e-Planning and Computing at MIT

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First of all let me say that I am quite pleased to join the group today. It reminds me of the good experiences that I have had with Pedro in Portugal during previous e-Planning meetings, as well as during Pedro's time at MIT, when the world was still sort of disavowing the relevance of digital technology to daily lives and the way we plan cities and shape their future.

Today, it is easier to see the impact of digital technologies on everyday life and their relevance (for better or worse) to many of the issues we face while trying to shape a better world.

Let me begin by saying a bit about prior e-planning history, back when Pedro was at MIT, that lead to our MIT Initiative.

Originally (back in the 1980s) we had a research group we called Planning Support Systems (PSS) and subsequently Urban Information Systems (UIS). The original motivation was making use of early geographic information systems that could systematically encode location and display digital maps.

These technologies were just becoming possible on desktop machines and they enabled spatial juxtaposition and proximity calculations that are so important for understanding cities and urban planning. Gradually, more and more data has become location-tagged, and the tools have improved and migrated to laptops and smartphones.

In the nineties and even the turn of the century, a lot of the motivation for urban planners to use digital technology was to document, visualize, and analyze local settings to assess resource needs, environmental impacts, and development strategies.

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Location-based services have now become big business with so many applications and widespread adaption that their potential for privacy and surveillance misuse has heightened public concern. Indeed, the growth of digital mapping and location-based services has accompanied a broader explosion in the use of digital technology that has raised many new concerns about socially responsible computing and who controls the vast and growing repositories of digital traces and urban sensing.

The opportunities – and concerns - have spawned new fields of study such as computational social sciences and ethical computing. As AI and machine learning have gotten better in areas such as object recognition, predicting buying habits, and assisting in medical diagnoses, their limitations have also come into question. For example, gender and racial biases have been demonstrated in facial recognition algorithms, and the proliferation of fake news and misinformation on social media has prompted calls for increased regulation of technology platforms.

As the wider social implications of computing have become more apparent, it has become easier to explain how e-Planning is more than the automation of maps and building permits.

For example, digital technologies make it much easier to control access to physical spaces on a personalized basis. Depending on how these controls are used, the meaning of 'public space' and the right to protest in the streets can be significantly altered.

New digital divides can also surface in ways that exacerbate social inequity. Back then, e-Planning folks recognized that computing was disrupting so much of every day society that we might not want to just leave it to the computer scientists and large technology companies, and assume that everything will turn out well.

But, for this audience, you are aware of this background regarding e-Planning so I won't say more about that and will instead focus a bit on what is happening with computing at MIT.

As was mentioned before, I am a Professor in the Urban Studies and Planning Department at MIT and Head of our Urban Information Systems Group. I have been at MIT "forever" as I studied engineering there as an undergraduate in the 60s and never left. In graduate school, I became interested in management science at a time when its application to public policy was new and I gradually moved into applied math in the public sector with a particular focus on urban planning. So, I have - over a period of 50 years - combined engineering, computing, and urban planning.

What we have started at MIT this year is a 4-year undergraduate program that tries to combine the core elements of this journey into one Bachelor of Science degree.

Let me say a little bit about the strategy and the rational for this new undergraduate degree, and then say a little bit about the larger and more recent development, in the last couple of months, when MIT announced its substantial investment (of 1 billion US dollars) in a new College of Computing. Our new urban planning and computer science undergraduate degree is just an early example of what MIT intends to do with this new College of Computing.

The new undergraduate degree is formally called, "Bachelor of Urban Science and Planning with Computer Science," and the basic strategy and rational is two-fold: One consideration is that we are starting out with urban science by focusing on an undergraduate degree rather than a PhD degree or research focus.

There is not yet a single view about the full scope of what is involved in urban science and what fields are relevant. Much research and graduate work will continue in the relevant departments and labs and require considerable expertise in urban planning, good governance, and computer science. But we can agree on some of the basics in CS and urban planning that undergrads need to know in order both to understand the emerging information technologies (IT) and also to have some sophistication regarding the social impacts of ubiquitous computing and the ways in which IT can help (or hinder) good governance and urban development.

A lot of the motivation has come from the fact that at MIT in particular, but also across the USA, there has been a big shift of undergraduates toward majoring in computer science. So MIT admits more than 1000 new students every year, and more than 300 of them sign up for computer science (CS) as their major. But MIT is not going to locate one-third of its faculty in a single CS department. In fact, MIT does not have a department of computer science. CS has always been interdepartmental, with the base in the electrical engineering department. I think that has been healthy to give CS an engineering, problem-solving flavor and not isolate it within an academic silo.

Anyway, the MIT strategy in response to the growth of interest in computing is not to put one-third of the faculty in one CS department, but to recognize that computing has begun permeating research and learning in pretty much all departments. If you look across MIT departments, each one of them has many people who are working, in one way or another, with new information technologies as part of their research. So, a good part of the motivation for our urban science degree and, subsequently, for the College of Computing initiative, is to work out mechanisms that can cut across traditional departments.

We want to facilitate the ways in which computing is impacting everything from sociology, economics, political sciences, biology, engineering, and brain & cognitive science - as well as urban planning – and to do this in a way that ensures appropriate examination of the deeper implications of computing-driven disruption in each area.

To provide one small example of curriculum development that helps such efforts in core CS classes, let me describe one of the class exercises that we wrote for an intensive introductory CS class taken by more than MIT 600 students each year.

The first half-semester (6.0001) teaches programming using Python and the second half-semester (6.0002) uses lectures and problem sets to show how computation can facilitate problem solving in various domains. We rewrote one of the half-dozen weekly exercises for 6.0002. The exercise focused on building and traversing network graphs and had involved navigating through MIT buildings to find the shortest path between offices.

We reworked the example to focus on shortest paths through a road network and tied it to a 'real-world' setting involving driving into New York City that has become controversial over the last couple of years. During rush hour, a new navigation tool (Waze) was monitoring

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realtime traffic congestion on the interstate highway heading into New York from New Jersey. Sometimes, the app would send motorists on short-cuts through local New Jersey streets to bypass highway traffic on the main roads accessing the George Washington bridge for the trip into New York City. Often, the local streets became jammed and the residents revolted.

They protested at public hearings, threatened to ticket and fine non-local motorists driving through their town, and (in some cases) changed street segments to be one-way. There was a big fuss. Ultimately, the app developer (Waze) agreed not to route motorists through local streets during certain times.

The 6.0002 class is intensive and this was only one of six problem sets during the half-semester. We did not want to eliminate technical content from the class in order to make room for a deeper understanding of the urban context. Also, with more than 300 students each semester, the exercises couldn't handle complex, open-ended questions and most of the grading had to be automated.

So, we wrote the exercise for a simplified network, had students build the network graph and traverse it using Dijkstra's algorithm, and we made sure that the local 'short cut' was preferable under certain congestion conditions. While the emphasis of the exercise was on finding the quickest path for an individual driver under tightly specified conditions, we wanted students to see how different rules and objective functions could yield different 'solutions' and how the technology that helped some drivers choose 'short cuts' might adversely impact others who had some control over the use of local roadways.

We linked to articles and debates about the 'real-world' controversy and pointed out possibilities that raised broader social policy questions. For example, using tolls to control access could be disproportionately burdensome to poorer folks, and barring all through traffic from using the short-cut would be sub-optimal. Would it be 'fair' for Waze to provide short-cut information only to 'select' customers who pay a premium?

The idea is for the exercise to retain the same technical content as before, but to show how some choices of what to optimize might lead to a much broader set of questions about the social implications and policy choices. So, we do machine grading for most of the problem set but give them references to the real-world setting and ask a few of the broader questions for discussion with TA (Teaching Assistants) during weekly recitation meetings.

The basic idea is not to teach a lot of planning and governance issues in this CS class, but to stimulate people to think about the generality and sensitivity of their problem 'solutions' and to motivate them to take future classes that dig further into the urban planning, social policy, and governance issues. This approach is consistent with another motivation for the urban science degree.

Many MIT CS undergraduates go to work for the large technology companies (Google, Facebook, Amazon, Apple, Microsoft, Netflix, etc.). They have technical and analytical depth and a state-of-the-art view of the latest information technologies, but not necessarily a sophisticated view of the social impacts of computing.

If only 10% of those taking the CS core subjects became interested in urban science and were motivated to take more classes about urban planning and social policy, that would be plenty for our new undergraduate degree and would enable them to pursue graduate school and career options that contribute more effective to e-Planning goals.

We will see what more is done along these lines as MIT's new College of Computing takes shape. Over the next few years, MIT anticipates adding 50 new faculty slots, with more or less 25 in computer science or engineering department, and another 25 in other disciplines that have a computing connection. Our department has already receive one slot, as a result of the new urban science major, before the College got underway.

MIT has yet to work out all the details needed to make the College approach work. How do you make good career paths for the junior faculty who take these appointments. Interdepartmental appointments are difficult to manage. Most of the people engaged in e-Planning are quite familiar with those difficulties. [*laughter in the room. Pedro says "Yes, Yes"*.] and this is the direction in which we are heading.

Before finishing my talk, I should mention the research that I am currently doing at an MIT research center in Singapore (where I am today).

I am part of an interdisciplinary group that has been studying 'future urban mobility' issues since 2010. For the past few decades, Singapore has been enticing international research universities to engage in research relevant to Singapore at their international facility on the National University of Singapore campus.

Our 'future urban mobility' project has involved a dozen MIT faculty from engineering, computer science, and urban planning together with hundreds of Postdocs, Research Scientists, and MIT students. So, the effort is an example of one area that can benefit from collaborative research involving urban planning and computer science.

Singapore has been a world leader in transportation infrastructure investment and management and one of the first metro areas to implement congestion pricing. They have recognized that new technologies such as autonomous vehicles can have much broader impacts on urban form and metropolitan development, and they have supported our effort to build a new agent-based microsimulation platform (called SimMobility) that can examine land use and transportation interactions as mobility options evolve.

For me, this has been an interesting setting in which to reflect on the need for e-Planning as we seek to shape urban futures that are more sustainable, equitable, and democratic.

I hope these reflections about e-Planning and some of our work and programmatic development at MIT are of some interest to the group I'll stop here and be happy to hear any comments and questions.

Thank you. [Aplause]

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http://www.e-planning.org/workshop2019vid.html

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CyberLaw Eclipse? A sequence to Prof. JFerreira Keynote on MIT

José Magalhães, Deputado (Member of the Parliament), Assembleia da República, Portugal

Professor Ferreira talked about disruptions.

1. We are all aware that many disruptions are happening. Many of them not visible and very deep. it is also clear that political systems are not prepared to tackle these new challenges. Let us remember that moment of Zuckerberg's appearance in the Senate that revealed the clear lack of preparation and literacy of some of the members of the Congress of the United States of America.

But does this mean that in the future we'll keep having ignorant legislators and outlaws at large? I do not agree with such a vision of things.

There were times in which the most spread vision of the future portrayed cyberspace as a non-regulated nirvana.

Those times are gone. Laws have been drafted and enacted in several countries with different legal systems, on both sides of the Atlantic and in many other parts of the world. They even allow us to identify two sides of the Internet: the democratic side, and the authoritarian side of the Web. Not to speak of the Dark Web.

We also have an intricate maze of self-regulation and co-regulation codes of practice.

2. A Web of norms of such a different nature makes the moment of enforcement a complex and uncertain process as it may involve a vast array of components when we have actions practiced almost at the same time: a server in Canada, a criminal somewhere in Porto, an ISP in Lisbon, members of a criminal association in several other parts of the world.

Does this mean we are facing an eclipse of the law, caused by the disruptive power of the high tech revolution fueled by the good old Internet and the innovative power of the big digital platforms? Ironically the Big5 use in their favor the legal protection granted by contract law, patent law, copyright law, etc. They also spend millions in lobbying, mostly to avoid regulation at any level.

Law is also the reason why big companies make big deals such as the ones Facebook made with Cambridge Analytics. The clauses may represent breaches of law but hey seem to be protected by trade secrets law. Courts, Parliamentary committees and police forces seem impotent to disclose what is happening behind the curtains woven by lawyers and other law experts.

3. Of course the legal ecosystem we are living in is untenable. REGULATION IS NEEDED! More then ever. Cyber law, digital law – call it whatever you like.
To fight cyber crime.
To protect intellectual Property.
To protect copyright.
To defend children.
To regulate online transactions
To protect human rights
To guarantee cyber security
(…)

A never-ending list.

4.There will be a Cyber law BOOM, not an eclipse.

The boom makes perfect sense.

A) Self regulation is clearly not enough and not appropriate to solve the complex problems we are facing. The unique experience led by European Commission in 2019 forcing the big platforms to make reports on the results of the enforcement of the code of practice against DISINFORMATION signed in October 2018 has brought clear evidence of poor results. Self-regulation allows the big companies that signed the code of practice to know all about content that flows in the networks and for that purpose hire thousands of "moderators", who evaluate and take down posts. The national states do not have the means to hire and manage such a crowd of cyberburocrats, nor would that be compatible with our democratic rules. The jurisdictional control, although not impossible, is not exerted.

B) Even a brilliant outcome of self-regulation would have as a consequence a need to draft and enforce a big library of codes of practice to cover the several areas that are at stake. Many codes would then be needed. And it's associated burocracy… And some degree of oversight by public authorities. And many months of preparation (it took two years to draft and sign the code of Practice on fake news).

C) The European Union is already drafting European laws such as the general data protection regulation, the new code of electronic communications and the regulation on terrorism.

5. Moreover, all of a sudden, a surprising turn about happened.
The American companies that had fathered a monster capable of smashing and destroying privacy everywhere in the world engaged in a fantastic dispute To determine which of them should get the prize for being the best privacy defender
.
Silicon Valley became a place where CEOs can be seen openly competing to write the best letter to Congress begging for regulation or writing op-eds in the Washington Post explaining why it is urgent to complete that task and how.

Apple CEO Tim Cook called online privacy a "crisis" in an interview with ABC News, reaffirming the company's stance on privacy as companies like Facebook and Google have come under increased scrutiny regarding their handling of consumer data.

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"*Privacy in itself has become a crisis"." It's of that proportion — a crisis.*"
(Of course unlike companies such as Google and Facebook, Apple's business isn't focused on advertising, but saying that it does not benefit from collecting data would be exaggerated!).

Mark Zuckerberg wrote a Washington Post op-ed where he declared:
"*I believe we need a more active role for governments and regulators. By updating the rules for the Internet, we can preserve what's best about it — the freedom for people to express themselves and for entrepreneurs to build new things — while also protecting society from broader harms*."

From what I've learned, I believe we need new regulation in four areas: harmful content, election integrity, privacy and data portability".

So let the legislative games begin.