



Connecting the world

with value-based network rollouts


accenture



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“ We need holistic simulation capabilities to unlock the full value of multi-billion fiber investments.



Thomas Knuchel

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01 The current state of fiber network rollouts

The expansion of fiber networks is accelerated across the globe. In many parts of Europe, for instance, numerous new initiatives to close the digital gap are underway, designed to increase fiber to the home (FTTH) penetration rates. In Germany alone, eight fiber network companies are working to build their own networks that will become inter-regional fiber networks. To get the best return on investment (ROI), operators need to optimally sequence their rollouts, and this requires capabilities in key areas.

These multi-billion-dollar projects are mostly driven by capacity or cost factors. We believe, however, that fiber rollouts need to be evaluated more holistically, taking the long-term business opportunities and strategic considerations about assets into account, and not just capacity and cost.

Communication Service Providers (CSPs) should understand which building areas will be the most lucrative, for instance residential areas which are typically served by only one operator.

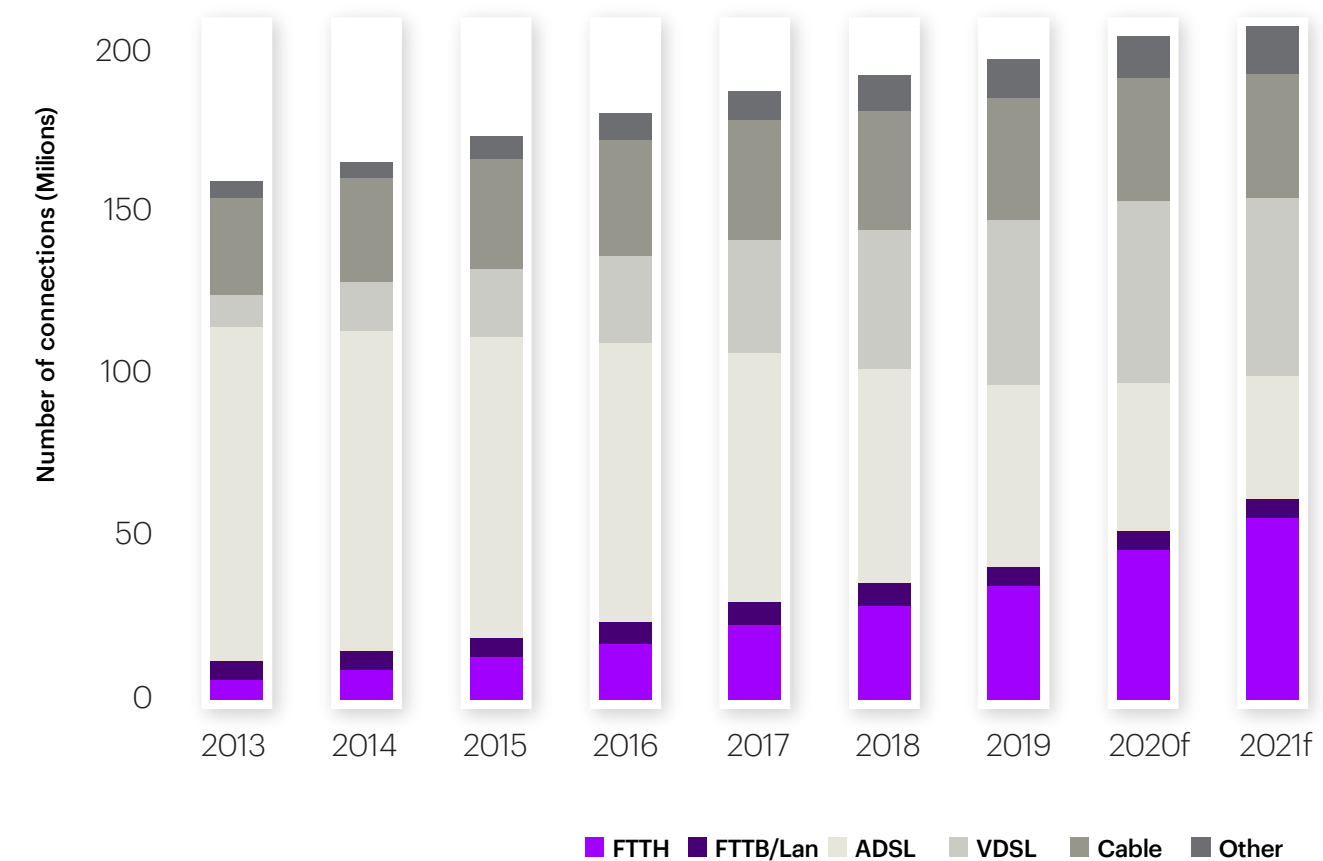
¹ Fixed Wireless Access

² Hybrid Fiber-Coax Network

In addition, they should note the overlap with FWA¹ and HFC² networks. Here, in-depth analysis is important to understand the potential profitability (or lack thereof) of a fiber rollout.

Many CSPs slip into a one-dimensional approach to their network rollouts that is capacity or cost driven and does not serve them anymore. At the same time, they face shrinking top-line revenues, which requires better capital utilization from all departments involved in the rollout. Network departments in particular need a more holistic approach to maximize their investments.

Figure 1: The rise and rise of fiber to the home



Source: European Telecommunications Network Operators' Association: The State of Digital Communications 2021



Five dimensions of network rollout success

To enable a value-based network rollout, CSPs need to master five dimensions and their related competencies. These include:

1. **Cost analytics.**
The competence to understand and optimize built cost in a new area.
2. **Revenue analytics.**
Understanding the potential take rate ³ and average return per user (ARPU) per area.
3. **Feasibility analysis.**
Understanding restrictive factors like availability of installation partners or political drivers.
4. **Visualization for decision making**
The competence to bring these three aspects into a unified view, enabling better, more holistic decisions and simulations of various scenarios.
5. **Operations & Improvement.**
The ability to sustain and improve these dimensions and their related competencies over time.

In the following chapters, we will discuss the dimensions and their related competencies in more detail and show why they are important.

³ Percentage of the available market that buy the offered product

02 Mastering cost analytics

Mastering cost analytics, and its related competencies, is about understanding the true cost of a fiber rollout. It is not sufficient to work with the average cost per kilometer or per household (HH), since we observe more than 500% variances between similar situations (see chart). From a cost perspective, CSPs should first focus on areas that offer a low cost per HH. It's clear that cost per kilometer is not a sufficient factor and does not correlate with cost per HH. To highlight the vast cost differences, we analyzed 35 actual fiber builds in Italy and extrapolated data points for more than 700 low-level fiber builds.

To derive these data points and enable us to focus on the right ones, a network infrastructure pathfinding simulation (NIPS) is needed. This is required to provide a highly accurate and automated design from which costs can be derived. As we demonstrated, the average cost per kilometer can be deceiving.

In addition, fiber routes can be optimized by an algorithm that allows for better capital utilization. We created automated FTTX⁴ designs that lowered built costs by more than 30% compared to original designs from network designers.

Figure 2: Understanding the true costs of a fiber rollout



● Samples of estimated FTTH network creation costs for 753 towns (from LLD)
▲ Samples of actual FTTH network creation costs for 35 towns (from As-built data)

⁴ Fiber-To-The-X, where X can be street, curb or house

Taking existing infrastructure and architectural guidelines into consideration, we can run an optimization for a rollout to improve its speed, the coverage of the rollout or the cost of the rollout. This allows the client to prioritize build areas based on different restrictions:

- If speed is crucial, the simulation would show options with easy-to-build fiber routes that may not be the shortest or cheapest.
- If coverage targets are what matters, maybe to qualify for a government incentive, we can simulate how this target can be reached with the lowest investment needed.
- If the CSP has to build within a given budget, the simulation can highlight which areas can be rolled out with the budget.

CSPs must know the cost impact of a planned build in detail. Without this, they cannot allocate resources efficiently and risk going over budget. Upgrading from a copper-based network to fiber will create different challenges. Here, these companies need clarity on dismantling costs, re-using assets, and they need a timeline to transition customers to the new technology.

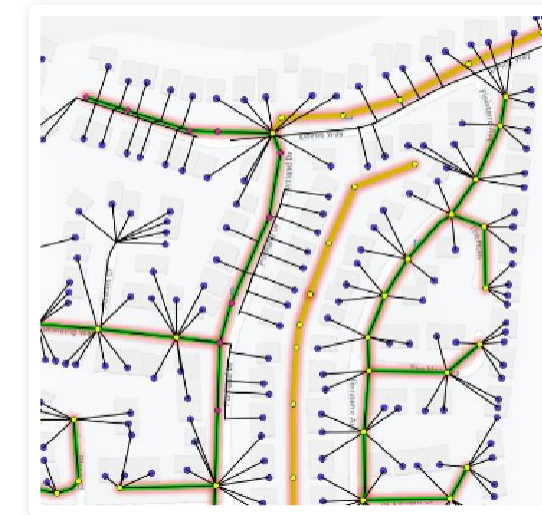
Understanding fiber rollout costs in detail is the first step towards a Value-Based Network Rollout.

Figure 3: Sample of pathfinding simulation with correlated cost based on existing infrastructure



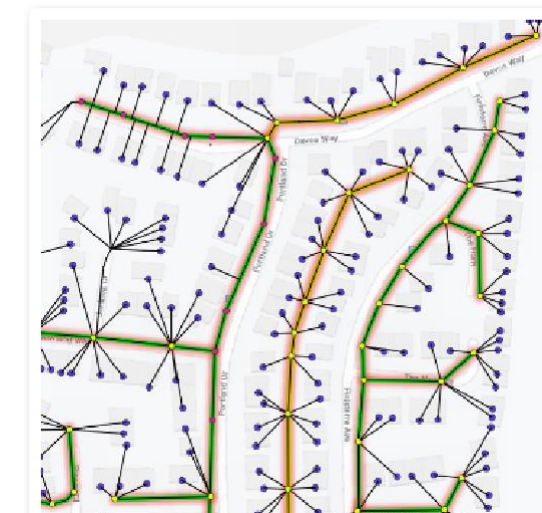
Types of infra used: roads only (no reuse)
Total Costs: 9.179.955 €
Total Length: 165,40 km
Drop infrastructure: 96,37 km
New Dig: 69,03 km
Reuse: 0 km

- ✓ Mainline
- ✓ Poles
- ✓ HRP North of the city
- ✓ Route - Simulation1
- ✓ G Inc FIA
- ✓ A Inc FIA



Types of infra used: roads and existing infra (occupancy <20%)
Total Costs: 6.813.967 €
Total Length: 176,51 km
Drop infrastructure: 95,37 km
New Dig: 44,45 km
Reuse: 36,69 km

- ✓ Mainline
- ✓ Poles
- ✓ HRP North of the city
- ✓ Route - Simulation1
- ✓ G Inc FIA
- ✓ A Inc FIA



Types of infra used: roads and existing infra (occupancy between 20% and 70%)
Total Costs: 5.028.769 €
Total Length: 167,14 km
Drop infrastructure: 94,59 km
New Dig: 20,07 km
Reuse: 52,48 km

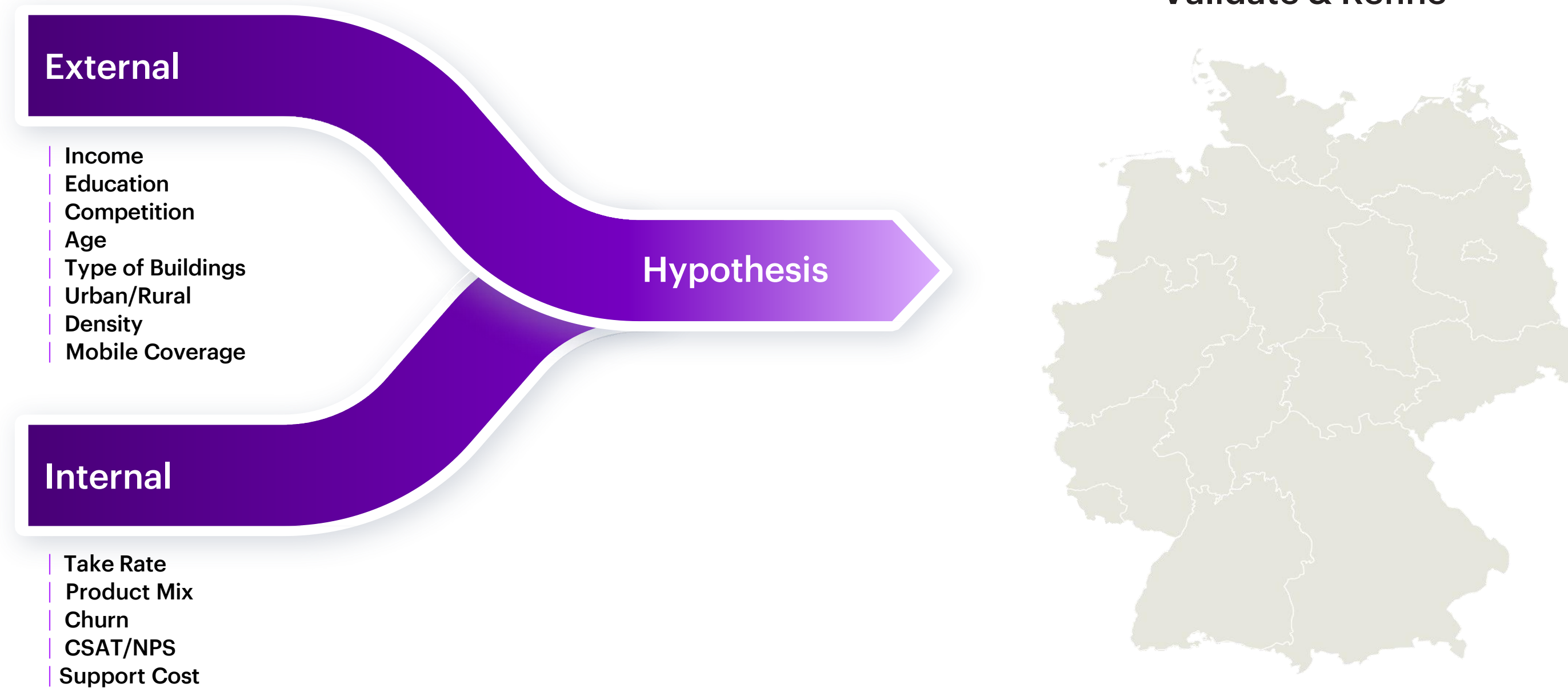
- ✓ Mainline
- ✓ Poles
- ✓ HRP North of the city
- ✓ Route - Simulation1
- ✓ G Inc FIA
- ✓ A Inc FIA

03

Using revenue analytics to derive actionable insights

CSPs can identify areas with an above-average take rate, lower churn and higher ARPU to derive actionable insights. To identify these areas, existing, data points from inside the CSP need to be correlated to publicly available data to generate insights. By doing so, CSPs can find attractive areas where they can increase ROI. CSPs need to give priority to building with fiber in these areas, or the competition will do so first.

Figure 4: Sample of internal and external data points to create actionable insights



To improve in this dimension, CSPs need to identify and then calculate the correlation between internal revenue factors and external data points, as there is no public information available on take or churn rates.

To get to an approximation, we need to develop our own model. As an example, we look at two areas with a different churn rate and then correlate these with external factors. In the example, we discovered a strong correlation between churn and areas where more rental units are located.

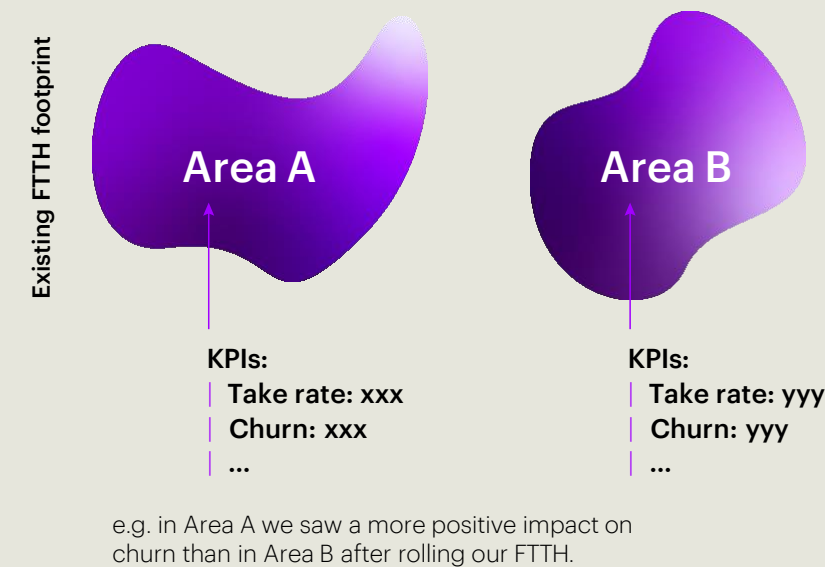
When people move, they often rethink their connectivity options, and people living in apartments tend to move more often than those living in homes. This is, however, only one of many external factors that could explain why one area is more attractive than another for a network rollout.

These observations and hypotheses need to be considered when building a statistical model that explains the differences between various options. Finally, we need to test the model in a new area to confirm the findings.

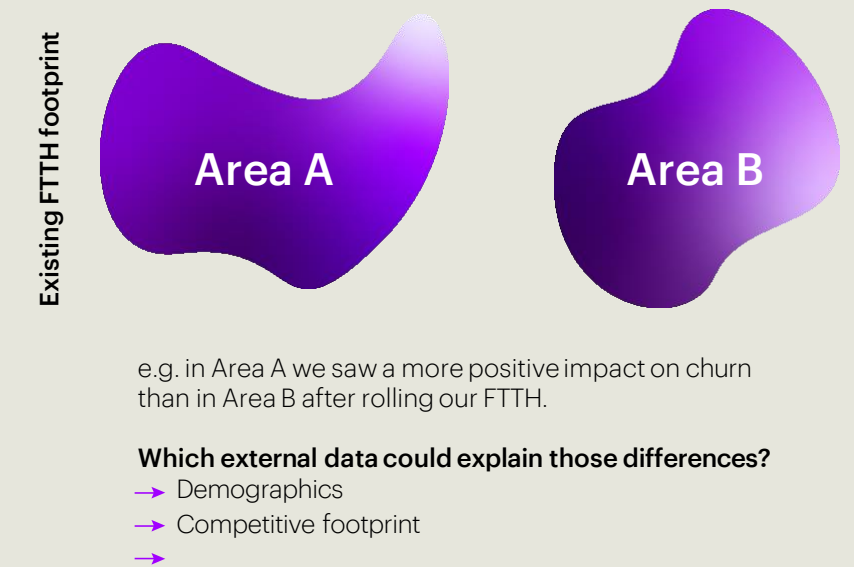
If you don't understand the revenue side, CSPs might invest in assets that become stranded. Building fiber networks in areas with low take rates or areas with high operational costs will mean it takes longer to achieve ROI.

Figure 5: Modelling fiber statistics to improve ROI

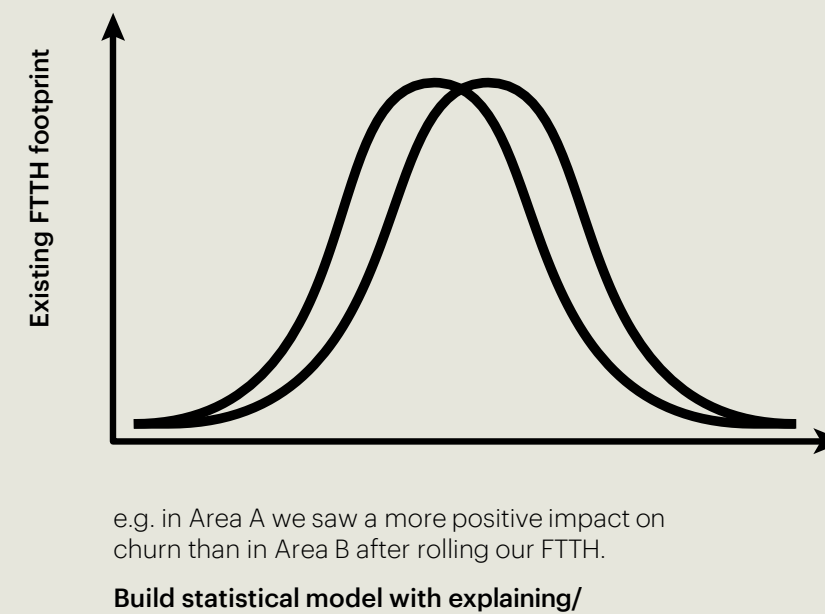
1. **Identify** two areas (already FTTH built-out) with differences in take rate, churn, ARPU, NPS etc.



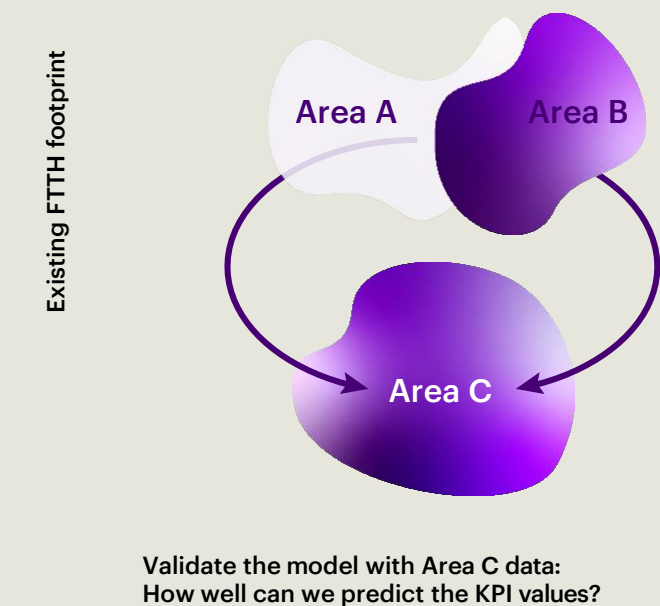
2. **Hypothesize** which external data (e.g. demographics) could explain those differences



3. **Build** statistical model(s) with external data explaining the differences



4. **Test** model with another area (also with existing footprint)



04 Assessing rollout feasibility

In addition to understanding the potential cost and revenue, CSPs need to take rollout feasibility into consideration. In our analysis, we separate constraining factors like capacity, budgets and technical capacity, as well as strategic factors like partnerships, political drivers and other initiatives. Any change in either category can lead to reshuffling the priority of the rollout and need to be considered in a Value-Based Network Rollout approach.

The constraining factors to Value-Based Network Rollouts include:

Capacity

CSPs face their own capacity constraints with their workforce, and external suppliers do, too. Due to the complex nature of a fiber rollout, it's difficult for companies to hire additional workers quickly. What's more, many cities only allow a limited number of crews to operate simultaneously to reduce the impact on traffic.

Investment

When considering the investment case, CSPs must keep in mind that they are often tied to multi-year planning scenarios and yearly investment volumes. This means companies cannot roll out networks in all attractive areas at one time.

Technical Limitations

Complex building situations, where execution of civil works is challenging, will further limit the speed of rollouts and are important to keep in mind.

Strategic factors impacting Value-Based Network Rollouts include:

Infrastructure & Partnerships

Certain opportunities need to be considered strategically, such as the opportunity to dig at the same time as other companies, or new building sites or developments that can lower rollout costs or provide exclusive access to a large customer pool.

Political Drivers

Government incentives can be a reason to change a rollout plan. In addition, regulations can come into place that force CSPs to change their network building plans (e.g., new requirements for changes to the architecture).

Other Strategic Initiatives

Model projects can lead to positive press reviews, or a company's marketing campaigns can also lead to shifts in the rollout plan.

While this is not a complete list of constraining or strategic factors, it provides a good overview of drivers that can influence a carefully prepared rollout plan. In an organization that does much of its planning manually, these factors need to be discussed individually. Over time, they should be integrated and automated as much as possible into the planning process to ensure the best results.

05 Visualization for decision making

Finally, the results of various analyses need to be displayed to strategic planners. To do the analysis, CSPs gather a lot of data and insights. Ideally, they will also have advanced capabilities to make the data more comparable and to weight different aspects. The tools should also enable it to model new scenarios when changes occur, include different time horizons and visualize the expected behavior of the competition. This cannot be done with a static view.

Given the dimensions and related capabilities discussed here, it is clear that network rollouts are not processes that can be managed well in spreadsheets. There is no simple solution. Different dimensions need to be combined into a holistic view, and users must be able to establish, calculate and view the dependency between the dimensions.

Here's a simplified example: both CSPs need to look at the cost of a rollout considering its financial attractiveness and the building restrictions. Next, they need to consider competitor moves, changes in regulations or possible improvements in technology. By weighing multiple factors and scenarios, they can make a more holistic decision after calculating, comparing and selecting.

By using advanced tools and creating simulations, teams can more easily secure funding for rollouts from the management, as questions from executives can be answered easily. Dependencies between actions and inactions can be quickly and easily understood and visualized.

Sample of network rollout analyses



06 Operations & Improvements

Building various rollout models, understanding the correlation between factors and gaining insights into strategic options must be done on a continuous basis. CSPs will need to add factors where needed and incorporate changes observed in the field and new requirements into their scenarios.

To improve continuously, model more scenarios, validate more hypotheses and extract better insights, tools need advanced capabilities such as machine learning and artificial intelligence. At the same time, tools must make the data more consumable.

The five steps to operational efficiency:

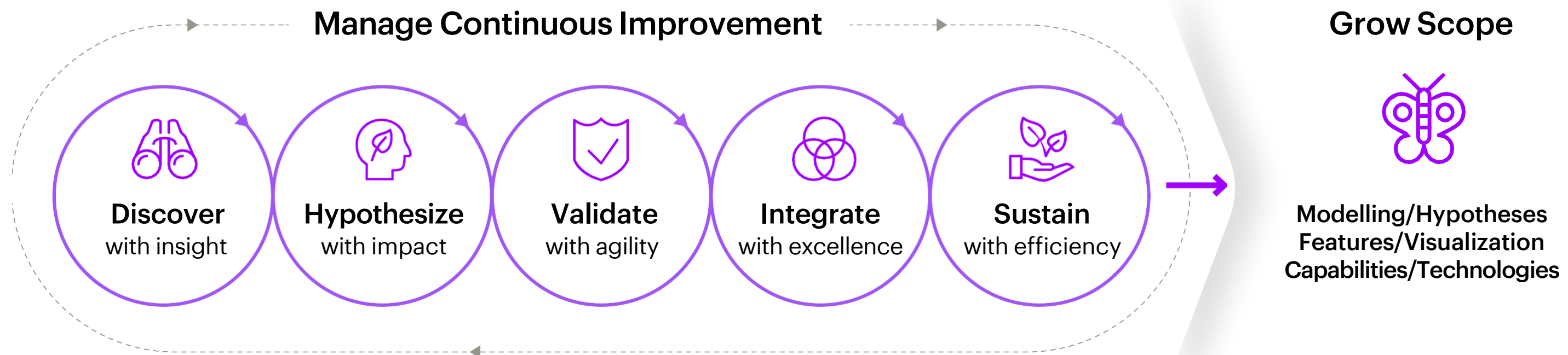
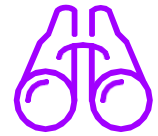


Figure 6: Continuous Improvement Process

The five steps to operational efficiency:



1. Discover with insights.

New data and insights (from inside and outside of the organization) will spark new ideas.

Example: We found evidence that the FTTH take rate is significantly higher in City A vs. City B.



2. Hypothesize.

Use the ideas and data discovered to formulate a new hypothesis.

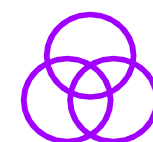
Example: We believe that superb mobile coverage could lead to a lower take rate of FTTH in City B.



3. Validate.

Define how the hypothesis can be confirmed or validated.

Example: We should find other cities that have either a high or low FTTH take rate that is negatively correlated with superb mobile coverage.



4. Integrate.

Enhance your model by integrating the new insight into the model.

Example: Include mobile coverage as a value parameter to estimate FTTH take rates.



5. Sustain.

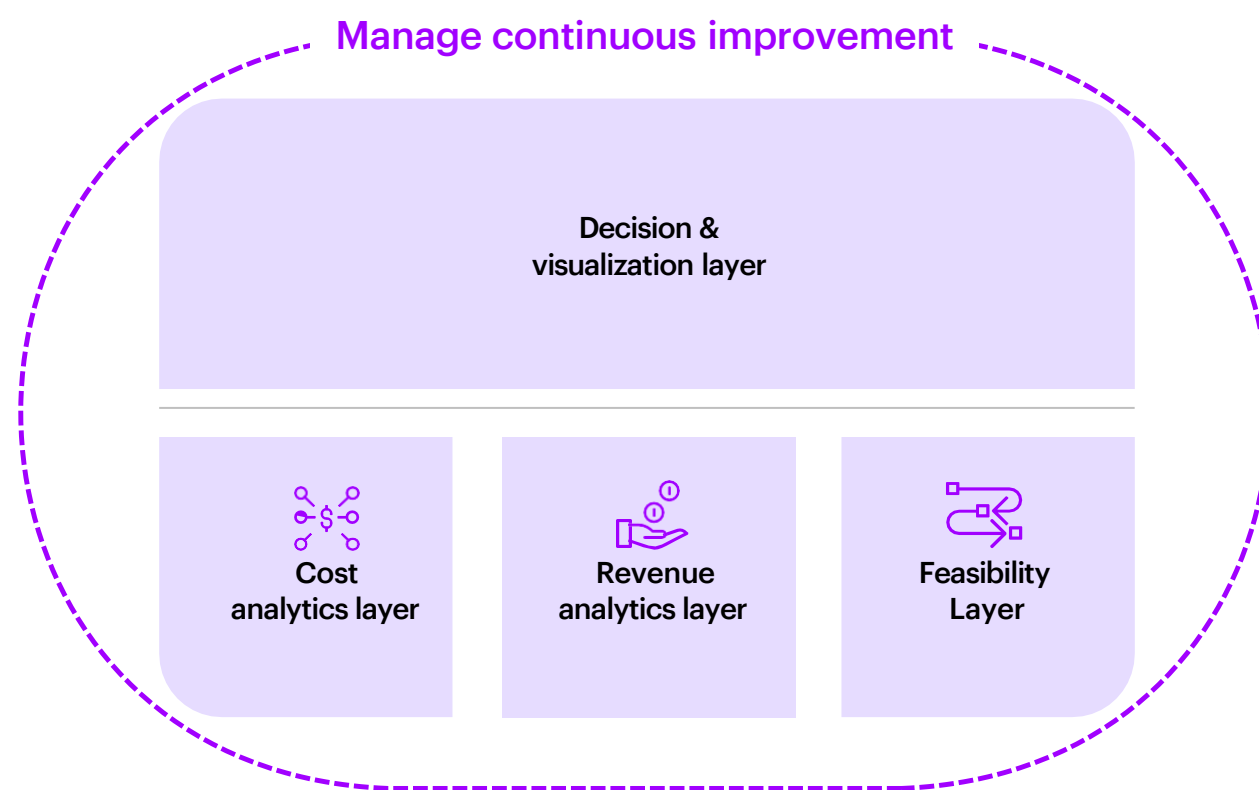
Update input parameters regularly and wherever possible in an automated fashion.

Example: Make quarterly updates of mobile coverage in the model. Conduct regular reviews on the company's assumptions and operations.

07 Holistic value-based network rollout

In this paper, we have shown that a one-dimensional approach to fiber rollouts will not achieve an adequate ROI. Only when all five key dimensions and related competencies are mastered will the potential of a Value-Based Network Rollout be achieved.

Figure 7: 5 Key Dimensions



08 How to get started—the roadmap to efficient scaling

As shown, network rollouts are a complex endeavor. When they are managed right and data is collected and analyzed along the way, companies can gain even more and better insights on where to invest and build. We suggest starting small and getting all pieces in place to begin analyzing and visualizing a few parameters. The insights gained should then be put to a test in a pilot area so they can already deliver the first value. After that, CSPs should focus on efficiently scaling to other areas and enhancing their model.

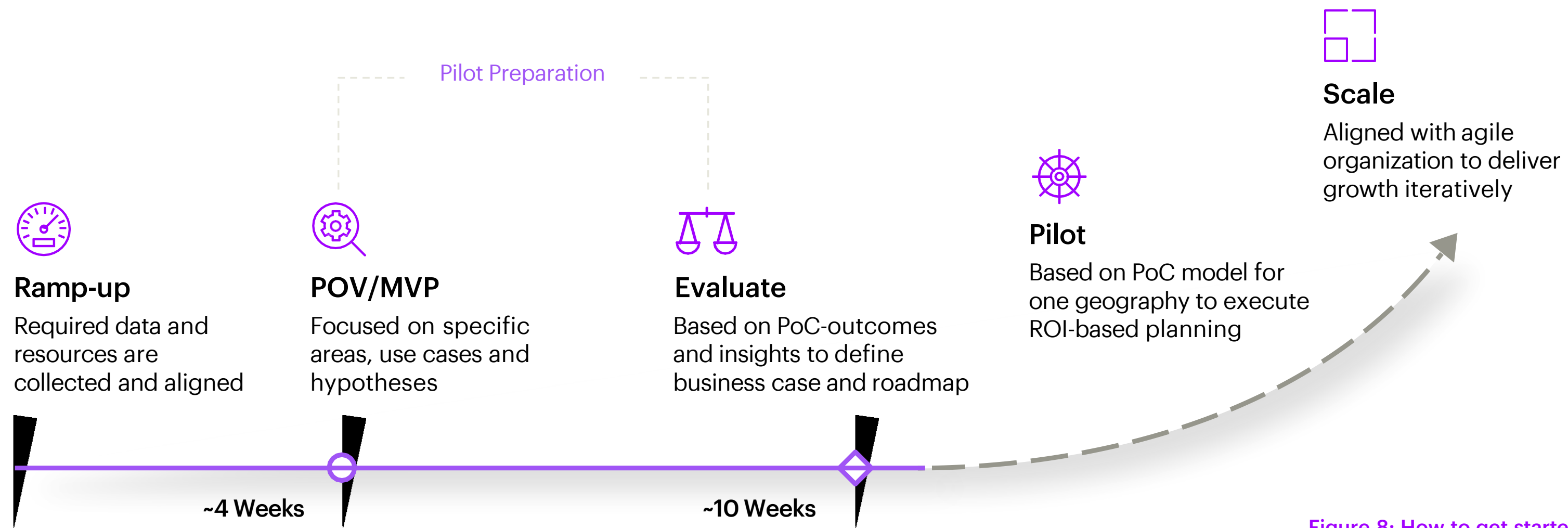


Figure 8: How to get started



09 Conclusion

We believe that these dimensions and related capabilities are key to providing significant ROI on multi-billion-dollar fiber rollouts. If companies fail to consider even one factor, they will get a suboptimal outcome, resulting in lower ROI and a competitive disadvantage.

As seen in the capabilities required, this initiative needs to be rooted throughout the organization, not only in the infrastructure division. Existing silos need to be torn down to make this a successful endeavor. With the massive fiber rollout still ahead, now is the time to use this data-driven approach to ensure better results.

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