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城市模型应用的经验与教训

Your new book is titled as The New Science of Cities. Which "old" science is it compared with? Can we put it this way, that the academia has made a substantial amount of achievements in urban complexity and network research to give impetus to a "new science"?
您的新书题为《城市新科学》，是与什么"旧"科学相对应的呢？是否可以这样认为，学术界在城市复杂性研究方面已经取得了相当多的成果，以催生一门"新"科学？

Michael Batty：It's a good question. One thing which I say in the book is that there is not just one new science. There are many new sciences of the city. And the reason why I call it "the new science" is because many of the techniques and tools are relatively new, compared to the older science. The older science was related to urban economics, social physics, central place theory, transportation-type theory, etc. In other words, the old science was what was loosely called "regional science". And it was based on much more static and cross-sectional view of cities, which takes city as a system；while the newer science is based on the idea of evolving cities and complexity theory. To some extent, a way of talking about the new science is to say all of the new tools and techniques, which have come over the last twenty to twenty-five years, are related to complexity theory. So there are many different dimensions in which we can characterize the new science, such as disaggregation, bottom-up thinking, and evolution and so on.

这是一个好问题。我在书中也提到，并非只存在一门关于城市的新科学，而是存在多门这样的科学。我之所以称其为"新科学"，原因在于，相比"老科学"，其所使用的诸多技术和工具相对较新。"老"的城市科学是指城市经济学、社会物理学、中心地理论，以及与交通相关的理论等。换句话说，"老"的城市科学可被粗略地称为"区域科学"。它更多的是基于静态的、截面的以及基于系统论的城市视角。而新科学则是基于演进的城市理念和复杂性理论。在某种程度上，我们可以这样描述这门新科学——利用了过去20至25年内发展出来的新技术和新工具，且基于复杂性理论。其实，我们可以从许多角度来界定这一"新科学"，比如离散性、"自下而上"的思想、演进的视角等。

The answer to the second question is "yes". The urban complexity theory, network science are two main areas that

have pushed into the new ways of looking at the city. I think one of the key things is the idea of networks and flows. It is really changing the emphasis on location. It is not that location is not important, of course it is important, but networks and flows are particularly important in this particular new science, and also the dynamics of change.

第二个问题你说得对。城市复杂性理论和网络科学是两个主要的研究城市的新视角。"网络"和"流动"的思想尤为关键，这一思想正在改变城市科学对于"区位"的强调。"区位"并非不重要，它是很重要，但在这门新科学中"网络""流动"以及"动态变化"更为重要。

The golden age for quantitatively understanding cities in 1960 to 1970 was then damped by social theory and Marxist approaches. A main reason for this is not well addressing planning problems and lack of practical applications. Now we seem to have entered another golden age, what could we do to avoid the previous problem and do better this time around?

上世纪60年代到70年代是城市定量研究的黄金时期，但不幸被社会学理论和新马克思主义城市理论所冲击。发生这一现象的主要原因在于当时的研究没有很好地与规划问题相结合且缺少实际应用。在当前这一新的黄金时期，我们应如何避免类似的问题并做得更好？

Michael Batty：There is no question that there is a new interest in these things, which is also coinciding with the interest in the smart cities, big data and all these kinds of stuff, which are not quite the same as modeling. In some senses, the difference this time is that in the 1960s, particularly in the US, a lot of ideas were transplanted really from system analysis and system development, which were being developed in the military and defense related aspects, to municipality governments. It wasn't easy to get the transition right. Often the techniques and the tools were not well adapted. There were problems of data, problems of computation, and problems of financing and funding, etc. And also the cultural difficulties were not making these models work and they were not well used by planners and policy makers, who didn't have any real sort of feel for these approaches. So, to some extent, there was reaction against this style of modeling by, as you say, social theory, political economy, Marxism, and so on. The interest moved away from urban and regional modeling and system approaches to planning in the late 1970s. And it was often said that "the models are part of the problem, not part of the solution". In some senses, the issue was that the models themselves contained within them various things that planners and policy makers wanted to change. It was the structure of things.

毋庸置疑，人们对城市定量研究正在产生新的兴趣，同时被人们所关注的课题还有智慧城市、大数据等——它们与城市模拟不尽相同。从某种意义上说，本次城市定量研究的热潮与上世纪60年代，特别是在美国的不同之处在于，许多系统分析与系统发展的思想移植自军事领域。在不同领域间进行这种移植并非易事，相关的技术和工具通常并不能很好地适应新的需要，出现的问题包括数据问题、运算问题、财务和资金等问题。另外，"文化"

问题也阻碍了这些模型在规划师和决策者中的应用——他们对这类方法无动于衷。所以，在一定程度上当时人们借助社会学理论、政治经济学理论、新马克思主义城市理论等反对城市模拟。到上世纪70年代末，对城市和区域模拟以及系统性规划的兴趣便消失了。甚至有人称"城市模型本身就是问题，而非解决方法"。从某种意义上讲，出现这种说法的原因在于，城市模型中存在一些规划师和决策者希望改变的东西，这是一个结构性问题。

But at the same time in parallel what began to grow was GIS, sort of because computers were being down-sized, miniaturized, and made much more available. And it was only in the 1990s, perhaps even more recent than that in the 2000s, that we got in a situation where data was much less of a problem, computational power was no longer a major issue in term of these models. You can say that all of these things are coming together, are giving a new impetus to modeling. And at the same time, there is the idea of putting computers into cities in different ways and generating new data from the methods. So this is also coinciding with this renewed interest in modeling.

但与此同时，随着计算机的小型化与普及，GIS也在不断发展。到上世纪90年代，也许是更晚至本世纪初，我们真正进入了数据可获得性与计算机计算能力不再是城市模型的主要问题的时期。在上述因素的共同作用下，城市模拟获得了新的发展动力。同时，大数据思想（将计算机以不同方式整合入城市生活并从中产生新数据）的出现也与人们对城市模拟的新一轮兴趣不谋而合。

The smart-city movement is running in parallel to this interest in modeling. Smart cities and urban and regional modeling are really quite different in many ways. Urban and regional modeling is just a set of tools and techniques that are used to think about the cities. Maybe there are some aspects of the smart city such as very fine-scale problems of movement and transport, emergency vehicles, police vehicles, very detailed transport system disruptions, and so on. All of these things are what the smart city technologies are designed to improve. So as part of that, some styles of operation and research modeling are being developed in the smart city movement by IBM, CISCO, etc. The urban and regional function within our long standing models is much more related to bigger questions of housing policy, transportation policy, policy which is thinking about what is happening over a longer time span basically. Smart cities are dealing with short time spans, the day basically, or the peak hours, or what is happening over a couple of days or weeks. Whereas urban and regional modeling is about the

dynamics over a much larger time span, say six months, five years, or longer.

智慧城市运动与城市模拟的新热潮并驾齐驱。但它们在很多方面截然不同，城市和区域模拟只是用于理解城市的一系列方法和工具，这与智慧城市的某些方面有所交叉，比如非常精细尺度的交通与人流移动问题、急救车警车调度问题、非常具体的交通系统故障问题等——所有这些问题都是智慧城市技术旨在改善的。因此，IBM、思科等公司在其智慧城市项目中开发了一些操作性与研究性城市模型。但智慧城市更加关注短期变化，诸如一天、高峰时段或者几天几周内发生的变化，而城市与区域模拟则关注更长的时间跨度，比如六个月、五年内的住房政策、交通政策等。

What could be done to avoid the previous problems is a big issue. Because in some instances, this is not a precise science in any sense. It is extremely fuzzy around the edges. And there is a lot of ambiguity. So I think we need to continue learning from the past experience. I hope so we will do better this time around. But you never know.

怎样才能避免此前出现的问题是一个重大课题。因为，从某种程度上讲，城市定量研究并不是一门精确的科学，它包含大量的模糊性，所以我认为我们应当不断借鉴过去的经验教训。希望我们这次能做得更好。

Though the academia has made a lot of progress in urban simulation in the past decades and there's a growing number of "clients", like governments, funding bodies, becoming interested in simulation, it has not yet been applied vastly in planning practice. According to our experience in China, it is a complicated process to persuade planners the simulated results. There are always a portion of them doubting urban models. Could you comment on the application performance of urban models up to now?

虽然过去几十年学术界在城市模拟领域取得了大量进展，并且有越来越多的地方政府，学术资助机构等"客户"正在对城市模拟产生兴趣，但此类方法仍然未被大规模应用于规划实践。根据我们在中国的

Michael Batty：Different cultures develop different styles of thinking about these models. So, for example, in the US, there is a much stronger sense of what we call technological optimism. They are more optimistic about technology than there is in, say, Britain. Although that is changing a little bit because of the impact of new technology. So I think that in different places you have different sorts of reactions. In the 1960s and 1970s in the US, there was very strong optimism on the part of policy makers and planners that these tools would be useful in some way. Of course they were found out not to be as useful as people suggested even there. But here, for example, there was much less optimism that these tools would be useful anyway. So there are many less applications of urban models in Britain than you find in the US. There are probably some that the David Simmonds Consultancy does, some for London, and southeast England；one or two transport consultancies have done some；MEPLAN did do some, and they had a big model of southeast England, which to some extent the DELTA model has taken over from. The company that owns MEPLAN now I think is still working with models, but much less so. Whereas in the US you will find that most big cities would

经验，扭转规划师对城市模型的怀疑态度并说服他们接受模拟结果并非易事。您能否评价一下到目前为止城市模型的实际应用情况？

have models of various sorts.

不同文化对待城市模型的态度不尽相同，比如，美国有较为强烈的所谓"技术乐观主义"，他们比英国人更看好技术。当然，由于计算机等新技术的影响力持久不衰，英国的情况也有所转变。因此，我认为在不同地区存在着对城市模型的不同反应。上世纪60年代到70年代，美国的规划师和决策者对这类工具在某些方面有所裨益持有非常乐观的期望，当然，后来人们发现它们并非如此有用。英国并不具有如此强烈的"技术乐观主义"，城市模型在英国的应用明显少于美国。英国David Simmonds咨询公司可能有一些应用，包括几起在伦敦和英国东南部的模型应用；一两家交通咨询公司的模型应用；MEPLAN的模型应用。相比之下，大多数美国大城市都有其自身形形色色的城市发展模型。

And back to the question. You have a strong physical planning orientation in China, which is architecture and urban design orientated. And in this country, and certainly in the US, there was always a much stronger transportation lobby, a transportation planning, engineering kind of emphasis. And that made a big difference in the US and to some extent a big difference here. So there are some quite big transportation groups. We have not really talked about that. But the transportation group at Berkeley in the 1960s was very strong. There is a strong link to transportation here. Big transportation centers such as Imperial College are very strong.

回到你的问题。中国的城市规划有强烈的物质规划倾向，侧重建筑设计与城市设计。而英美两国的情况是，它们拥有强大的交通部门，侧重交通规划和相关的工程设计，这使两国都出现了较大交通研究机构，比如上世纪60年代伯克利大学的交通研究组，以及帝国理工大学的交通研究中心。

Now in terms of the question you asked about applications in planning in Britain there was sort of gradual change from an architectural approach to planning towards more of a social science approach of planning in the 1970s. So most planning schools here don't do this sort of stuff either, but they don't do urban design either. They do a lot to do with economic development in cities, such as the development process, the social structures of cities, social welfare. So a lot of planning schools now in Britain are really non-design and non-technical. And that is different again from what is in China. So you get the same sorts of reaction in different countries as in Britain. A lot of planners would not be very comfortable with this sort of models because they really don't consider that you can actually make predictions of the near future with respect to the issues

they consider important. And they think that the world is too complicated, too complex. In terms of China, I don't know, I imagine that a lot of people who are interested in design and prescription would not be very comfortable with prediction. Because I assume that the design process is informed by these tools. The planning support systems that have emerged here and in the US are such that you have the iteration between some kind of proposal and some kind of prediction of its impact, etc. And that might be a problem. Also there is a basic lack of training, and a lack of exposure to these ideas.

现在来说规划的应用。上世纪70年代，英国的城市规划由偏向建筑学逐渐转向偏向社会科学，所以英国的大多数规划院校也并不从事与城市模拟相关的工作，但它们也不做城市设计，而是涉及较多的城市经济发展问题，比如城市的发展历程、社会结构、社会福利等。因此，当前许多英国规划院校既非"设计"也非"技术"，这与中国的情况有所不同。但你在英国可以发现人们对城市模拟有与中国类似的反应——许多规划师并不习惯于使用这些模型，他们认为现实世界过于复杂，并非借助模型即可对未来进行预测。我不了解中国的具体情况，但我猜测很多来自设计背景的规划人员考虑到设计过程会被这些模型工具所左右，并不习惯于模型"预测"。规划支持系统就是一个不断调整方案并预测方案影响的过程。此外，规划人员对城市模拟相关思想了解较少并缺乏相应的训练也是造成这一问题的原因。

The only way around this is that the education system should be adapted in some sense. That can take a long time to change. It is very difficult to say that you can do one thing if several things need to happen. And there are certainly some good things in terms of the way planners actually do planning in China compared to here. So the design side is not all bad. It could be useful in some sense. We can probably do it with more design here. So there really is no magic formula for knowing how to deal with this problem.

唯一的解决方式是调整规划教育体系，这需要较长的时间，同时可能还需要许多其他转变同时发生。我们也不能断然否定中国规划师偏重设计的工作方式，在某些方面可能好于英国，英国的城市规划也可能需要更多的设计成分。所以说并不存在解决上述问题的灵丹妙药。

So the major obstacle lies in education?

所以说，城市模型应用的主要障碍在于规划教育？

Michael Batty：Education is one thing. But it is also the ability to know how to deal with scientific tools. A lot of scientists and non-scientists believe that science can produce magical answers. And the big difficulty is that the magical

answers are unknown. In planning it is particularly acute because the whole notion of planning is to make up the answers. So, to some extent, it is this tension between what we can model in terms of actual behavior, and what we want to change, which is also related to behavior. That's a big tension that education in the broader sense can help with. In the broader sense I think that needs to be thought through by a lot of different people that are involved in planning and prediction. So, education yes, to some extent, but also this is a reflection on what is being done in cities. So it is the wider context. It is about the policy makers as well. Policy makers are probably not very happy about models. It may be because what we need to do is to let cities develop more spontaneously and that conflicts with the role of policy makers. Policy makers are in the business of making policy. They see their rationale for making decisions about the future, to optimize in some sense. I am not saying that one should not optimize, but lots of predictions might tell you what you should not optimize as well as what you should optimize. And that is a difficulty for many policy makers who should do nothing really, rather than to do something. They ought to do a lot less of something than what they might want to do.

教育是一方面，使用科学工具的能力也很重要。许多科学家以及非科学家都相信科学可以产生奇妙的答案，但困难之处在于，这些答案是未知的。而规划的总体理念即是"编"出答案。所以，在一定程度上，"我们能模拟什么"和"我们想改变什么"之间存在冲突，这二者都与人的行为有关。这一冲突可以通过更广义的教育获得改变，但并非仅能如此。我认为很多参与规划和模拟预测工作的不同专业的人士都应深入思考这一问题，思考在城市中究竟发生了什么，这是这个问题所处的更广阔的背景。这一问题也关乎决策者，他们可能并不乐于使用城市模型。这可能是由于我们的工作在于使城市发展更具自发性，而决策者的工作在于为未来发展作出决定以起到"优化"作用。这并不意味着我们不应去"优化"，但许多模型预测结果可能既告诉人们应该"优化"什么，也告诉人们不应"优化"什么。然而，让决策者"不去做什么"难于"去做什么"——他们想做的事情中很多都是不应当做的。

How long do you think it will take before quantitative becomes an essential part of planning education? 您认为使定量分析成为规划教育的一项基本内容还需多久？

Michael Batty：That's very difficult. It is going to take a few years. It is like you have the same question in a British context, which is how long would it take for planners to be much more exposed to urban design. To some extent, there needs to be a change in the faculty, in terms of having more expertise in these areas. Then secondly,

this is changing slowly as more people get skilled in these things. But the most important thing I think is that it is not so much that planning students would do this, but that people in planning are coming from many different backgrounds. That probably is the main thing. And some of these different backgrounds would be scientifically orientated. So consequently, I think the change will come more from the prior education of people coming into planning. Because it is a much more fluid set of ideas and disciplines now in planning. So there are lots of different backgrounds, some of which will be more scientifically-literate than others. And probably the changes in practice will come more from that. The change will also come from different agencies dealing with planning. A lot of big firms, big agencies, and government agencies now deal with sort of planning. And they are all doing it from different perspectives. The IBMs of this world have planning divisions. Big engineering companies like ARUP have a lot of quantitative planners within them. So the big consultancies, the big agencies, the big computer firms, any big multi-national firm with a lot of operations would have planning staff who would not necessarily be professional planners in the traditional sense of the word. In fact, a lot of our professional planners go into the development control system instead of strategic planning. Strategic planning takes place in different agencies now.

　　这很难讲，可能需要若干年，这就像问"还需多久英国规划师才会介入更多的城市设计"一样。从某种意义上讲，这需要规划院校教师人才结构的转变——引进更多具有这方面知识的人员。事实上，有越来越多的人开始具备这方面的技能，所以情况正在逐渐改变。但我认为最重要的一点是，定量化的城市研究并非一定由规划专业的学生来完成，可以由规划行业中来自不同学科背景的专业人员来操作。他们中的一些人可能更为"以科学为导向"。我想规划领域的改变将源于此。此外，改变还可能来自不同的和规划相关的机构。很多大公司、大型机构、政府部门现在各自从不同角度处理不同的规划工作。IBM等IT公司就建立了规划部门，ARUP等大型工程公司则拥有许多从事定量分析的规划人员。可以说，大型咨询公司、大型代理机构、大型IT公司，所有涉及大量业务的大型跨国企业都可能雇佣了规划人员，而他们并不一定是传统意义上的规划师。实际上，有很多专业规划师进入了开发控制部门而非战略规划部门，而战略规划则由不同机构完成。

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