] actions undermine the long term financial planning for Cambridge”1. Most recently MIT has embarked on a rezoning petition for Kendal Square that suggests an inclusive process and considerations for achieving placemaking. The rezoning calls among other things for 880,000 square feet of additional commercial space (labs, offices, research facilities)2, 800,000 square feet of academic space, 120,000 square feet of residential space, and a public plaza.3

1 Reeves, “Opinion: MIT Investment Management Company disregards the City of Cambridge.”
2 March, “Rezoning Petition.”
3 News Office, “MIT moves forward with rezoning petition for Kendall Square.”
university and its face to the city

MIT education facilities
MIT real estate holdings
Technopolis surrounding MIT

MIT education facilities: What represented as the MIT campus
Driven by the complexity and controversy over the institute’s urban development politics and its role as “growth machine” the section below explores the synergies in three cases that suggest different types of symbiosis between the three actors involved: the Institute, the private firms, and the city of Cambridge. The first case refers to the development of University Park, one of MIT’s first attempts to create an expansion not associated directly with its educational operations. The second case is Genzyme that illustrates a more recent example added to the cluster development of Kendall One Square. Although the Genzyme headquarters project did not directly involve MIT, it could have not happen without its soft synergies (reputation). The last case is based on the start-up firms and presents information that derived from interviews with representatives of startups in Technology Square.
UNIVERSITY PARK

The University park showcases the frictions created between MIT and the residential community of Cambridge. Is one of the first expansions of MIT with facilities other than educational or student housing. It’s also a very interesting example because it expands in time before the intensification of the high-tech and biotech cluster in the area of Cambridge. The process of the expansion is far more simple than the example of Genzyme. The land is still owned by MIT and Forest City Enterprises holds long leases of the Land. MIT Investment Management Company is also planning a further expansion of University Park at 298–334 Massachusetts Avenue again with Forest City26. The new development will be located in the area just north of Random Hall, with a building use of research labs and possible retail spaces along the block.

The 27-acre property was purchased in small pieces since 1969 and the planning process of the area as it exists today started in 198327. In the site was formerly the Simplex Wire and Cable Company. M.I.T. intended to transform the area into a complex of research facilities with high-technology research and development spaces that would include, a hotel and conference center, few retail stores, and housing. M.I.T. viewed the project as a revitalization of the area that the overall tax revenues would benefit the city. The development was both delayed because of city’s hesitation about the master plan and the lack of housing units but also because of the residents reaction in adjacent areas.

As early as in 1974 residents groups and the Simplex Steering Committee were concerned with evolution of the area. Holding informal neighborhood referendum they were intensively trying to persuade MIT for the future of the of the land, requesting less dense development than the one the university was envisioning. The residents were asking for a development that would not increase traffic and would have a minimum number of 500 housing units. They were expecting at least one third units to be affordable or moderate income population. Their final request concerned was expressed concerning the type of jobs that this development and how inconsistent would be with the existing population.

26 Cunniff, “MIT plans expansion of University Park.”
The development was further delayed after the first phase of 1983 because another wave of reactions was initiated. William S. Noble, one of the few residents on the remaining buildings of the site interviewed by the New York Times for the article published April 12, 1987 called “CAMBRIDGE GROUP TAKES ON M.I.T.” said: “University Park is what we call an M.I.T. entertainment and drinking district, there will be lots of expensive retail shops. Property values are going to continue to skyrocket. It means a lot of people are going to be displaced”. Another statement by Bill Cavellini, member of the residents committee described MIT as “a creature from the deep with eight tentacles that grabs and destroys our houses and jobs.”

The final approval for the master was given in 1988 and the development was implemented in several phases. MIT graduate student dormitory and high rise apartment tower were the latest additions to the plan that constitutes mainly of office and laboratory buildings that are home to several biotech companies. Alterations in the program took place due to market needs of the different phasing like the increase of the initial number of 450 units to 668 rental apartments. The housing is located in the west side of the redevelopment area, transitioning to the established residential areas in Cambridge-port. Despite the ostensible intention to adjust the program, these changes solely derive from the market needs that will facilitate the creation of the knowledge cluster around MIT. “No one goes to University Park that does not live there and the park has been designed to deter its use by the public.”

28 Vaillancourt, Controversy over development of University Park.
29 Cunniff, “MIT plans expansion of University Park.”
30 Forest City Science + Technology Group, Where science meets life in the city. University Park at MIT.
31 Reeves, “Opinion: MIT Investment Management Company disregards the City of Cambridge.”
The PO-box.

There is an extensive literature on spin-offs which it is not proposed to review in this stage. For the purposes of this research, a spin-off company is a company with a link back to the university, in that the founder was a university employee, or the university supported the entrepreneur in establishing the company by providing access to laboratory/ office space, loans/ equity or intellectual property which established a contractual link between the university and the new company. In this definition; firms like the graduate start-ups which start independently of the institution need to be added to include the entire spectrum of activities in the MIT cluster area. Another very important aspect in the study of the spin-off companies in relation with physical space is to consider that a large number of these firms as temporary. A very important number of Spin-offs have a transient role in the invention–innovation process and their goal is to be absorbed into established firms that own additional assets or commercialization.

These transient forms have an equivalent representation in physical space. As it derived from interviews with start-up owners from the Cambridge-MIT area and specifically Technology Square, they seek for a short term visibility in the area. In the premise of the knowledge cluster formation, young professionals that might not have hard synergies with MIT aim to come to the area to be part of its reputational network. Consecutively the presence in the region will make them more competitive and prestigious. Since the reputational network is the most important factor, what is of critical importance is to have a PO box and an address in the cluster. Many of the firms are sheltered in studios and singular rooms that are not necessarily used or equipped for research. Nevertheless are necessary to provide the firms with the address.

In that case MIT, and the proposed Laboratories for the Arts and Environmental Sciences in Eleusina, could play another role in supporting start-up firms. A different kind of symbiosis could develop where these transitional firms not solely harvest knowledge and reputation from the institution. In a programmatic way the institution could incorporate them in the educational process. The example of artists and research affiliates in the ACT Program at MIT has already establish a more vivid collaboration. Last, in terms of the spatial needs a more flexible architectural typology could develop that could benefit both the firms and the institution and their integration.

32 Benneworth, "The role of university spin-off firms in strengthening regional innovation systems in weaker places."
GENZYME

The Genzyme project showcases a different kind of synergy that takes place in the cluster developments. The University is not directly related with the development led by private corporations, real estate developers and the city of Cambridge. Also the specific project illustrates the planning tools used to promote and maintain the research facilities in the area. Moreover, although most of the developments in the research clusters are primarily speculative projects that hope to attract private firms and research centers like the MIT-Science Park and the rest of Kendall 1, the development for the Headquarters of Genzyme is a highly customized building with a secure tenant prior to its development. This example is also very useful for the design proposal that follows in the next chapter because it presents similarities with the site of Eleusina like the condition of the site as a Brownfield and the criteria of the site selection of for equivalent projects like the proximity with the university, urban offerings and transportation hubs.

The Genzyme Center in Cambridge, Massachusetts, is the 356,000 square foot world headquarters of the Genzyme Corporation, a biotechnology and pharmaceutical research and development enterprise. The 12-story building, which was designed explicitly for Genzyme, was completed in November 2003 with a total development cost of $140 million.

Located at 500 Kendall Street, the Genzyme Center is the centerpiece of a 10-acre mixed-use urban development. The project is in the Kendall Square area of Cambridge and is framed by the Massachusetts Institute of Technology (MIT) campus, the Charles River, and the East Cambridge residential neighborhood. Although the area is now known as a high-tech life sciences hub, it was previously an industrial center, and a coal gasification plant once stood at the Genzyme Center site. The plant as later replaced with a parking lot, which was owned by a local utility company. Lyme Properties, a speculative developer of research and lab buildings, purchased the site in the mid-1990s when Kendall Square was just becoming a center for high tech industry. The utility’s decision to sell the property was instigated by a regulatory change that prevented utilities from landbanking. Due to a prior relationship with a principal at Lyme, the utility approached the development company before auctioning the property.

33 Lyme Properties, Kendall Square Design Competition Brief.
Despite the fact that the site was a brownfield and would require a significant upfront investment for cleanup, the parcel was desirable because of its proximity to MIT as it was explained in the previous chapters, and the Kendall MBTA station. It was also one of the last large developable parcels in the Kendall Square area. At the time Lyme purchased the Kendall Square property, the firm was one of New England’s leading developers of biotech labs, owning and managing approximately 500,000 square feet of labs in the Cambridge area alone. Although initially the developer thought that the market for the site might lie in computer-related industries, the target market changed to life sciences companies due to the growing cluster in the Kendall Square area.

The Genzyme Center site is located in one of Cambridge’s Planned Unit Development (PUD) districts, specifically PUD-3. A PUD is a means of land regulation that promotes large-scale, unified land development, often with a mixture of compatible land uses. The Cambridge zoning bylaw states that “PUD districts and uses are intended to provide greater opportunity for the construction of quality developments on large tracts of land by providing flexible guidelines which allow the integration of a variety of land uses and densities in one development.” Specifically, Cambridge states that the PUD-3 district is “intended to provide for the creation of a high quality general and technical office environment which permits large scale development and supporting commercial activities and encourages strong linkages between the new development at Kendall Square and along the East Cambridge waterfront.” To meet this overall objective for the district, the city has laid out density, dimensional, and use restrictions, which provide a framework for the development of the parcel purchased by Lyme.

In 1998, Lyme hired Urban Strategies of Toronto to conduct the site’s master planning. A guiding planning goal was to relate the site to its surroundings, creating a design that would help absorb the site into the larger urban fabric. This was difficult given that the site’s former uses created “a challenging legacy of neighbouring buildings that turn their backs to the site.” The planning process involved an extended dialogue with the city planning board,

34 City of Cambridge, “Cambridge Zoning Bylaw section 12.10.”
35 City of Cambridge, “Cambridge Zoning Bylaw, section 13.40.”
36 Lyme Properties, Kendall Square Design Competition Brief.
37 Behnisch, Behnisch & Partner, Genzyme Center.
city and state agencies, elected officials, special interest groups, and neighbours. Public workshops were held to address stakeholder concerns. The developer and planners knew that in order to develop the area as an innovation cluster, they had to offer a high-quality urban environment to enable companies to attract and retain the specific population.\(^3\) The final master plan for the site featured a 1.3 million square foot urban mixed-use program.

While Lyme was in the process of crafting their development project, Genzyme was planning to build its world headquarters and had settled on a site in Boston. However, the company had a pre-existing relationship with Lyme, as it had been a tenant in Lyme's One Kendall Square project nearby in the 1980s while still a start-up company. Lyme convinced Genzyme's leadership that the Kendall Square location would be a better option for a host of reasons, including ease of planning and permitting approvals and proximity to MIT. Initially Genzyme wanted to purchase the land at 500 Kendall Street, but Lyme convinced the company to enter into a long-term lease instead. While Genzyme was already an established company, and could have afforded to own its headquarters, the company was still growing. Rather than laboratory or research space, Genzyme needed a corporate headquarters and was attracted to the level of amenities called for in Lyme's master plan. They required space to house over 900 employees and showcase their corporate ethos.\(^3\) This lead to a design competition where Behnisch, Behnisch & Partners won the first prize.

\(^3\) Ibid.

\(^3\) MT C Green Building Case Studies, *Genzyme Center, Headquarters for Genzyme Corporation: Shedding New Light on Sustainable Building Strategies.*
RE-IMAGINING THE KNOWLEDGE FACTORY IN ELEUSINA

LABORATORIES FOR THE ARTS AND ENVIRONMENTAL SCIENCES

4.1 DISCOVERING THE CITY OF ELEUSINA

4.2 URBAN DESIGN STRATEGIES

4.3 PROGRAMMATIC DECISIONS - THE LABs

- EarthLAB - Laboratories for Environmental Sciences and Earth Engineering
- InLAB - Laboratory for Industrial Engineering and Logistics
- CityLAB - Laboratory for Architecture and Planning
- LabART - Laboratory for the Arts

4.4 ARCHITECTURAL STRATEGIES

Last the fourth chapter called “Laboratories for Arts and Environmental Sciences in Eleusina” constitutes the proposal for an alternative educational institution in Western Attica, Greece. This chapter seeks to discover the city of Eleusina in Greece and to describe the programmatic and physical decisions, informed by the previous research presented in chapters 2 and 3, and by the specific locality. This proposal recognizes the benefits and synergies associated with the knowledge-based economy, and it suggests a different manifestation of the economic, cultural, and dynamics associated with it. The restructuring of the Greek University, already an ongoing process, gives the opportunity to re-imagine education in its contemporary context. The design proposal suggests transforming the proposed Institution, Academy for the Arts, to a new Laboratory for the Arts and Environmental Sciences in the town of Eleusina. Today the image of the town has radically changed from a thriving industrial centre to an industrial wasteland of ruined factories and rusting machinery. This transformation coincides with the recent economic crisis that has created the current wave of unemployment. My intention is to respond to the challenges that the new context of higher education present for Greece and explore the definition of educational institutions in this specific locality.
“The punk underground grew out of the ruins of the suburban factories and now we experience a so-called creative economy parasiting the underground itself: it is time to imagine the factory of culture getting organized within the ruins of value that the ‘creative cities’ are ready to leave behind.”

Matteo Pasquinelli, Berlin, December 2008, Beyond the Ruins of the Creative City: Berlin’s Factory of Culture and the Sabotage of Rent
The Laboratories for Arts and Environmental Sciences is a project of higher educational facilities, providing both education and research, in science and arts. The regional scale of the project, both in terms of its spatial manifestation and its educational orientation; resembles more a network of educational facilities seen as comprehensive plan for the area rather than a traditional centralized campus. The intention of this architectural proposal of fragments is to oppose the traditional segregation of university campuses and the city, and to challenge the validation of the university as a symbol of institutional power. The main purpose is to create an integrated system of relations, flows of information-knowledge and everyday life activities. This new formation aims to a system that is intertwined to the social,
Fragment: dismantling centralized institutional power
economic and cultural fabric of the community and the region and not to remain cloistered from it. The adaptation to the EU higher educational reform forces the synergy of educational institutions with private corporations in research and production of knowledge. Realizing that education is becoming a new kind of industry, in my opinion this aspect should not be standardized but progress further by taking advantage of these systemic changes and have the flexibility to adjust in the existing locus. The proposal is situated in Western Attica at the city of Eleusina, the main industrial hub of Athens that was devastated by the Greek economic crisis. Nevertheless there is still an important number of small active traditional industries, typical of the Greek economy, as well as a few global actors related with Earth engineering and material sciences that have recently initiated research activities in the area and finally a thriving artist’s community that found affordable shelter near Athens.

An interchange with the historical palimpsest and cultural heritage, ancient and recent, but also with the existing industries and the increased mobility of the population in Athens could result to a positive outcome and economic recovery for the future of the city.
4 RE-IMAGINING THE KNOWLEDGE FACTORY IN ELEUSINA

4.1 DISCOVERING THE CITY OF ELEUSINA

"THERE ARE HOLY THINGS THAT ARE NOT COMMUNICATED ALL AT ONCE: ELEUSIS ALWAYS KEEPS SOMETHING BACK TO SHOW THOSE WHO COME AGAIN."

Seneca _Quaestiones Naturalis VII, 30:6

«Η Ελευσίνα κρατάει πάντα κάτι κρυφό γι' αυτούς που θα την επισκεφθούν ξάνα» _ΣΕΝΕΚΑΣ

20 kilometres west of Athens, the city of Eleusina is located in a key geographical point, to the most important granary of Attica, Triassic Pedio (Triassic plain). Its harbour is a closed gulf, it constitutes an exit of marine communication and a node of transit trade. Eleusina remains until now the point from where all the main road arteries connect Attica to the rest of Greece.1

A small industrial town, Eleusina can be read as a palimpsest text, where the historical memory in a society that has changed beyond any recognition still exists beneath the repeated layers of writing, a memory that keeps evolving through the actual space but at the same time through the invisible narratives of the location. There is a unique variety of layers created through the centuries that are evident in the urban text of Eleusis, meeting point between the ancient years the immigrants influx of the 1920’s and the abrupt industrialization of the 1960’s2.

The plain of Thriassio is part of the west periphery of the region of Attica and it contains the municipalities of Eleusina, Aspropyrgos, Mandra and the community of Magoula. The population of the whole area is estimated up to 80,000 citizens and its area is covered by a large concentration of manufacturing uses and logistics.3

1 Σταματάδης, «ΠΟΛΕΟΔΟΜΙΚΗ ΟΡΓΑΝΩΣΗ ΘΡΙΑΣΙΟΥ ΠΕΔΙΟΥ».
2 Wasson, Hofmann, and Ruck, _Ο δρόμος για την Ελευσίνα_.
3 Πολύζος, Μαντουβάλου, and Τροβά, _Πολεοδομική Αναθάξιμη Ελευσίνας_.

62
Municipal border of Attica, Thrassion pedio (pink), Eleusian (red), and center of Athens (dark grey)

Topographic analysis and transportation infrastructure of Attica
Since the late 18th century, the history of the west part of Attica is intertwined with the development of the industrial section. In the plain of Thriassio are located some of the most contemporary industrial units of the country. The city of Eleusina is the centre of the Thriassio plain. It concentrates the majority of the industrial sites, of the population and crucial administrative services and in its administrative boarders also includes the military airport. The port of Eleusina is one of the oldest ports of Europe, dated back to 500 BC and remains solely commercial. One of the most important archaeological sites of Greece exists few meters away from the sea surrounded by factories and industrial infrastructure. In terms of transport networks, there are two national roads, the Attica road, the suburban railway and the old abandoned rail tracks.

It is located in a crucial point that connects the capital its peripheries and the region of Peloponissos. The national road that connects Athens with the city of Korinthos, as well as the railroad tracks that connects Athens and the city of Patras, come through Eleusina. It is the administrative centre of west Attica while a commercial harbor and a military airport is situated within the boundaries of the city. It is surrounded by the municipalities of Mandra, Aspropurgos and the small community of Magoula, all areas also with heavy industrial activity that are dependant in terms of urban and administrative development from the city of Eleusina. Despite the fact that Eleusina consists only of the 5% of the whole surface of the Thriassio plain, it has always been its pivot point. Apart from the industrial activities it is the host of the largest part of the population and the most expanded housing network. Despite the
city form
1. natural topography
2. industry
3. transportation infrastructure
4. urban grids
5. military airport
6. archaeological sites
7. abandoned quarries
economic decline of the area the population and housing development in the
city has been increasing constantly over the past years, attracting popula-
tion from Athens. Artist communities the last decade start moving from the
slowly gentrified center of Athens to the city of Eleusina. The community have
created a vibrant role in the area, supporting a performing Arts festival “Ae-
schylian”, and multiple ephemeral events in the city.

Eleusina holds an important role in the metropolitan area of the
Thriasio plain. It is the centre of administrative services, commercial uses
and houses the biggest part of the population. What is more an important
number of industries is also located within its boundaries. It is overall esti-
mented that 3,200 companies of smaller and bigger scale are functioning in
west Attica. In the municipalities of Eleusina, Aspropyrgos, Mandra and the
community of Magoula it is concentrated the 66% of the human resources
that are occupied in the secondary sector. The data shows that 2,200 working
facilities are located in the area. What is more in Thriassio plain a number of
heavy industries are in function: 2 oil refineries, 2 steel industries, 2 cement
industries and 1 ammunition industry. There are also facilities for storage and
handling of oil products, 3 units of regeneration, many chemical industries,
plastic industries, rubber, quarries and several smaller units. This activity cre-
ates a significant number of working positions not only to the citizens of the
area but for the broader area of Attica.

Art project: Abandond color factory “Iris”

7 Πολύζος, Μαντουβάλου, and Τροβά, Πολεοδομική Αναβάθμιση Ελευσίνας.
8 Δημοτική Αρχή του Δήμου Ελευσίνας, Ελευσίνα: Βιομηχανικές Αναμνήσεις.
1991
2001
active population 7484 9872
inactive population 882 1558
Population change

<table>
<thead>
<tr>
<th></th>
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<tr>
<td>agricultural land</td>
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<td>roads and housing</td>
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<tr>
<td>lakes-rivers</td>
<td>4000</td>
<td>4500</td>
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</table>

Land use distribution in 2001

Population change

Industrial patterns
- Growth
- Change
- Decline
Land uses in the city of Eleusina were often contradicting and unregulated since the review of the general urban plan in 2005. Because of the number of illegal settlements in the area it is almost impossible to follow the guidelines of the recently proposed urban plan. The expanded concentration of illegal settlements is mainly due to the poor economical status of the area. The three main road arteries that connect the area with the capital present a transversal flow that degrades the urban fabric and segregates the city. These three roads serve, apart from the inner city circulation, the transport between different municipalities and they are roads that often used from heavy vehicles for the transportation of goods. They divide the city of Eleusina in four independent urban sections. The connections amongst these parts are in rather poor condition and they could be easily characterized as malfunctioning, causing problematic issues in the overall development of the city.

The absence of a clear housing policy in the area has caused an unbalanced distribution of the residential developments. The city of Eleusina is located amongst two industrial areas and an inactive quarry, instead of growing, as it would be expected along the coast; it holds a linear expansion, perpendicularly to the coastline. In spite of the of multiple urban design proposal - superimposed grid systems that were implemented in the area, the poor economic state of its population often leads them to different dwelling solutions such as illegal settlements. Even since this day the sole open space of the coastline is situated between the industrial establishments of “Halivourgiki” and “TITAN”. Nevertheless the city has to offer examples of great industrial architecture. Eleusina has been an industrial city the last two centuries; with the first industries appearing in the area before 1900. Some of the inactive industries could be considered as monuments of the modern industrial history of Greece.

<table>
<thead>
<tr>
<th>Land Uses (2005)</th>
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</thead>
<tbody>
<tr>
<td>Commercial</td>
</tr>
<tr>
<td>Residential</td>
</tr>
<tr>
<td>Open Space</td>
</tr>
<tr>
<td>Industrial (abandoned)</td>
</tr>
<tr>
<td>Industrial (active)</td>
</tr>
</tbody>
</table>

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9 Πολύζος, Μαντουβάλου, and Τροβά, Πολεοδομική Αναβάθμιση Ελευσίνας.
10 Δημοτική Αρχή του Δήμου Ελευσίνας, Ελευσίνα: Βιομηχανικές Αναμνήσεις.
11 Ibid.
'TITAN', the cement industry-former owner of the abandoned quarries.

Views of the coastline.
The coastline of the city it was until recently considered as a degraded area instead of an area of potential appropriation. Eleusina keeps expanding vertically, leaving the coastline to degrade, a phenomenon that is rather often encountered in the modern history of the Greek cities. The coastline is occupied by extended industrial establishments that are either still active or they are abandoned and an obsolete quarry extensive in scale. In the city of Eleusis the coastline is a factor of degradation for the city. It should also be noted that is really hard to approach the sea, from the 16,5 kilometers of the length of the coast only 30 meters are open to the public. The coast is one of the most industrialized and environmentally polluted areas of the whole country. The sustainable development of the city is undermined by the heavy pollution, the activities of the industries and of the port as well as by the absence of agencies in Greece that could support initiatives for the remediation of the area and the technological advancement of the industrial production.

12 Πολύζος, Μαντουβάλου, and Τροβά, Πολεοδομική Αναβάθμιση Ελευσίνας.
**the waterfront**

The coastline of the city it was until recently considered as a degraded area instead of an area of potential appropriation. [...] from the 16.5 kilometers of the length of the coast only 30 meters were open to the public until 2005 and today only 200 meters.
4 RE-IMAGINING THE KNOWLEDGE FACTORY IN ELEUSINA
areas of intervention

Abandoned quarries and existing train station
The quarries owned now by the state, were formerly owned by "TITAN" - cement factory. Nevertheless the corporation is still responsible for the remediation process.

"TITAN" a multi-regional producer of cement.

"ΠΥΡΚΑΙ" factory for military shells. Founded in 1925.
Distillery "Ε. Χαρόλαος" and "Βότρυς" founded in 1898.

Color Factory "Ιπξζ" obsolete since 1985. The Public Housing Authority has initiated a program of 105 units, nevertheless the conditions of the site have delayed the process.
4.2 URBAN DESIGN STRATEGIES

"With ruins a city springs free of its plans into something as intricate as life, something that can be explored but perhaps not mapped. This is the same transmutation spoken of in fairy tales when statues and toys and animals become human, though they come to life and with ruin a city comes to death, but a generative death like the corpse that feeds flower."

Rebecca Solnit, A Field Guide to Getting Lost

The university is not a centralized campus but more a connective thread between the different urban formations of the city. Multiple strategies have been used to react to each condition, considering their spatial and social features, to them eventually under a network of pedestrian flows, movements and educational facilities.

1. Reclaiming and reusing the abandoned industrial spaces
2. A remediation process that transforms the abandoned quarries to an urban green space and gradually infiltrates the city.
3. Extending the city grids and open the city to the sea.
There is a major decisive element that gives form to the proposal. It is the act of reclaiming and reusing the abandoned industrial spaces, through different yet closely connected design decisions. These ambiguous spaces are seen in this project in terms of spatial features as a landscape intervention in conjunction with a remediation process that expands from the old quarry area and enters the city. Additionally, these spaces are reused and reclaimed as a part of the new development and finally in a secondary reading these monuments and ruins of the industrialization of Greece function as signifiers of the industrial past and the new knowledge sector.

Taking as a pivot point the abandoned quarries, an intense remediation process is implied to transform the polluted site to an urban green space through time with. The proposal expands from there, penetrating the city as a connective thread amongst the different borders. Gradually, the green spaces infiltrate the city.

The extension of the urban fabric to the coast line and its interaction with the public green space that slowly penetrates the city creates an intersection where the majority of the socio civic amenities are clustered. This concentration of the public facilities, like the main library and auditorium, are connected with main square of the city through the paths that lead from Eleusina's civic to the coast line.
The labs could never been perceived as a one designated area of educational facilities but they can only be discovered through the flows of the city. All distances are walkable, nevertheless the rail line that previously divided the city, is used by adding two stops as a connecting element between the facilities.
4 RE-IMAGINING THE KNOWLEDGE FACTORY IN ELEUSINA

4.3 PROGRAMATIC DECISIONS

THE LABS

The capacity of the Labs will be approximately 3000 students that will enter directly from the Greek national exam system that allocate students to universities around the country accordingly to their priority and their academic performance. The university will also have the capacity to create and accommodate programs for continuing education based on European funding (via State or European Social Funds (ESF) that aim to give opportunity for further education.

The school is divided in four laboratories. The Laboratories for Environmental Sciences and Earth Engineering (Earth LAB), the Laboratory for Architecture and Planning (CityLAB), the Laboratory for the Arts (Fine and Applied Arts) (LabART) and last the Laboratory of Industrial engineering and logistics (Industry LAB). It is envisioned to build regional capacities which will revitalize old ‘locked-in’ knowledge of the numerous related industries that are declining but also rely on the region’s unique skills base. Last create the conditions where science and arts coexist and interact. Reverse the results created by the knowledge economy sector that has the tendency to favor other disciplines; that present an immediate commercial potential.
The Laboratories for Environmental sciences and Earth engineering (EarthLab) further divided in three areas of concentration: Environmental sciences group, Geo-engineering Group and Material Science Group. The Lab seeks to expand knowledge of the physical, chemical, biological and human components of the Earth System, through research, student training and service to the community by initiating field research activities and remediation of the coastline and abandoned quarry. The area provides the opportunity for field research and in situ implementation of the extracted knowledge. The program of the Lab seeks not to overlap and compete with the National Technical University of Athens, the largest educational Institution in the Attica that is mainly oriented towards Information Technologies and Electrical Engineering, but in contrast to respond to its lack of knowledge activities related with Environmental Sciences. The EarthLAB also aims to a close collaboration with “TITAN” an independent multi-regional producer of cement, headquartered in Eleusina, one of the very few global actors in the area. It has an expanded production and distribution operations into 13 countries, directly employing more than 5,903 people with a newly established research and development program of quarry rehabilitation and sustainable geo-engineering.

The EarthLAB facilities are primarily located in the western part of the development in proximity with the inactive quarry, with a small number of research facilities located inside the quarry. The specific Lab is considered to have the greater impact to the knowledge economy sector of the region. It is envisioned to build regional capacities which will revitalize old ‘locked-in’ knowledge of the numerous related industries that are declining but also rely on the region’s unique skills base. The laboratory will provide space, available within its facilities for startups firms as well as in incubators. As it derived from the MIT analysis and the example of Technology Square, the university will protect the transitional firms and try to keep them within its facilities. On the one hand university will provide what could be considered as ‘reputational network’ and hard resources but on the other hand could also benefit with active participation of these firms in the research process. Undeveloped parcels have been incorporated in urban design scheme in the north side of the abandoned quarries. These sites could be used for future development. This land could allow the possibility of hosting projects like the Genzyme in Kendall, as they are in close proximity with majority of the labs, close to the train stop and the urban amenities and qualities of Eleusina’s city center.
InLAB - Laboratory for Industrial Engineering, Management and Logistics

The industry is divided in three groups: Industrial Engineering, Management and Logistics. It has a similar operational system as the EarthLAB, knowledge and research on the advancement of industrial engineering and management. It is also expected to provide protection for startup firms and have a consulting role for the large number of logistic areas that have been established in Thriasio plain after the completion the transportation infrastructure in 2004 ("Attica Odos" was part of the Olympic games plan). The patterns of industrial growth and decline in the region show that in addition to newly founded logistic areas a large percentage of the old industries is transitioning from industries related with materials and metals to logistic infrastructure. This change is more evident in the periphery of the city and in the rest of Thriasio Pedio.

CityLAB - Laboratories for Architecture and Planning

The CityLAB smaller in scale than the EarthLAB, is divided in two different disciple concentrations: Architecture Group and Planning Group with further specializations*. The school is located in the border of the city and the old industrial site and diffused with smaller labs in other that infiltrate the city. The aim of the school is to bring together planning and architecture and intensify their collaboration. In Greece planning is perceived only as economic planning and architecture as a discipline has been highly disregarded from the production of space. The informal solutions like illegal settlements and a homogenous type of building “poly-katoikia” have dominated the urban environment. Nevertheless recent legislative changes concerning urban development have created a new opportunity for these disciplines to have an active role in the formation of the Greek cities. The aim is to educate students who will develop ideas and views on architecture, understand in depth the social conditions in which they are going to work and master the essential technical knowledge and sensitivity to cope with the development of architectural ideas. Studies are combined with research which is held primarily in the School’s laboratories and studios. Experimental ideas are tested through applied research, thus establishing links between social needs and demands and the educational process.
Under the context of the Bologna implementation the government announced the founding of the Academy for the Arts, a project that was initially conceived in 2006 but cancelled two years later due to the disagreements between the actors involved to reach a consensus for the basic framework, place and program for the Academy*. The proposed program expressed the need of Greece to obey the Bologna declaration that forced the criterion of a common framework of readable and comparable degrees with rest of Europeans Universities. Art education in Greece has never been part of the higher education and has an idiomatic separation from the rest of the educational system. The aim was to dismantle the term academy and replace it with the idea of labs that trigger participation in artistic research, and provide opportunities for collaborative process between the academic body, the artist communities and the social fabric¹. The goal is to blur the boundaries between applied and liberal arts and reverse the results created of the creative-knowledge economy sector that has the tendency to favor other disciplines.

The ArtLAB is not solely concerned with the process of learning but also seeks to trigger cultural production. An art education that is not static but interacts with socio-civic environment but also with the knowledge activities of the rest of the LABs. The intention is to create the conditions of coexistence that could challenge and redefine artistic practices and provide a different perspective and critique in scientific processes². The LAB also seeks to reinforce the artists’ communities in the area, by providing artists spaces and open non degree programs, lectures and facilities. Last the LAB intends to enhance the dynamic of Aeschylean festival that takes place in the abandoned factories south to the archaeological site. The majority of the facilities is located in the eastern part of the proposed intervention, next to the site of the festival and along with the proposed pedestrian street that surrounds the archaeological site. Part of the facilities are ephemeral, flexible structures that infiltrate the abandoned factories and part of them are some new added buildings that define the primary paths.

¹ ElDahab, Vidokle, and Waldvogel, Notes for an art school.
² Van Gelder, “Allan Sekula.”
This diagram is based on a diagram made in 1960 for Leeds University by Chamberlin, Powell and Bon that represented the University Leeds development plan. The new interpretation of the diagram shows the relationship between the different labs and between the groups. The circle of the different discipline groups shows their relationship between the different labs and the columns outside the circle show the relationship within the same labs. The interaction between the groups are defined as exchange of students between the groups, number of courses that overlap and last faculty members and researchers that operate in more than one group. The purpose of the diagram is to show and envision an interdisciplinary context of knowledge creation. Finally the intention of the urban design proposal is to materialize the connective threads between the labs and discipline groups.
The intention is to create the conditions of co-existence that could challenge and redefine artistic practices and provide a different perspective and critique in scientific processes.

programmatic decisions

LABart
EarthLAB
cityLAB
inLAB

hybrid knowledge

LabART
EarthLAB
cityLAB
inLAB

educational facilities
socio-civic amenities
housing
support

Publicly supported private spin-offs and labs
educational facilities
support
socio-civic amenities
support
housing
Aeschylian festival
Public Academic Facilities
Publically supported private spin-offs and labs
Preserved existing industries ('TITAN' and its research program) and future homes of private research and development facilities

1. EarthLAB
2. CityLAB
3. LABArt
4. Socio-civic Amenities
PROPOSAL view from the north

EXISTING CONDITIONS view from the north
The LabArt is further investigated in a smaller scale of the architectural interventions. The specific Lab is chosen because it showcases a variety of different spaces, programs and characteristics. Its proximity to two radically different areas the archeological sites and the industries, operating or abandoned presents the first challenge. A third area collides with the previous two, the remediation process as a green urban space. The intention was to bridge those areas and transition from one to another either through soft landscape interventions, mobile structures or new buildings. The natural slope of the archaeological hill is restore from the previous industrial activities and a new additional entrance to the site is proposed. The infrastructure of the Lab resembles fragments of facilities that define the proposed paths and flows that open the city and the archaeological site to the sea.

Another main challenge was to dismantle the notion of Art Academy that the Greek government proposed in 2006 and replace it with the idea of labs. The new facilities aim to resemble laboratories that trigger participation in artistic research, and provide opportunities for collaborative process between the academic body, the artist communities and the social fabric. To achieve this goal multiple architectural strategies and typologies were used.
4 RE-IMAGINING THE KNOWLEDGE FACTORY IN ELEUSINA

4.4 ARCHITECTURAL STRATEGIES

existing industrial ruins as monuments signifiers

landscape interventions

Publicly supported private spin-offs of the Industrial Design Group

new structures: public educational facilities for the LabArt (Industrial Design Group)

reusing the industrial tanks: permanent additions as socio-civic amenities

art space incubator: ephemeral - mobile devices
Research universities which are being part of knowledge clusters present an increased portion of private spaces versus public. That shift isolates the university from its context and compromises the open and public character that education could manifest. My intention through the proposal is to investigate the fundamental relationship between those two conditions and try to reverse them.
4.4 ARCHITECTURAL STRATEGIES

new structures: public educational facilities for the LabArt (Industrial Design Group)
Publically supported private spin-offs of the Industrial Design Group

NEW LabART BUILDING view from the south

SOUTH FACADE
There is a major decisive element that forms the proposal; the act of reclaiming and reusing the abandoned industrial spaces. The landscape permeates the site and the major industrial building of the old distilleries is transformed to the main library.
4.4 ARCHITECTURAL STRATEGIES

Public educational facilities for the LabArt (Industrial Design Group)

Publicly supported private spin-offs of the Industrial Design Group

1. Imitating
2. Juxtaposing
3. Merging and transforming
4. Blending the above
Publicly supported private spin-offs and labs

mezzanine as an extension of the ground floor

offices, mediatechs and computer clusters

classroom - auditorium

adjustable classrooms

Possibility to add or subtract from the building. Accessible directly from the street.

SECTION A-A
“An urban ruin is a place that has fallen outside the economic life of the city, and it is in some way an ideal home for the art that also falls outside the ordinary production and consumption of the city.”

Rebecca Solnit, A Field Guide to Getting Lost

flexible and movable structures that infiltrate the abandoned factories.
"Since the 'creative destruction' of value characteristic of stock markets has become the political condition of current times, a redefinition of the cultural commons is needed too."


The recent financial crisis in Greece has created conditions in which the state of emergency defines sovereignty itself. Nevertheless, by seeking to trade on values of authenticity, locality, culture, collective memories, opens space for political thought, and potentially actions within which alternatives can be both formulated and achieved. The conflicting reality between over-identification and complete homogeneity might be one side of the reality. However, creative responses can aim to destruct the accumulated and concentrated value by exploiting the common domains of culture, of knowledge, and of symbolic capital. I argue that this open space created requires intense scrutiny and refinement; it requires the exploration of a certain type of cultural autonomy and the reinforcement of cultural creativity. Universities as cultural institution are taking part in this dynamic process. Educational institutions could provide the platform for redefining and negotiating the cultural commons. Operating in multiple geographies, universities are part of the global networks of knowledge. They are also significant nodes of the knowledge system and its global-local dialectic. The manifestation of these systems in urban space makes universities ideal places for this exploration.

Test-field is the city of Eleusina in Greece; one of the most devastated areas in the country both by the recent crisis and by its industrial past. On the other hand the city's unique superimposition of layers created through the centuries-evident in the urban text of Eleusina-in addition with the current uncertainty, are used as the pivot for the proposal of an alternative educational institution. The solution is a site-specific project and it does not intend for its re-production or for any kind of generalizations. Nevertheless the way of approaching education in its current context seeks to question universities' usual practices in the urban space.
Publically supported private spin-offs of the Industrial Design Group

archaeological site

public educational facilities for the LABArt (Industrial Design Group)

industrial chimneys kept as landmarks

operating industries
There is a rich precedence of projects, realized or not, that envisioned education as response to devastated post industrial areas. In those cases universities and educational facilities were a retroactive response to a declining economy. Usually their goals were manifold and expanded for creating a socio-civic incubator and an education hub. They aimed to provide technological resources and research facilities that would create links with the existing problematic sectors and help them modernize their operation and also operate as major industries for their areas. Also these universities hoped to reinforce the sense of community especially in the case of Sophia Antipolis\(^1\) were the already developed cluster and research center did not provide the desired physical and social conditions. These examples have been useful as a starting point in addition to the research in the previous chapters and especially Potteries Thinkbelt of Centric Price a great source of inspiration.

**NEWCASTLE UNIVERSITY, the North East of England**

The university of New Castle followed the development of the new industries and during the decline played a pivotal role in the economic recovery. The North East of England industrialized from the late 18th century, characterized by many small manufacturers unable and unwilling to invest in new production methods\(^2\). These conditions lead to a gradual economic decline from 1900, but demand for coal, steel and shipbuilding in two world wars and the following reconstruction efforts masked the emergence of deep-seated structural economic problems. The government responded during the 1940s to 1960s by nationalizing these industries intending to modernize them, but a wider national economic crisis in the 1970s left the government committed to austerity, rationalization and downsizing, undermining attempts to invest and modernize these sectors\(^3\). The Newcastle University was formally created in 1963 although as an institution had its roots in smaller colleges of the area\(^4\). Newcastle maintained industrial contacts throughout this period and become regionally engaged\(^5\).

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1 Hinoul, “Creating the Dynamic Technology Region.”
3 Benneworth and Hospers, “The new economic geography of old industrial regions.”
4 Benneworth, “The role of university spin-off firms in strengthening regional innovation systems in weaker places.”
5 Benneworth and Hospers, “The new economic geography of old industrial regions.”
POTTERIES THINK BELT

Rooted in the socialist ideologies of the Welfare State, the architecture of the Potteries Thinkbelt suggested a visionary models for housing, education, industry and architecture of the post-imperial, post industrial England. The project indented the transformation of massive wasteland of Britain's till then thriving industrial core into a 100 square miles of educational facilities. The potteries Thinkebelt challenged the institutionalized educational system and aimed to provide infrastructure that British unemployed workers of the region could learn and practice technology and science. The targeted population was at this time avoided by the English universities.

The prime weakness of the advanced educational system in Britain is the lack of awareness of both the correct scale at which such education should occur. Institutions today are too small and too exclusive. Because advanced educations is not regarded as a major industry, it is in danger of failing to achieve both a recognizable social relevance and a capacity to initiate progress than an attempt to catch up with it. Further education and re-education must be vied as a major industrial undertaking and not a service run by gentlemen for the few. Its resultant quality must stimulate its further use and not, as at present merely enable statisticians to predict future demand under present conditions.

Rattenbury and Hardingham, “Cedric Price,” p. 37

The Potteries think belt was conceived as an infrastructural network that will break down the isolation associated with education. The Architectural elements were movable adaptable structures that responded to the constantly evolving nature of knowledge.

6 Mathews, From Agit-prop to Free Space, 195-207.
7 Rattenbury and Hardingham, “Cedric Price.” 42
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