

Infrastructure disrupted: investing in the age of ‘unknown unknowns’

Viktor Kats, co-fund head of the IFC Global Infrastructure Fund, and Deepali Bahl, principal at the fund, argue investors need structured frameworks to be able to deal with the impact of technology

Investors have long viewed infrastructure as a long-term, low-risk, inflation-linked asset class. It has attracted increasingly large amounts of equity capital, growing from \$36.5 billion in new funds raised in 2010 to \$57.2 billion in 2017. In the first half of 2018, more than \$38 billion was raised by 29 infrastructure funds.

The original promise of infrastructure is compelling. However, some of the main assumptions of the risk-return balance for the asset class have recently come under pressure. Investors have seen unexpected regulatory action in many markets previ-

ously thought to be low-risk. Trade barriers introduced by political populism and geopolitical shifts are affecting established supply chains. Emerging markets are increasingly driving demand for new infrastructure. Interest rates are building their upside momentum. While these changes in risk profile are often reflected in new fund strategies and new investment valuations, a coherent framework to assess the impact of technology disruption on infrastructure assets is still largely absent from investment decision-making.

Technology is disrupting all sectors of the world economy, from consumer prod-

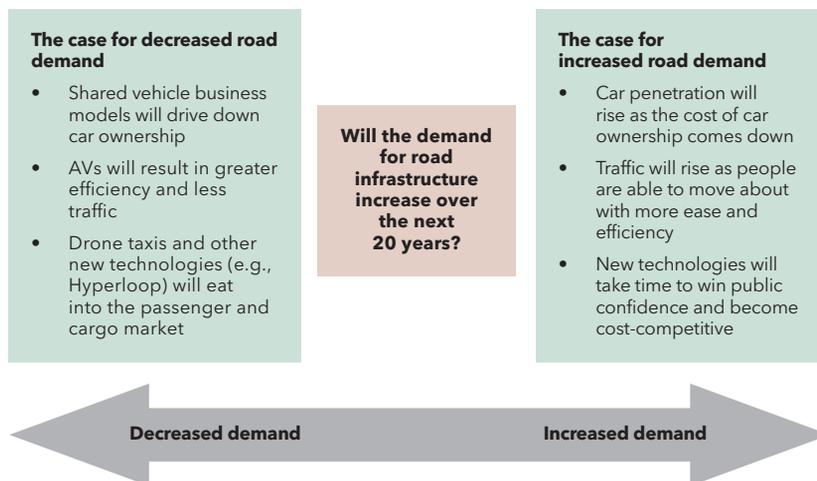
ucts to finance to agriculture to health. So, what is so special about infrastructure that we need a framework? The uniqueness of the intersection of infrastructure investing and technology comes from the infrastructure asset characteristics that institutional investors expect – long useful life, regulatory protection, difficulty to replicate and capacity to generate stable, predictable cashflows. We believe that technology is going to change many of these characteristics and that long-term investment decision-making will require an increasingly different frame of mind as well as financing and asset management approach.

Disruptive technology could enable both cost-saving and revenue-enhancement opportunities across various subsectors. As disruptive technologies become more pervasive, new infrastructure business models will emerge. Depending on which technologies evolve and are adopted, and consequently in which direction the future moves, the risk profile of existing assets will shift and certain assets will face the risk of becoming stranded.

Technology innovation today occurs exponentially, so, despite developing a strong fundamental understanding of disruptive technologies and potential implications, making investment decisions in an inherently unpredictable world can be risky and overwhelming.

Let's take mobility infrastructure as an example (see chart on the previous

THE CHANGING NATURE OF INFRASTRUCTURE ASSETS



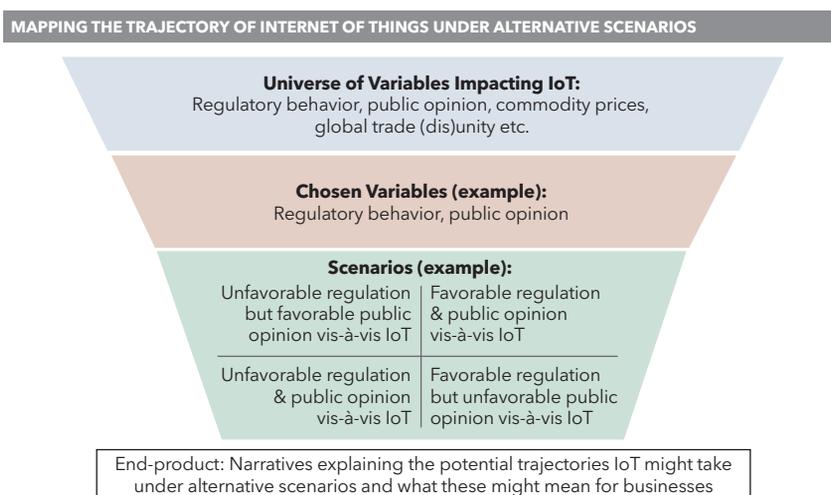
Source: IFC

page). Business models for shared vehicles have taken root, and autonomous vehicle (AV) and electric vehicle (EV) technologies are developing rapidly. Will these models and technologies definitively and significantly alter how people travel and commute over the long term? The answer is difficult to predict and depends on several external variables. Even if the answer were known, what would it signal for the demand for road infrastructure? Would demand increase or decrease over the next 20 years? As shown on the previous page's chart, an equally compelling case can be made either way. This underscores the perils of categorical predictions when making a long-term investment decision.

BUILDING 'INNOVATION MUSCLE'

Because there is so little certainty around what the future will look like, planning for alternative scenarios is important. Scenario planning prevents investors from becoming wedded to one view of the future and from getting blindsided when a different reality plays out. For instance, taking the view that utility-scale renewables are the future of power generation may cause investors to miss interesting new opportunities that emerge in distributed generation, such as the combination of rooftop solar and batteries.

Scenario planning reinforces a discipline among investors of continuously assessing the environment and refining portfolio construction and management strategies to achieve a better-balanced risk/return. Over time, this creates 'innovation muscle' among investors – i.e., the capacity to spot early signs of technology disruption in infrastructure and react either offensively (by capturing new opportunities) or defensively (by protecting and adapting legacy assets). Investors with in-house 'innovation muscle' have a significant competitive advantage in today's dynamic infrastructure landscape.



Source: IFC

THE 'INNOVATION ECOSYSTEM'

Defining alternative scenarios is a complex exercise. The real world consists of many variables which impact the trajectory of a disruptive technology.

For example, how will regulators behave vis-à-vis a disruptive technology? How will public-interest lobbies react? Will commodity-price trends have an impact? Will global trade (dis)unity influence how a particular disruptive technology unfolds? All these factors are relevant.

Let's take the example of the Internet of Things as a disruptive technology. Here, regulatory questions about cybersecurity could be a factor. Public concerns around data privacy and the prices of 'high-tech' metals such as lithium and cobalt used in batteries could also significantly influence whether and how IoT is adopted.

It is important for infrastructure investors to narrow variables down to the most important two or three so that scenarios can be simply defined. Because infrastructure investors are not technology experts, it may make sense to co-opt 'thought partners', firms or people versed in technology who can infuse cutting-edge thinking into the process. Over time, this innovation ecosystem of 'thought partners' can bring several benefits to investors such as

proprietary dealflow, reference and diligence checks, and expertise for portfolio companies to draw on.

TECHNOLOGY DISRUPTION FRAMEWORK

Investors can build the scenario approach into a tool that combines structured analysis with judgment to produce a 'heat map' to facilitate decision-making.

Chosen scenario variables can be developed into a series of metrics which help determine whether a technology is likely to disrupt a sector. For example, the 'regulatory-behaviour' variable can be developed into metrics such as how strongly the government mandates use of the new technology, the magnitude of government-provided financial incentives for use of the technology (such as subsidies or tax breaks) and so on. Similarly, the 'public-opinion' variable can be measured by unions' support (or lack thereof) of the new technology, consumer studies that measure attitudes towards a new technology and the like.

The graphic on the next page shows an illustrative heat map for a portfolio with renewables and water exposure.

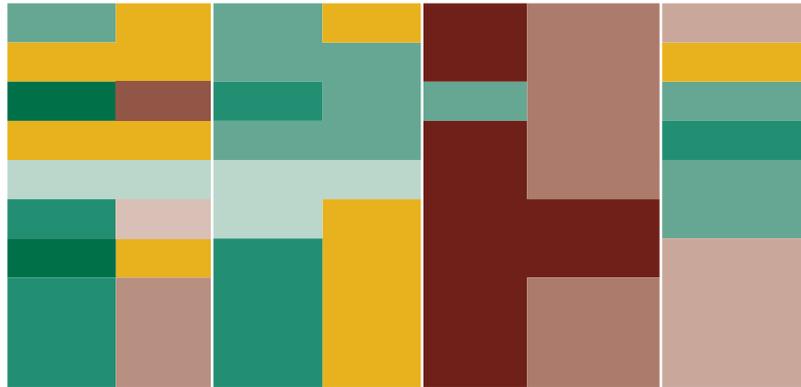
The deeper green boxes show metrics that are most supportive of technology disruption, while the deeper reds show

HEAT MAP GRAPHIC SHOWING CONDITIONS FOR TECHNOLOGY DISRUPTION FOR THEORETICAL PORTFOLIO

| Sector | Renewables | | | | Water | | |
|--------------------------|---|-------------|--------------------------|------------------------|---|------------------|--------------------------|
| Technology Category | Data Technologies (AI, Blockchain, IoT) | | Engineering technologies | | Data technologies (AI, Blockchain, IoT) | | Engineering technologies |
| Technology / application | Smart grid / smart meters | P2P trading | Battery storage / EV | Distributed generation | Smart water | Water harvesting | AI / IoT/ Blockchain |

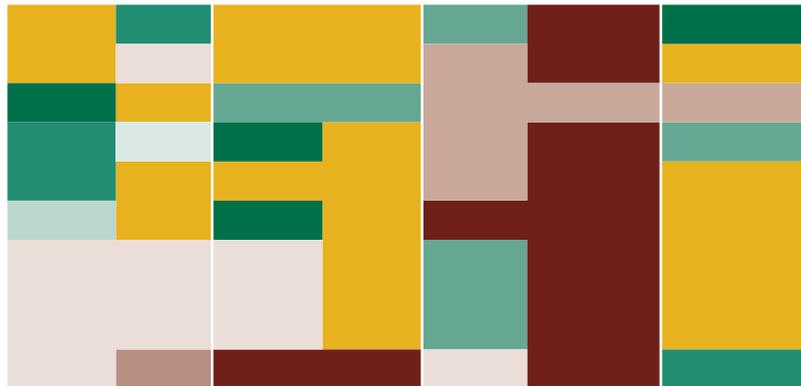
Regulatory Metrics

How strongly is the govt mandating the use of new technology by businesses and/or end-users?
 How significant are govt-provided financial incentives to adopt the new technology?
 Additional metrics



Public Opinion Metrics

How positive is public receptivity to the new technology based on consumer studies?
 How supportive are unions and other rights groups of the new technology?
 Additional metrics



Source: IFC

metrics that are most restrictive. The 'heat map' effectively suggests which externalities a portfolio manager should be most wary of or excited about, and how he or she might consider allocating time and resources across the portfolio to manage technology disruption threats and opportunities.

CONCLUSION

A dynamic environment calls for flexible strategies. As investors in a traditionally

stable asset class that is changing quickly, we need to develop in-house 'innovation muscle' to continuously evaluate the threats and opportunities presented by technology disruption.

Scenario analysis is a powerful tool to build such 'muscle'. Scenarios allow investors to objectively understand technology disruption and its potential impact. However, scenarios developed entirely in-house may be limited by institutional knowledge and bias.

Consequently, actively cultivating an innovation network or ecosystem is key to staying abreast of new developments and fostering a broader understanding of technology disruption over the long term.

Ultimately, creating structured frameworks to assess the impact of technology disruption on infrastructure must be married with investor experience and judgment to make optimal investment decisions. ■