

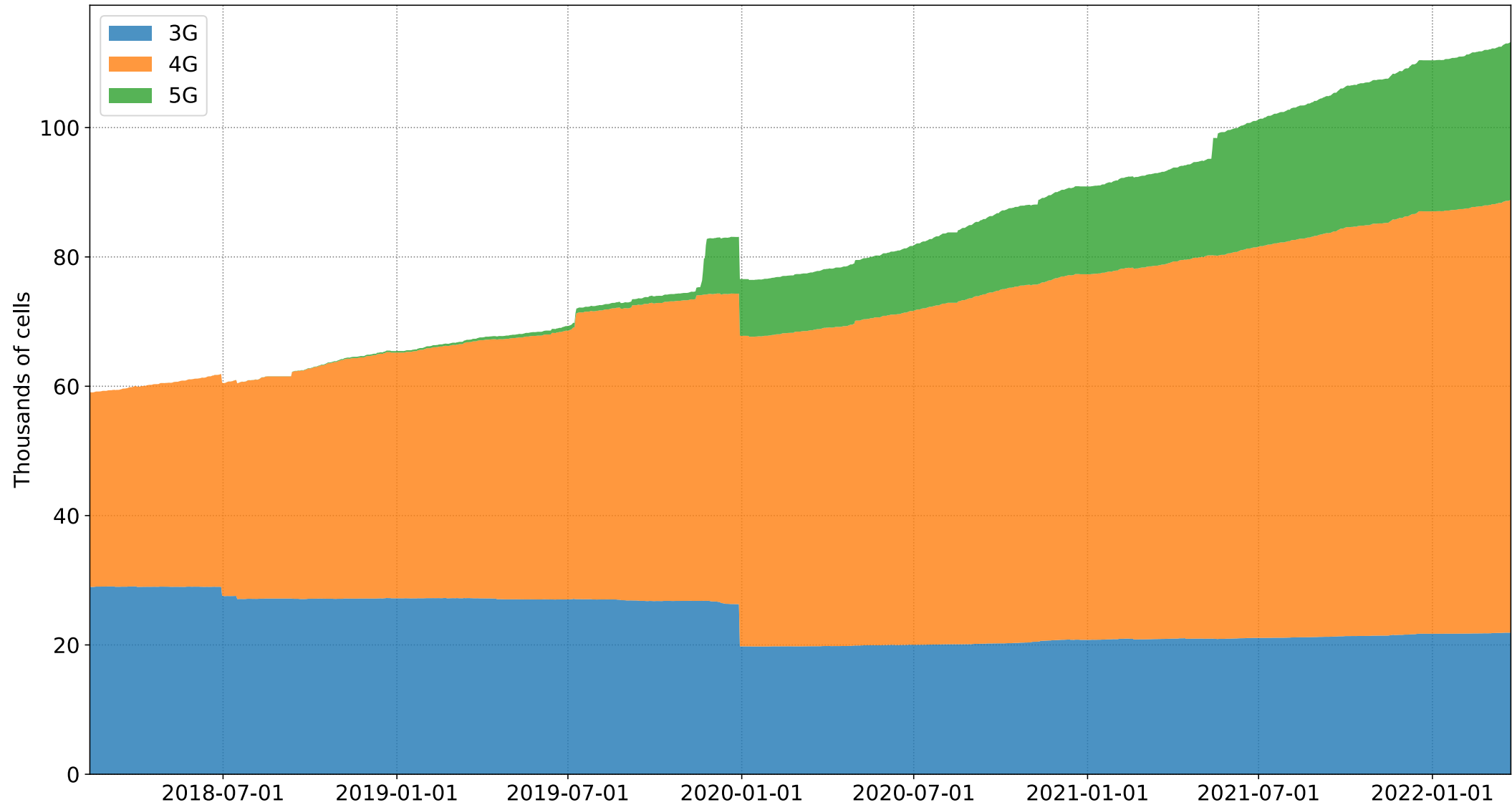


Creating a new super tuner for mobile networks using ML

Pavle Belanovic, Jules Triomphe



The Swisscom mobile network is evolving





Optimisation complexity is growing rapidly



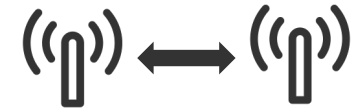
More cells

113'258
and counting...



More parameters

Newer 5G cells have more
parameters than 4G ones



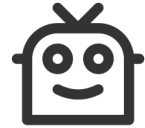
More interactions

New mechanisms for
resource sharing 4G-5G

We are expecting a **2.5x increase in complexity**
of our radio optimisation work over the next 2 years.



ML for radio optimisation



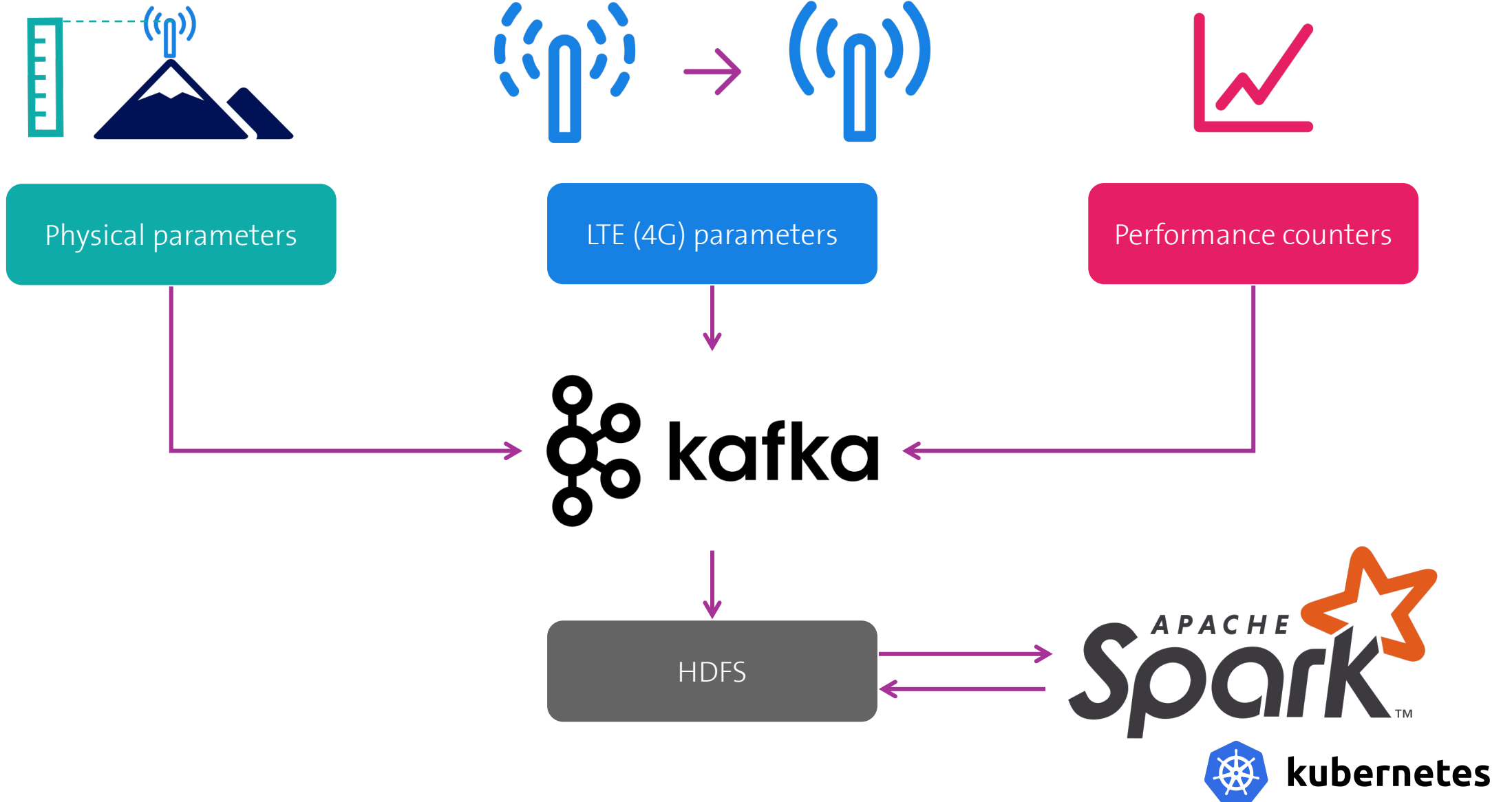
ML plays a major role
in our plan to address
this growing complexity



Launch AutoTune
as an ML product that will
accelerate radio optimisation



Data sources





Pipeline

Physical parameters

LTE (4G) parameters

Performance counters



Pipeline

Physical parameters
without changes

LTE (4G) parameters

Performance counters



Scale



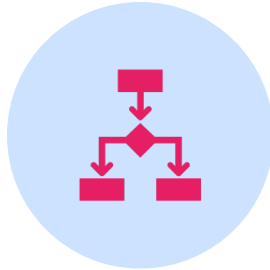
Over 60'000 cells



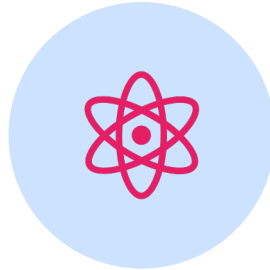
Each cell has over 1'500 configurable parameters



Each parameter takes multiple values



More than **10^{451}**
combinations per cell



10^{82} atoms in the
visible universe

Impossible to explore all possibilities





Pipeline

Physical parameters
without changes

LTE (4G) parameters

Performance counters



Pipeline

Physical parameters
without changes

Selected
LTE parameters

Number of cells
Number of days
Number of different values

Performance counters



Pipeline

Physical parameters
without changes

Selected
LTE parameters

1 value per day

Performance counters



Pipeline

Physical parameters
without changes

Selected
LTE parameters

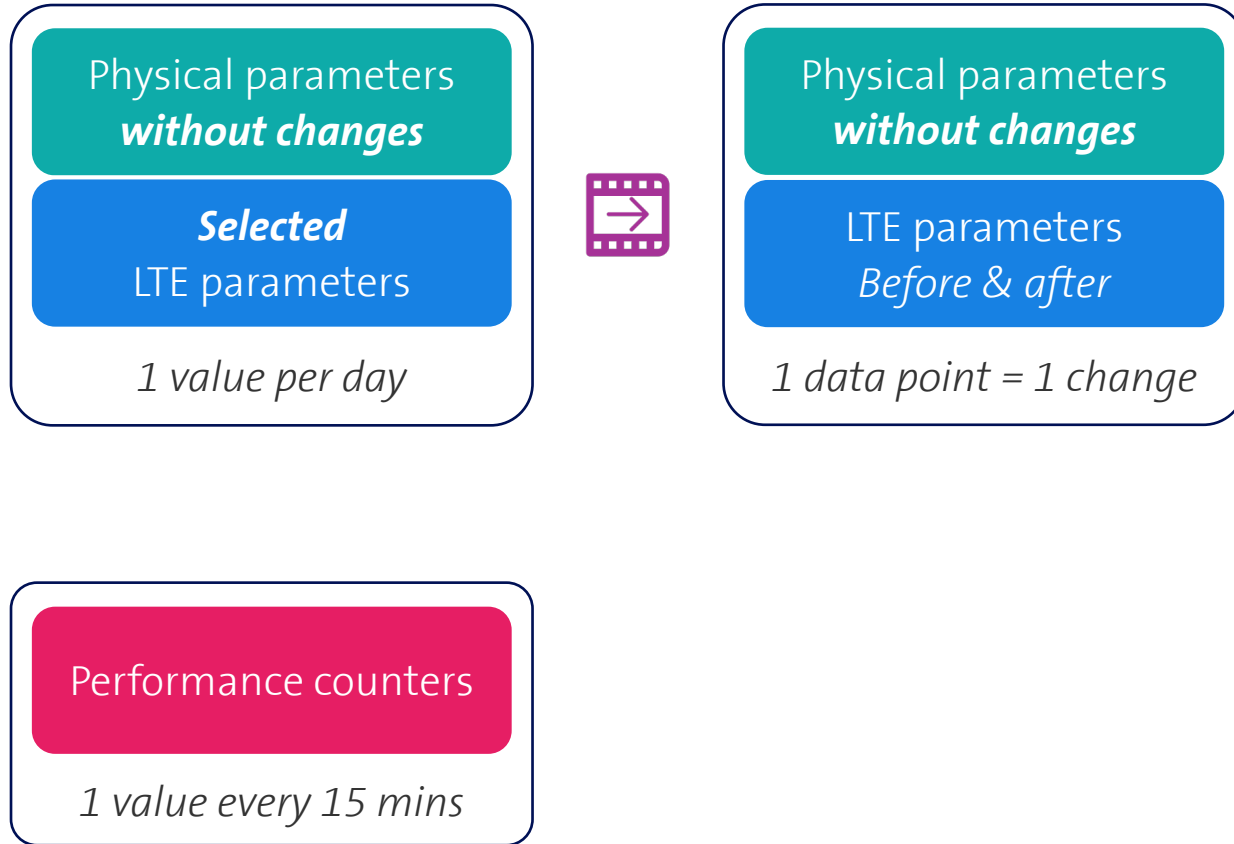
1 value per day

Performance counters

1 value every 15 mins

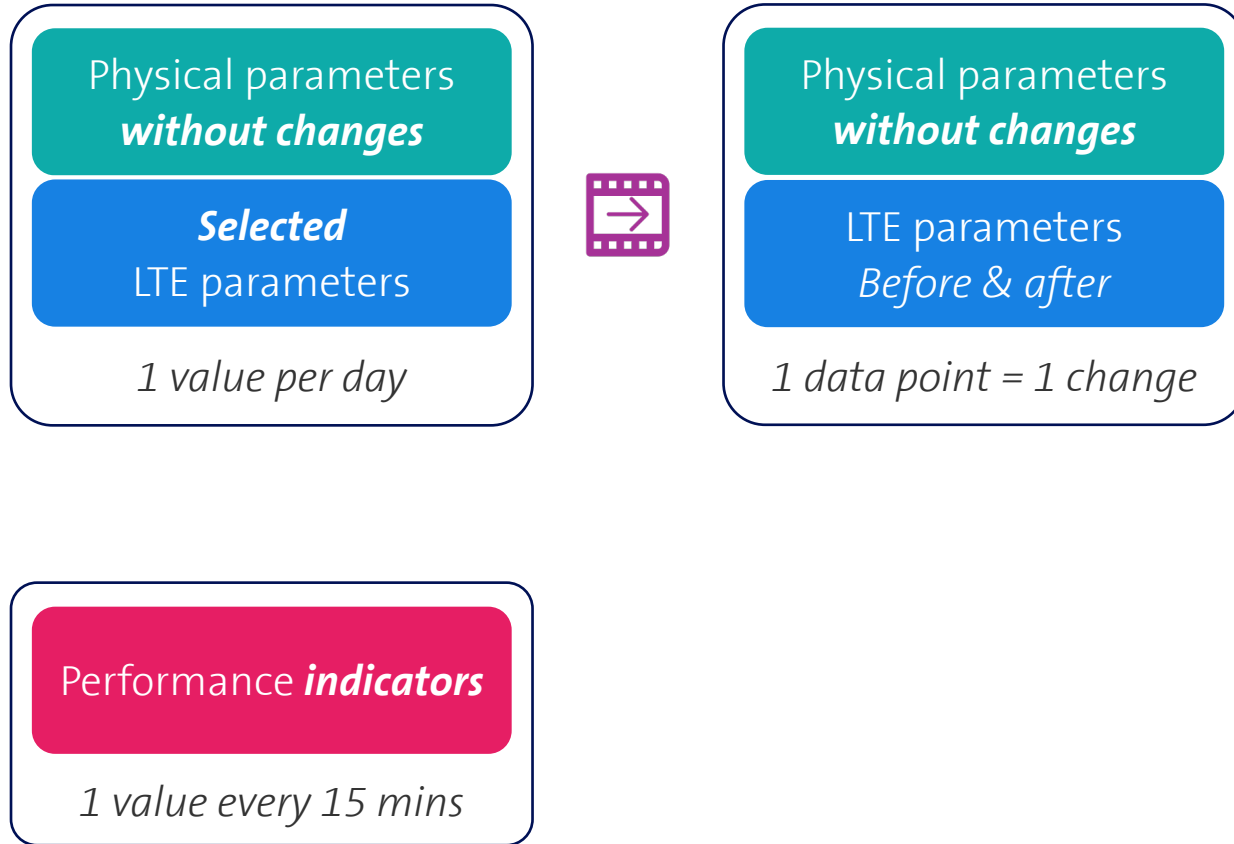


Pipeline



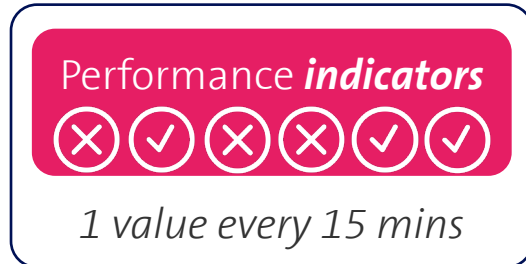
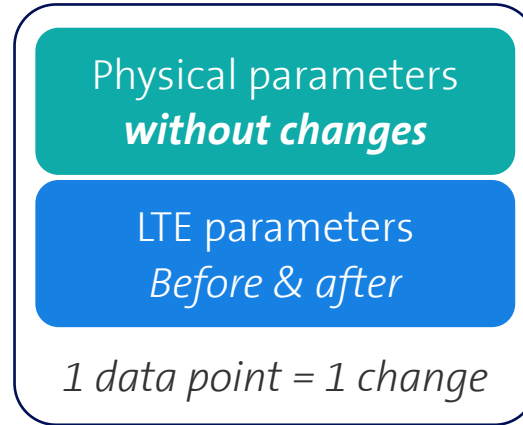
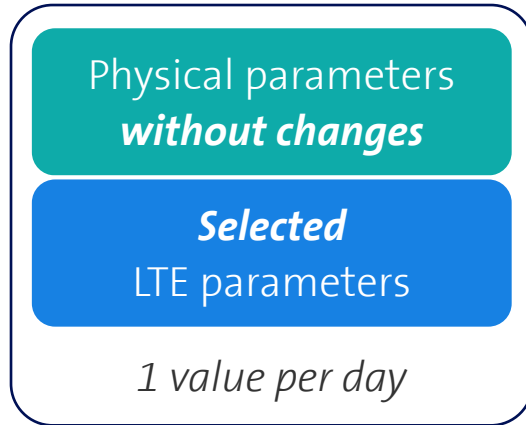


Pipeline



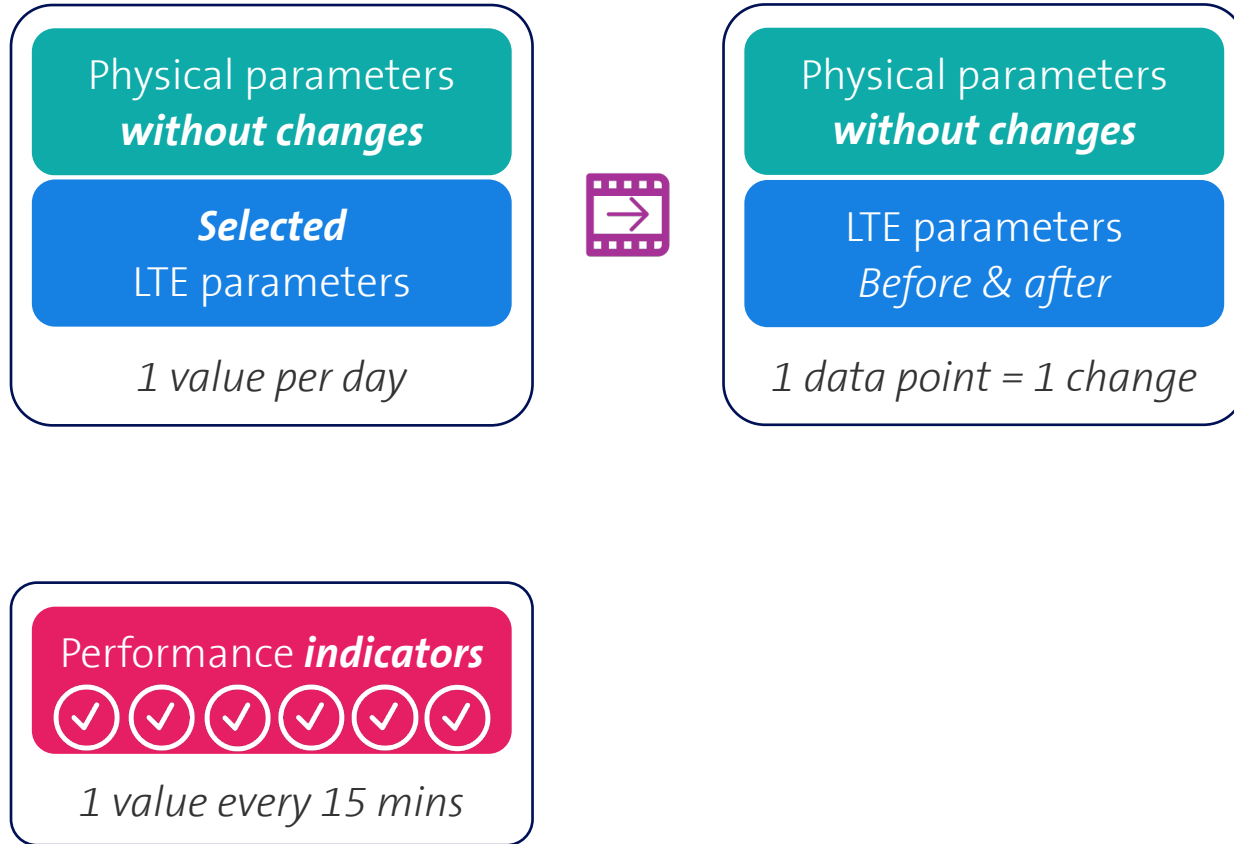


Pipeline



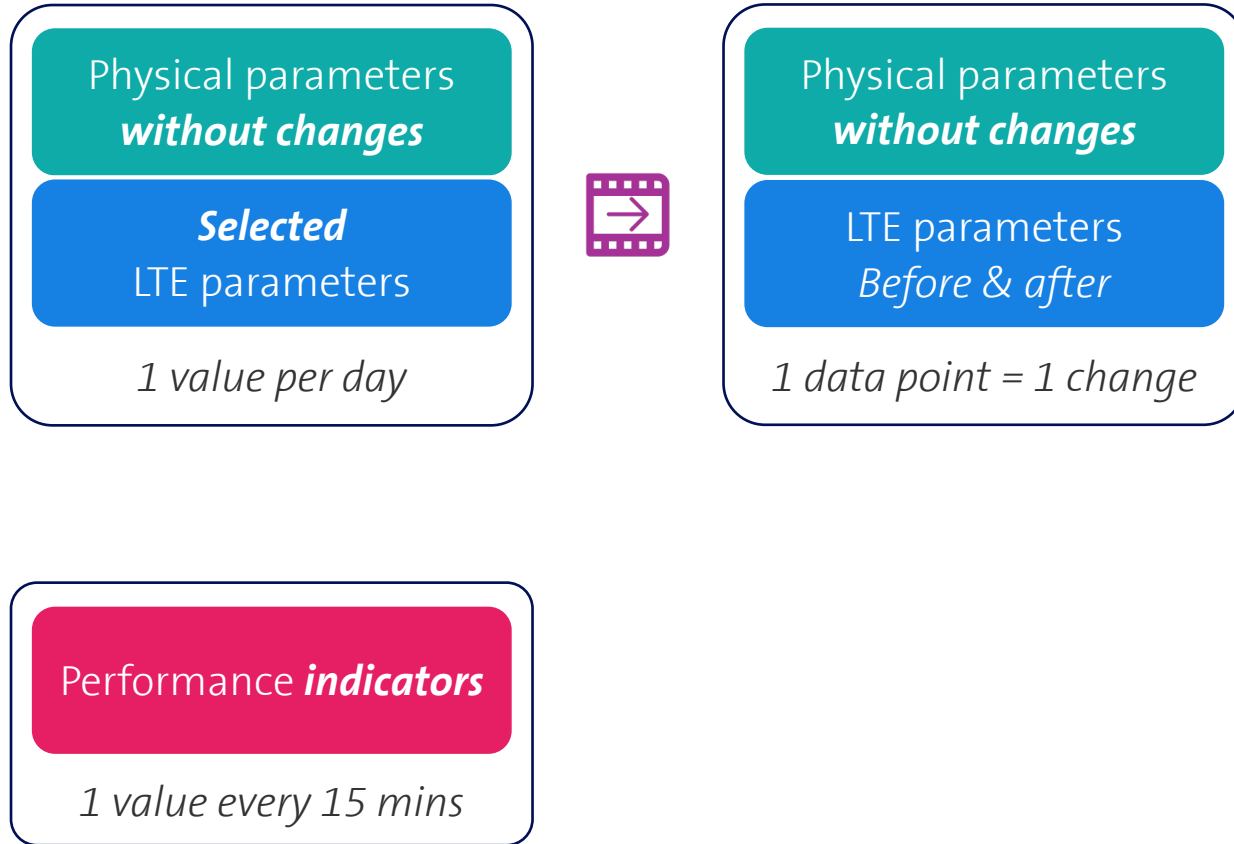


Pipeline



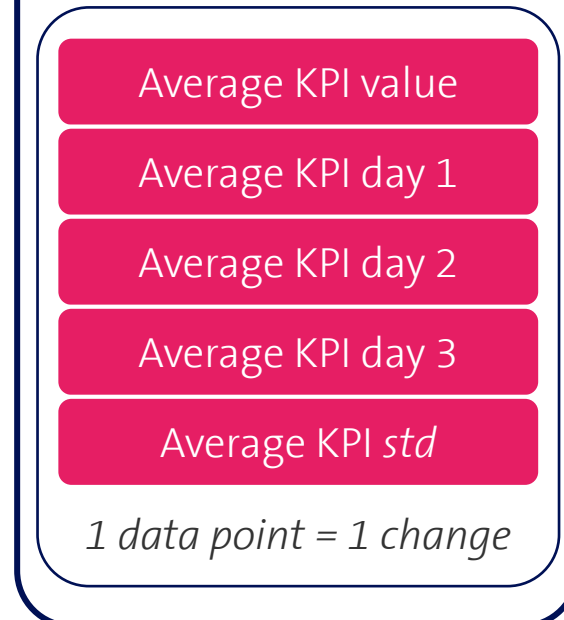
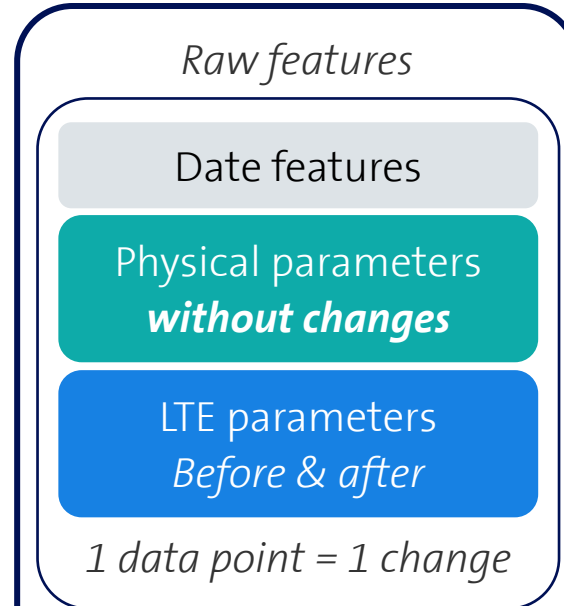
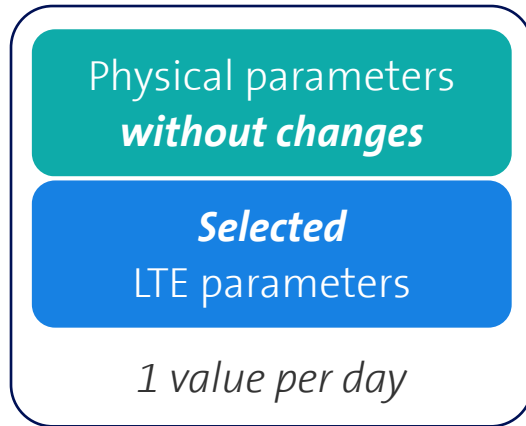


Pipeline





Pipeline



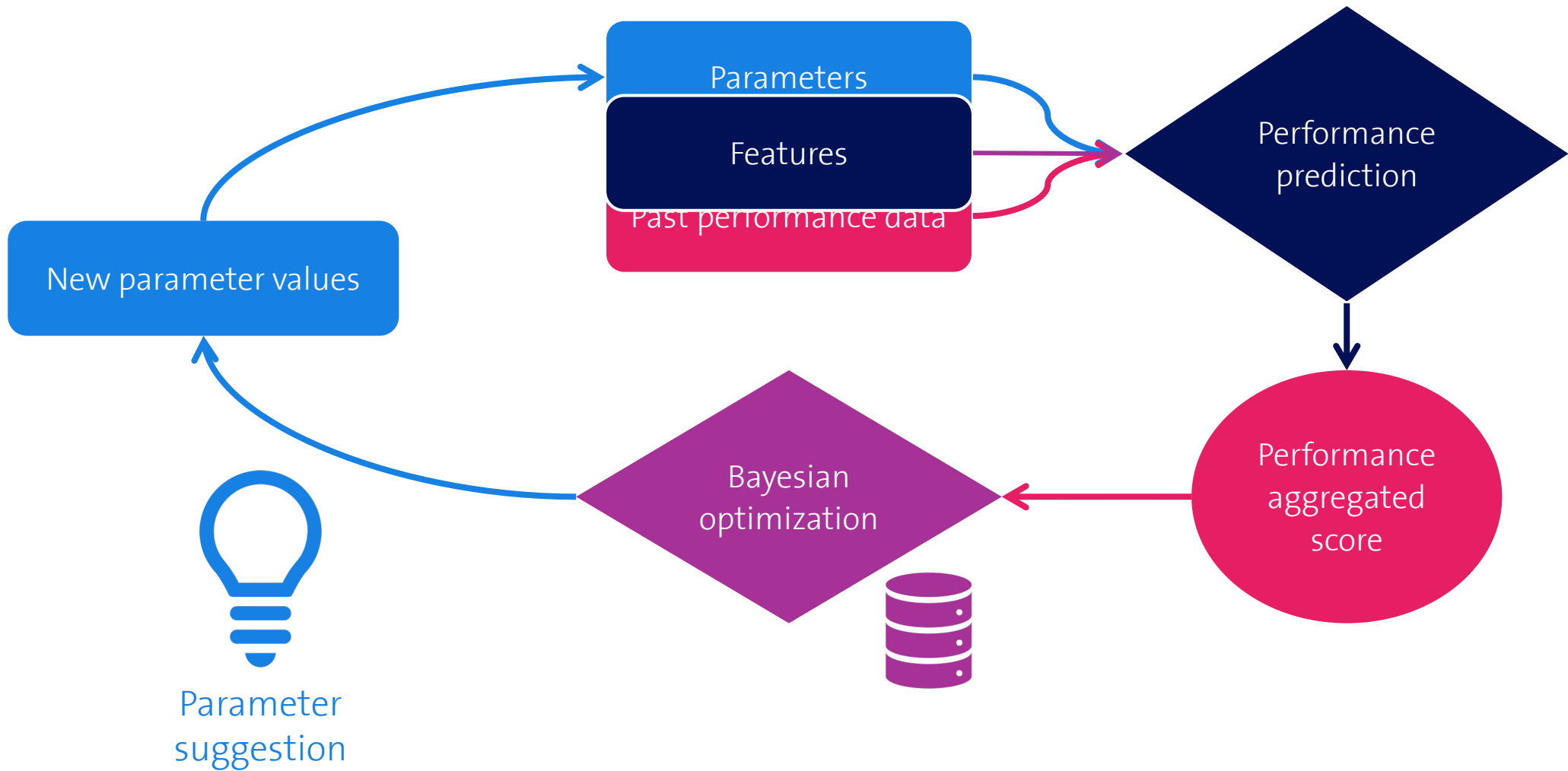


Pipeline

Features

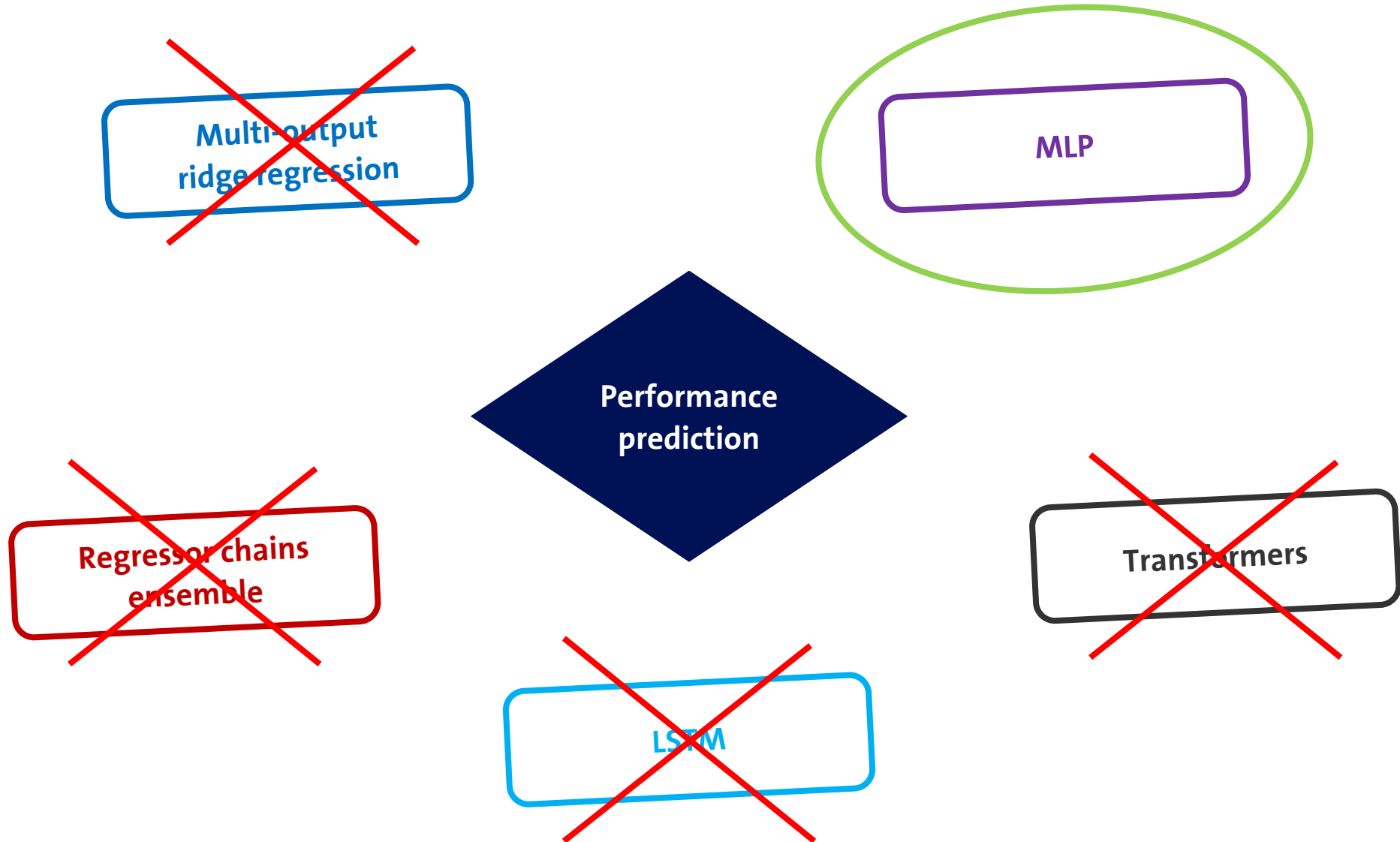


Overview





ML models





Conclusion

1. It's good to keep things simple when possible
2. ML can bring real, tangible benefits to mobile networks, and their customers
3. Cross-domain collaboration is critical to the success of ML-based products
4. Streamlining the undifferentiated work (data engineering) allows more focus on value creation (ML and domain-based results)





Backup slides



Cell performance improvement

