



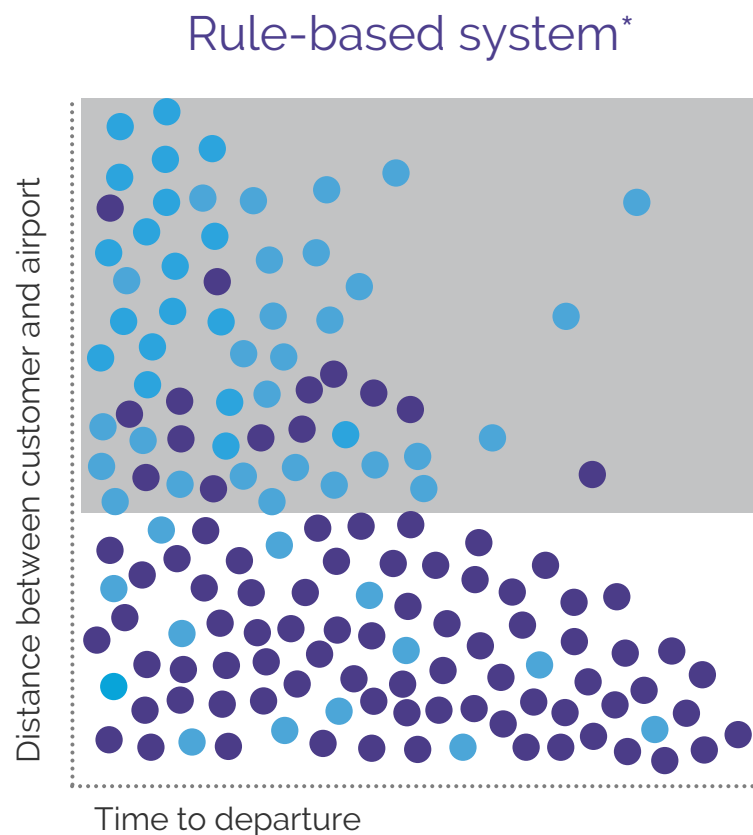
Rodrigo Camacho

Transitioning from Rules to Machine Learning

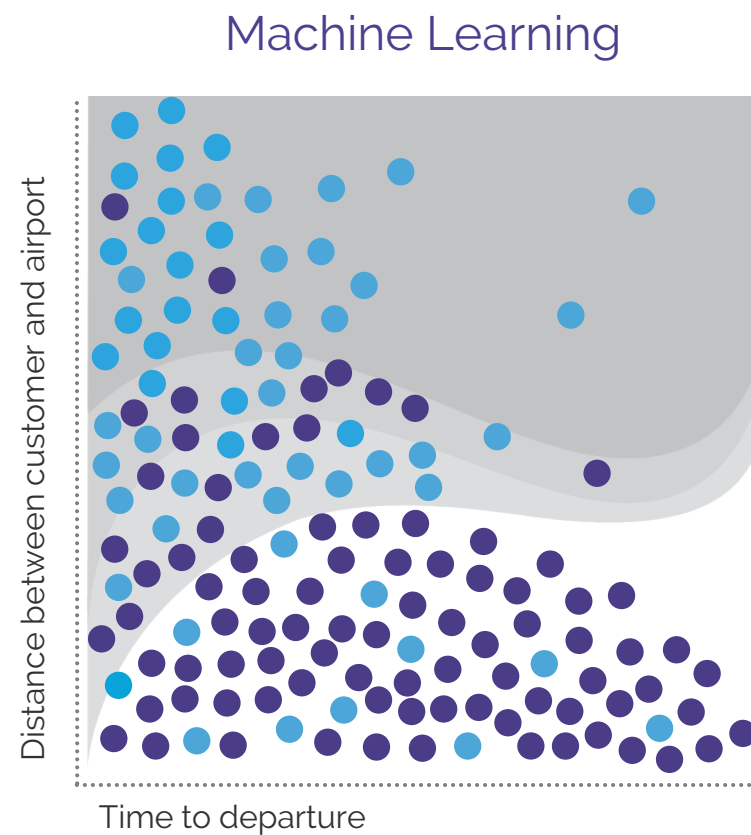


Why are rules insufficient

Machine Learning distinguishes many shades of grey, instead of seeing only black and white



* a rule that automatically rejects people who buy from a place that is over 1000 km from the departure airport



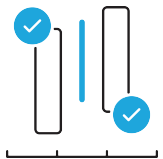
● Legitimate client ● Fraudster

Machine Learning proves to be better for fraud prevention



High accuracy

Ability to pinpoint trends difficult to spot by human



Predictability

Easy to follow progress regarding KIPs



Sustainability and flexibility

The ML engine adaptable to new frauds without multiplying rules with impossible to understand impact

How does Machine Learning work?

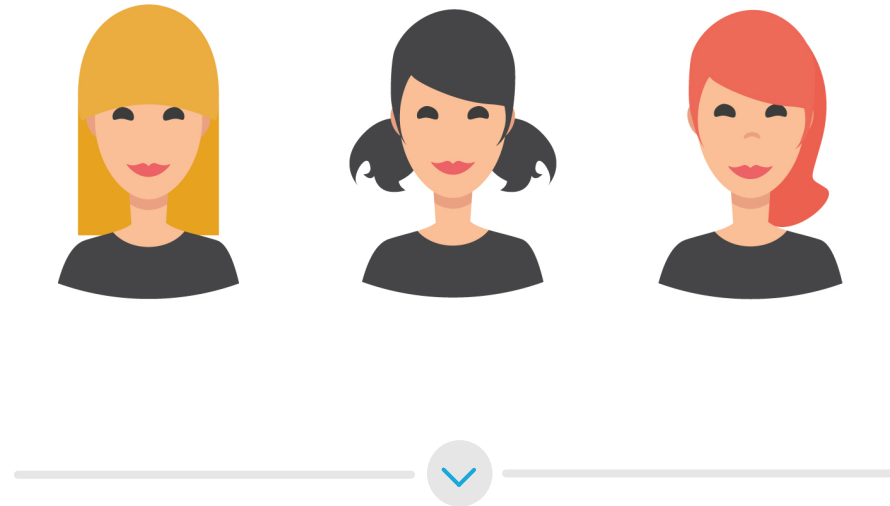
Please bare with me on this one - it will make sense



Thousand variables allow you to distinguish people
Setting simple rules could lead us to wrong conclusions

Let's use rules to tell people apart

- Color of eyes
- Size of lips
- Colour of their shirt

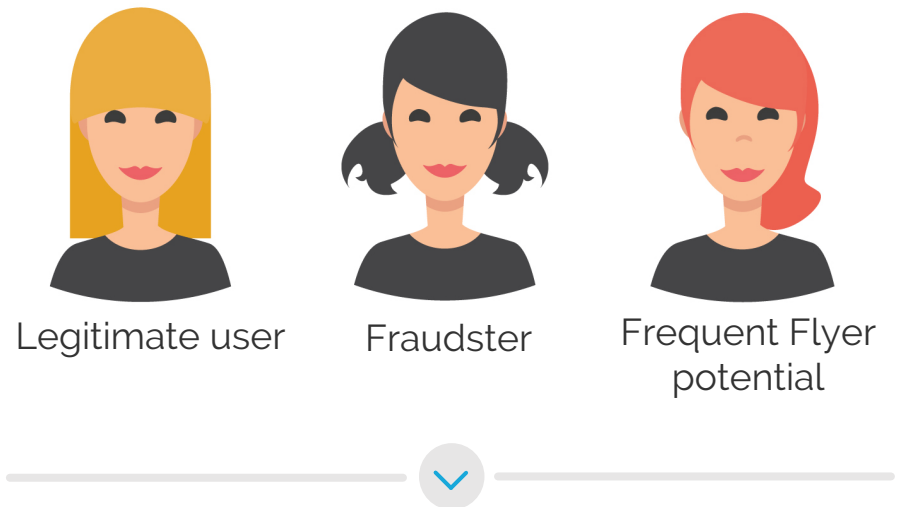


According to the rules we defined these three people are the same

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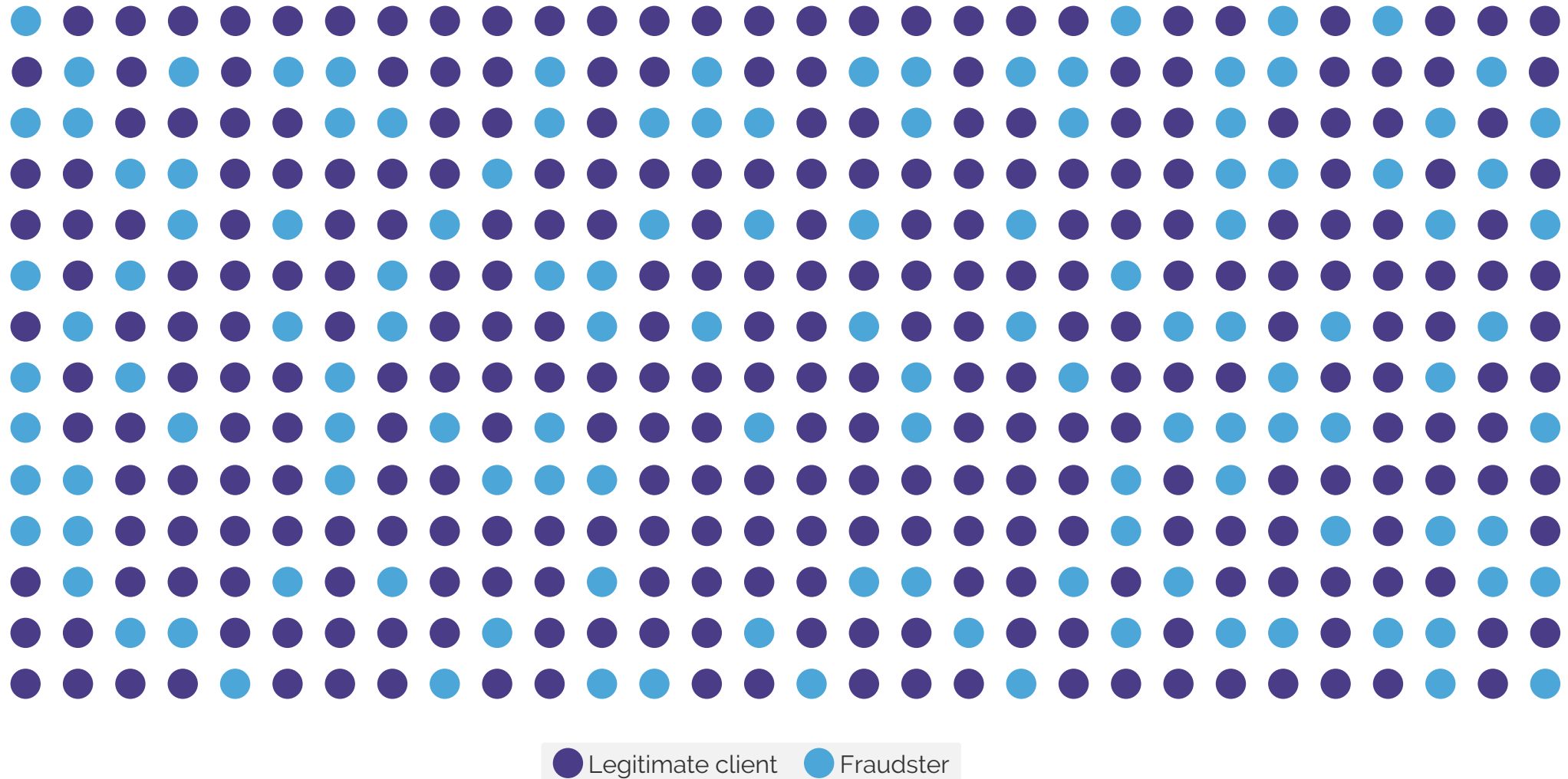


According to the rules we defined these three *people* are the same

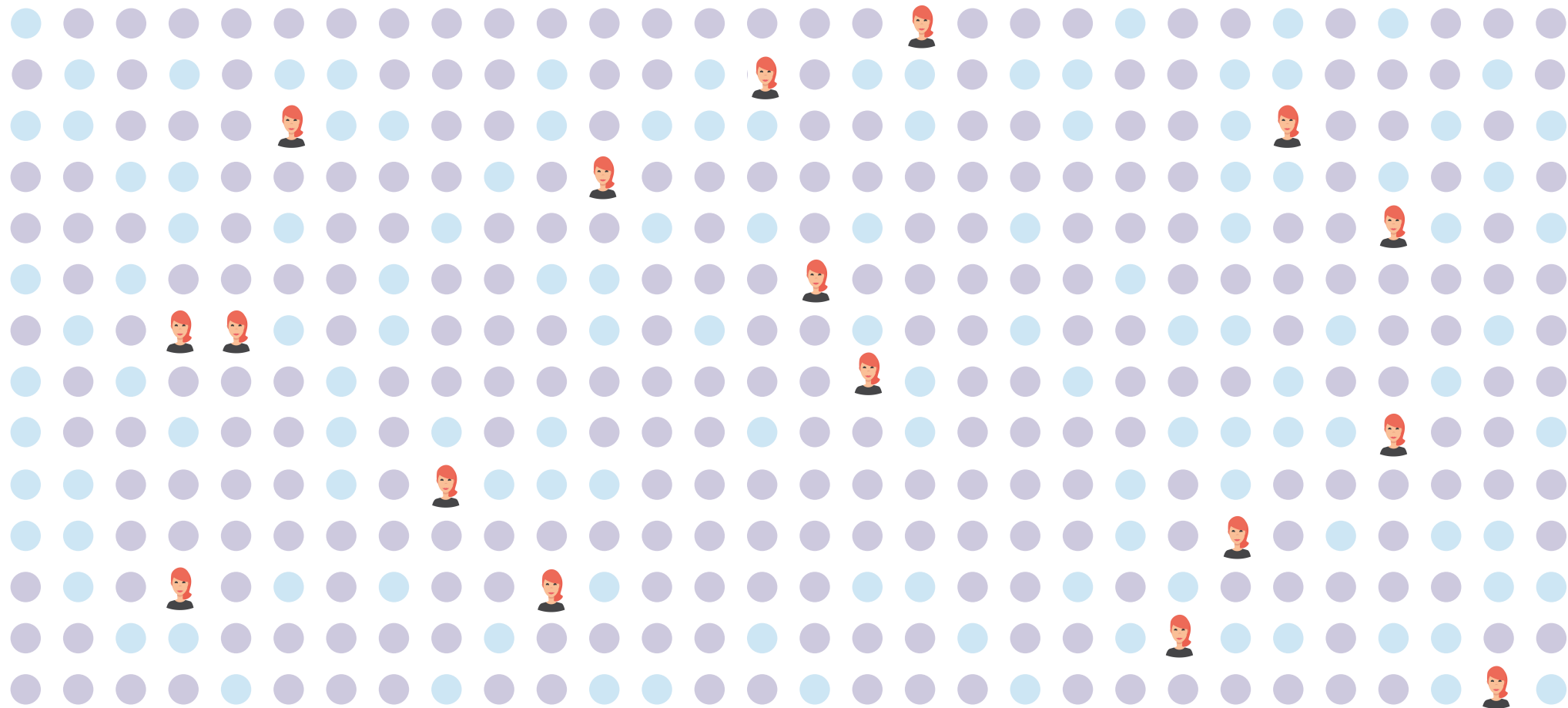
And what if there were more of them?



Thanks to ML you can not only tell the fraudsters from legitimate users...



... but also segment clients

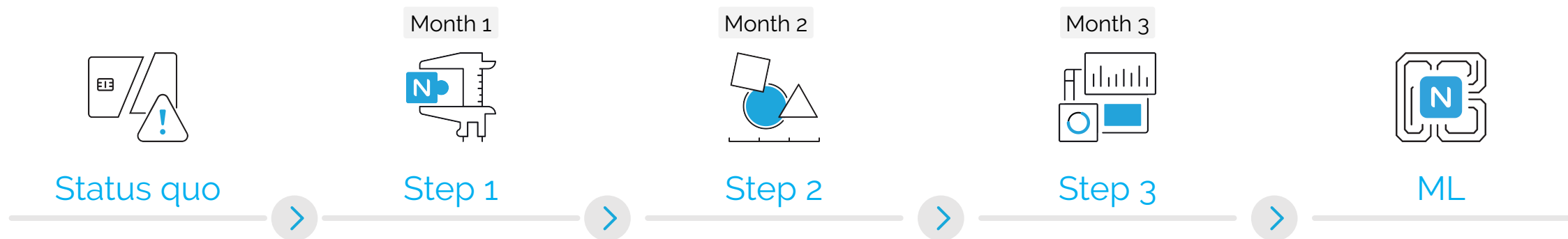


● Legitimate client ● Fraudster 🧑 Frequent Flyer & FF potential

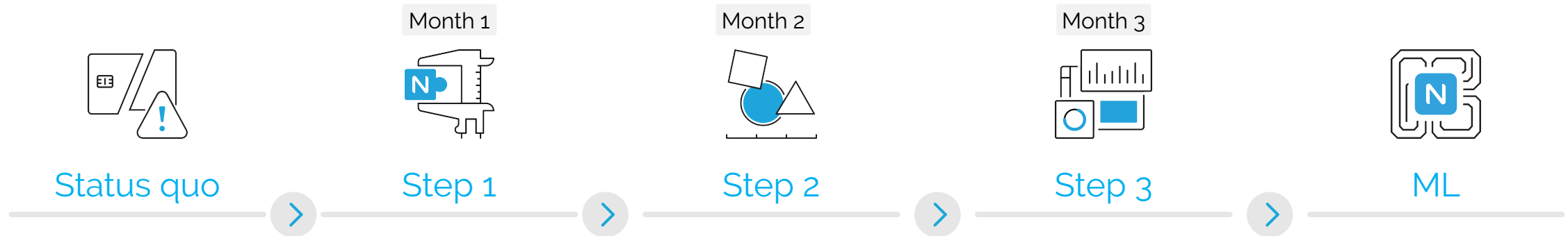


How to move from rule-based system into ML

Moving from rules into ML



Moving from rules into ML

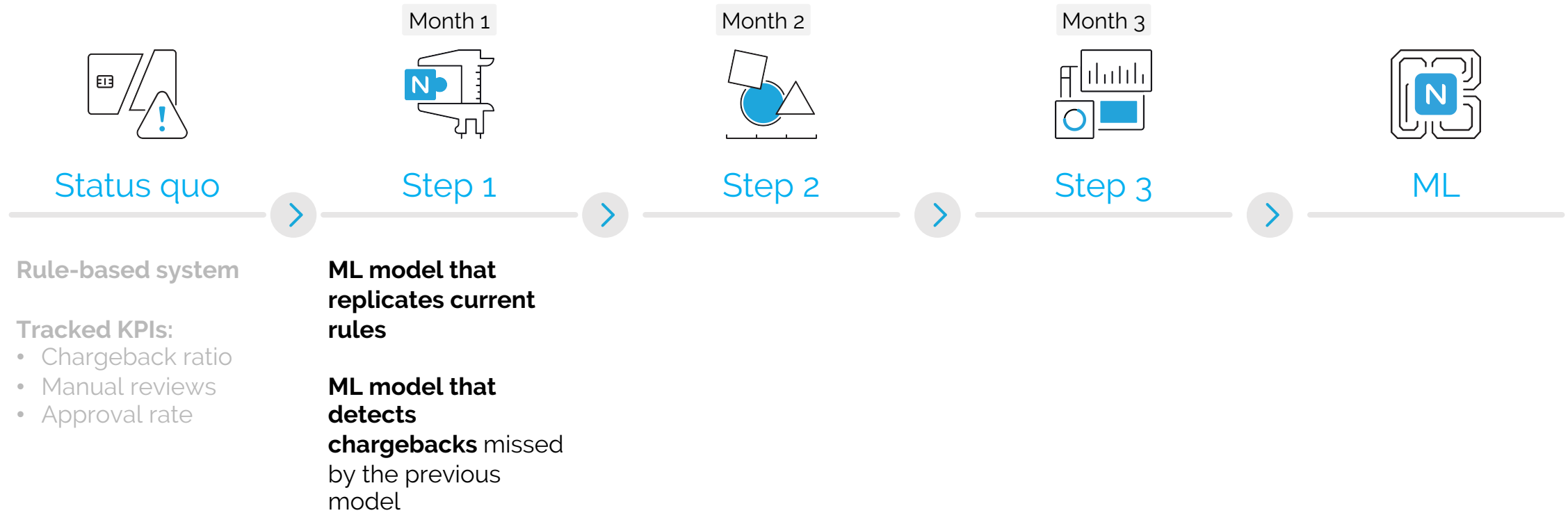


Rule-based system

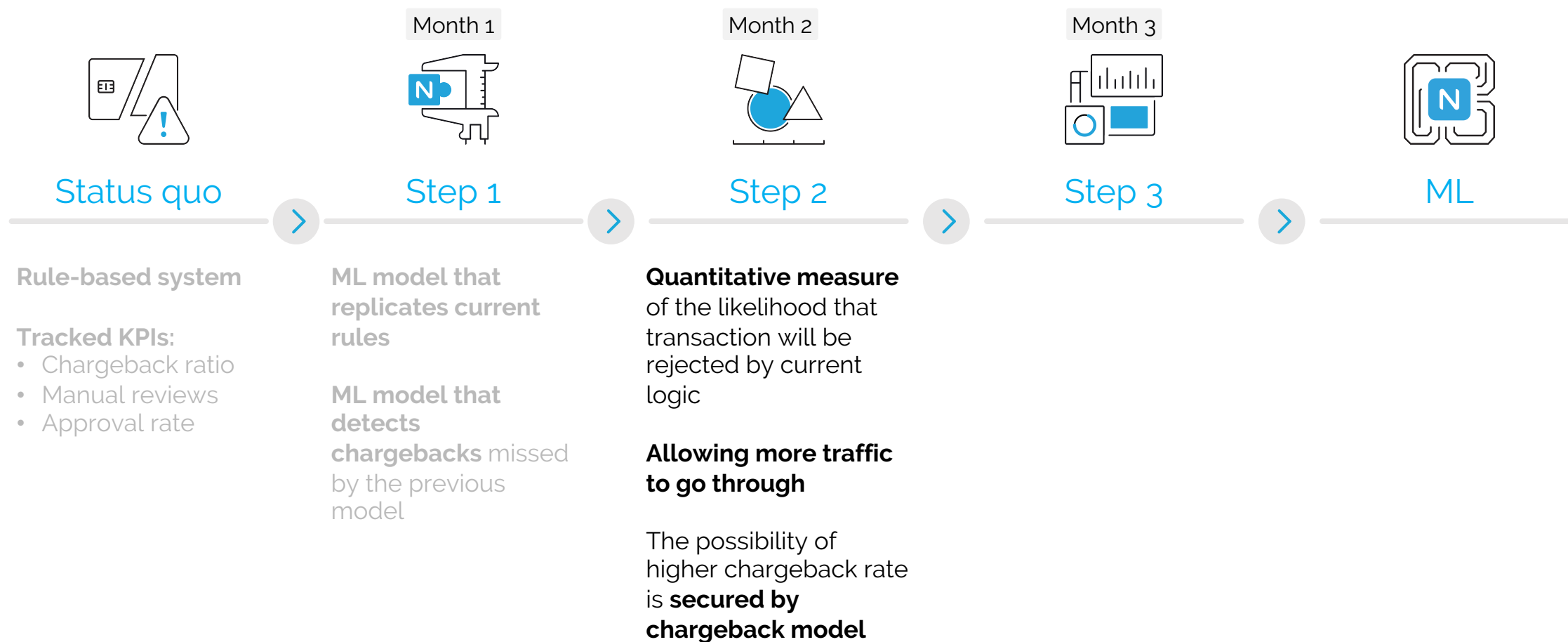
Tracked KPIs:

- Chargeback ratio
- Manual reviews
- Approval rate

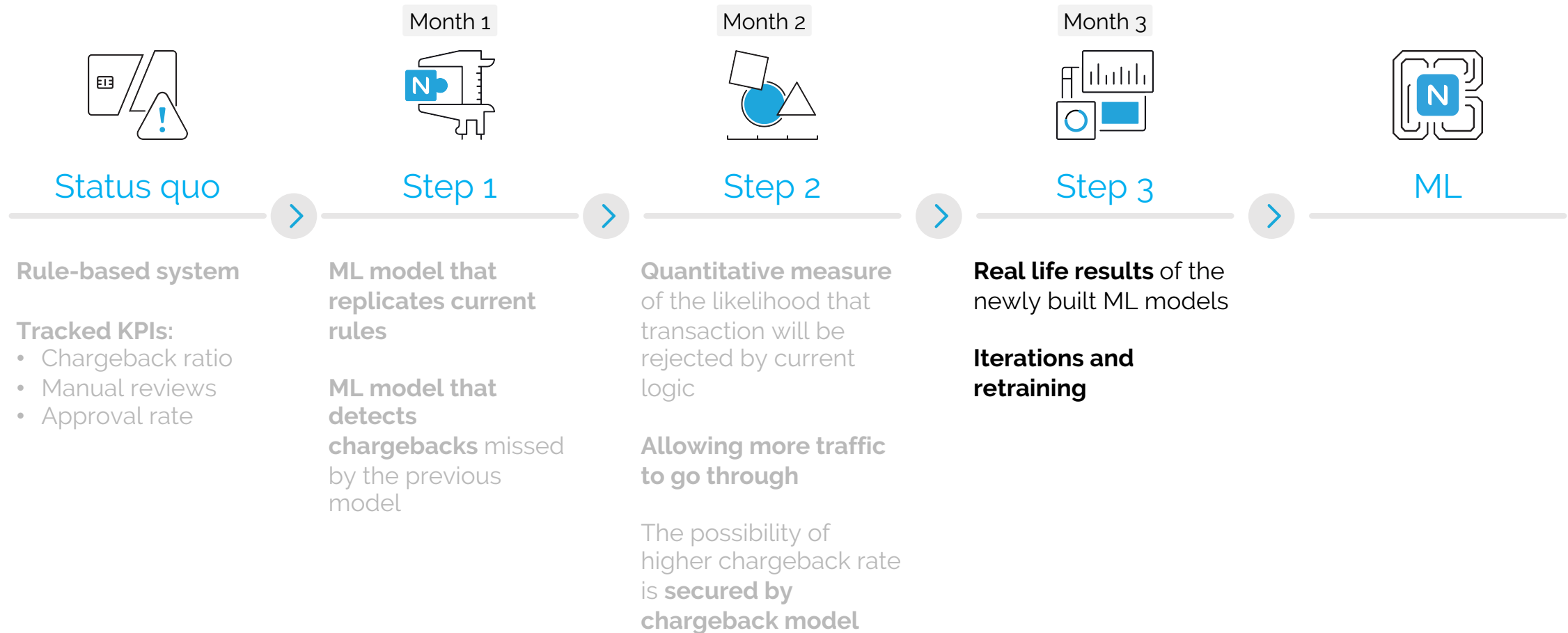
Moving from rules into ML



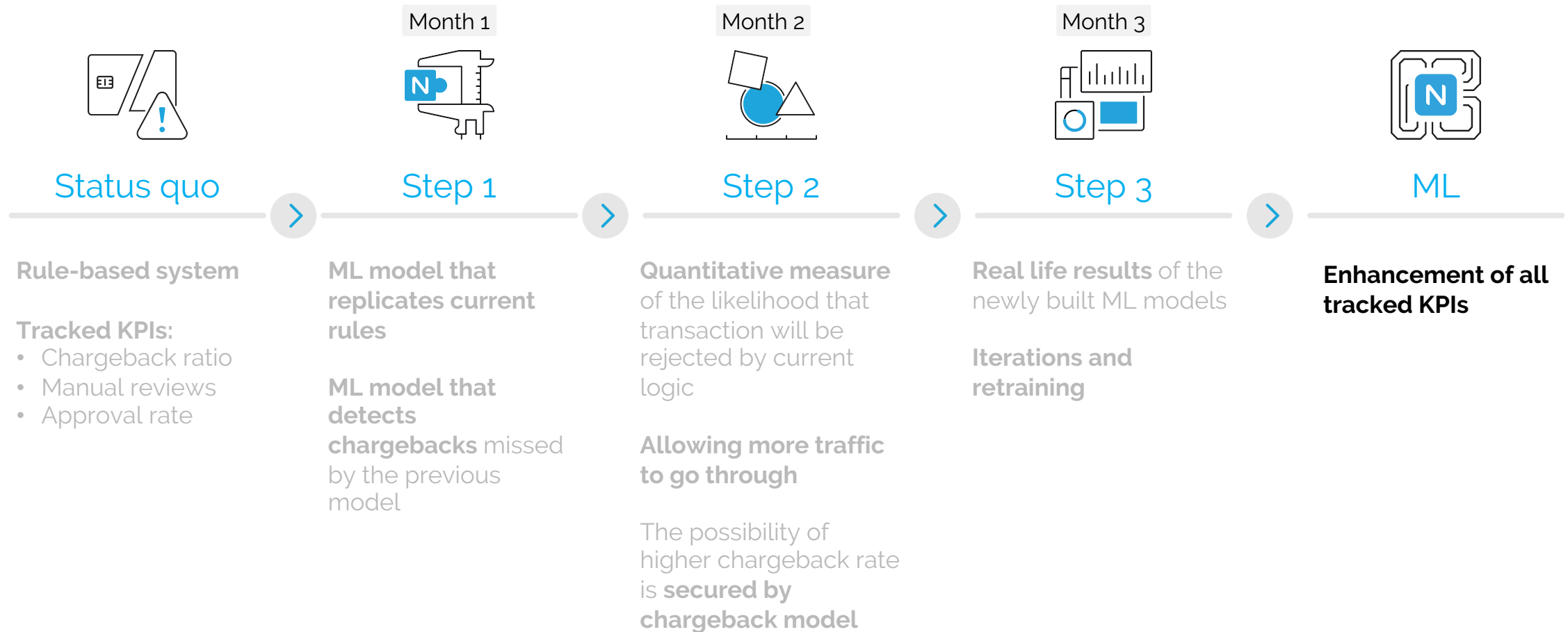
Moving from rules into ML



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Moving from rules into ML



Moving from rules into ML



0.2%

Chargeback rate

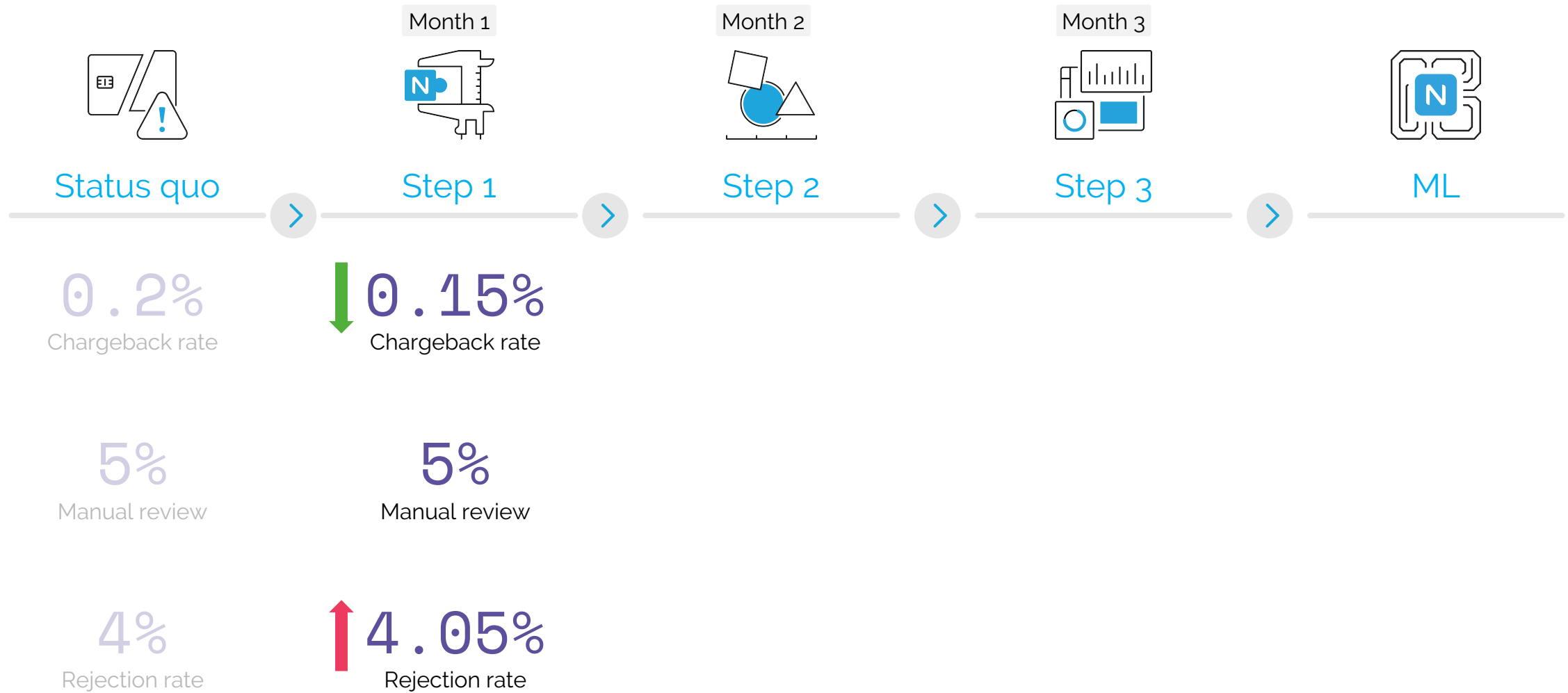
5%

Manual review

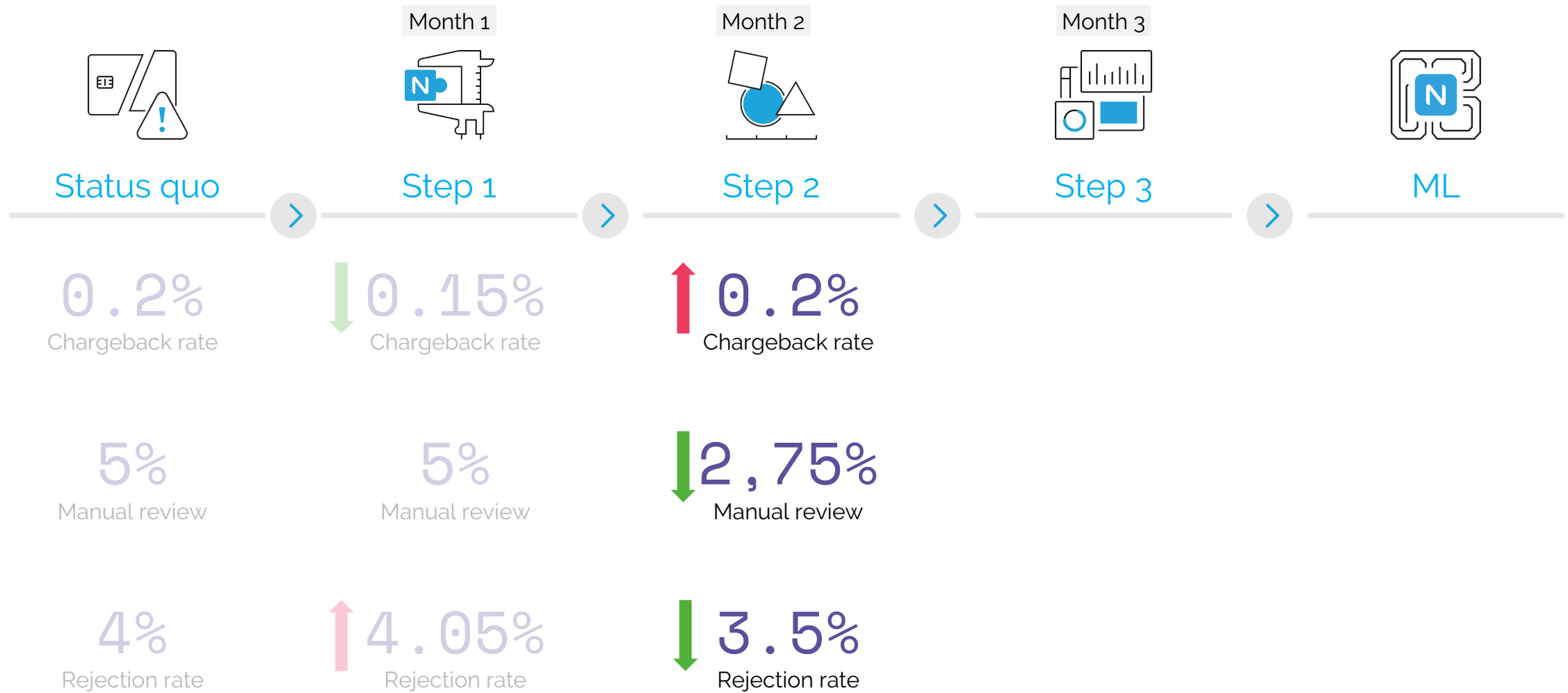
4%

Rejection rate

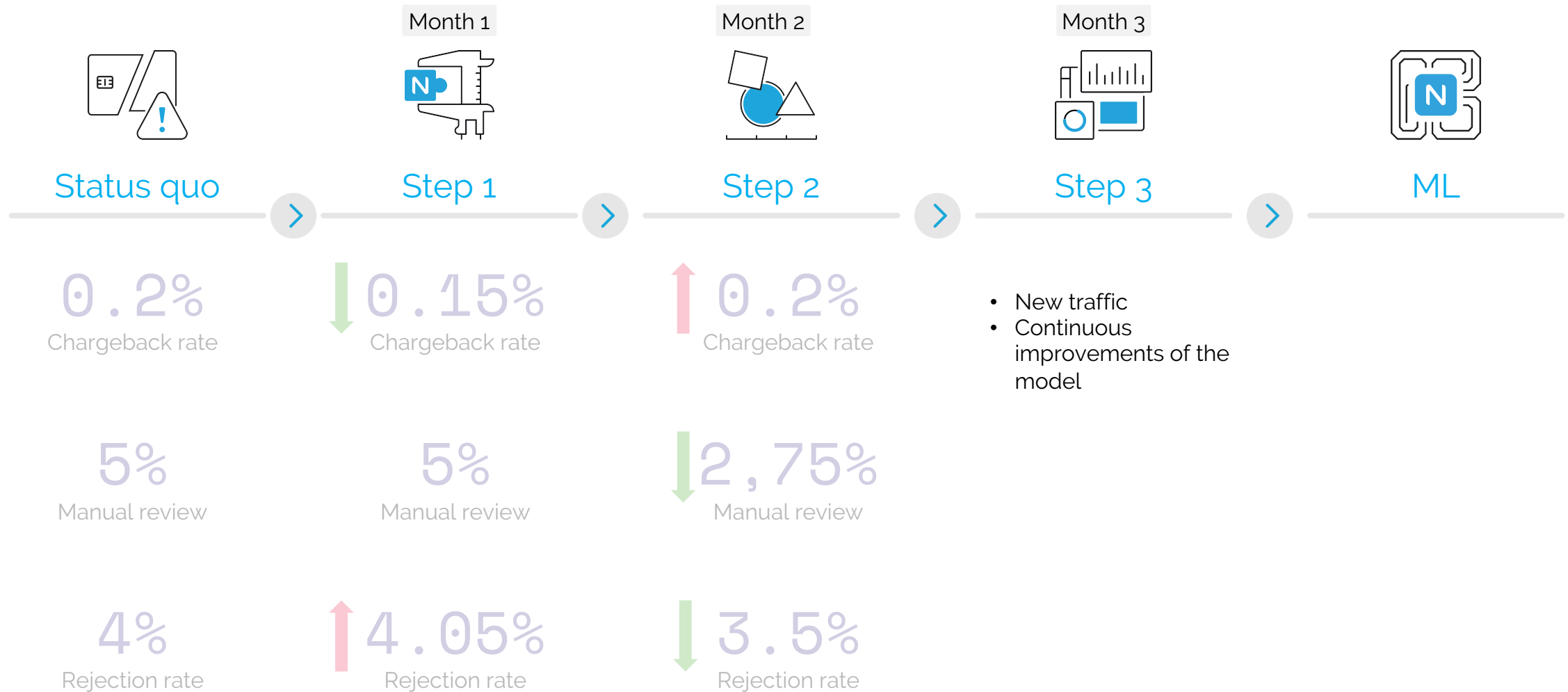
Moving from rules into ML



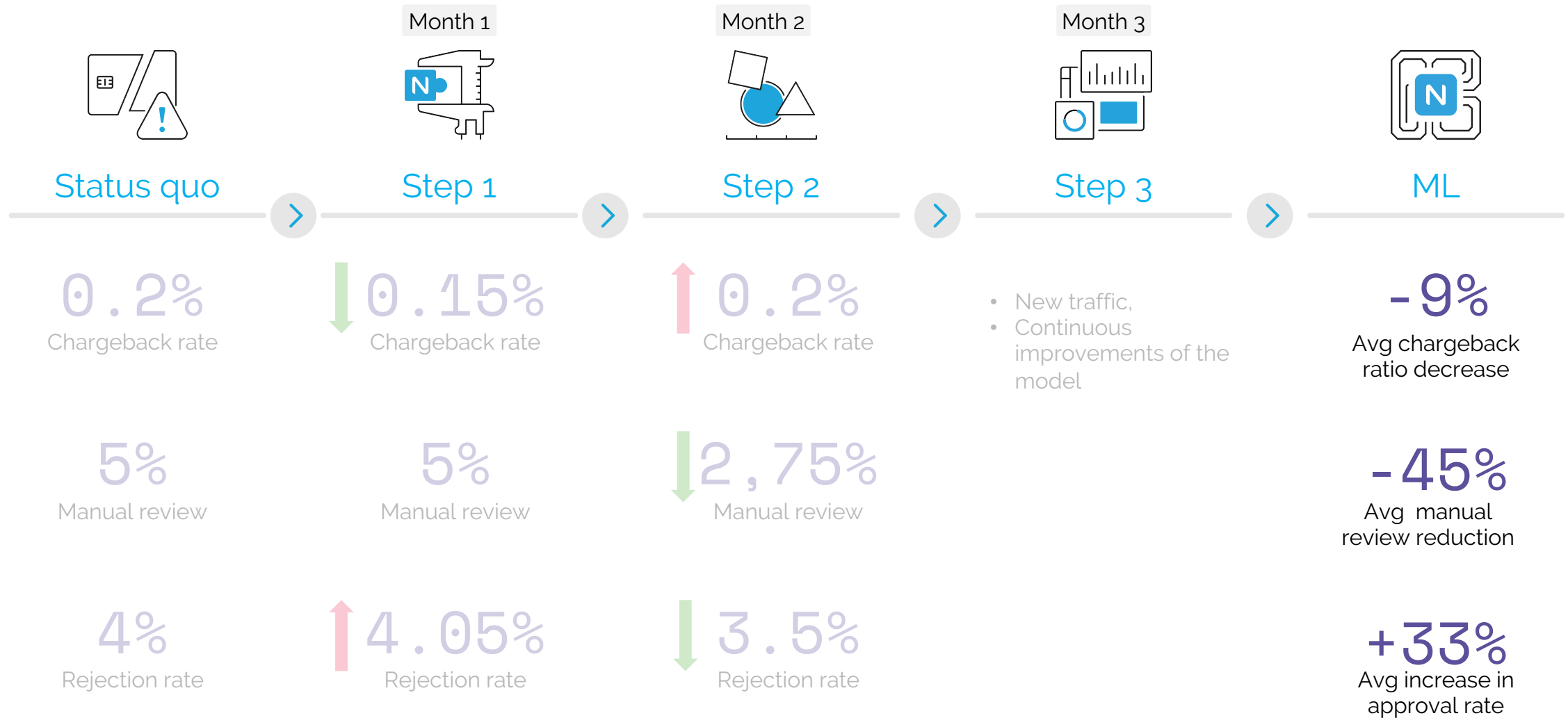
Moving from rules into ML



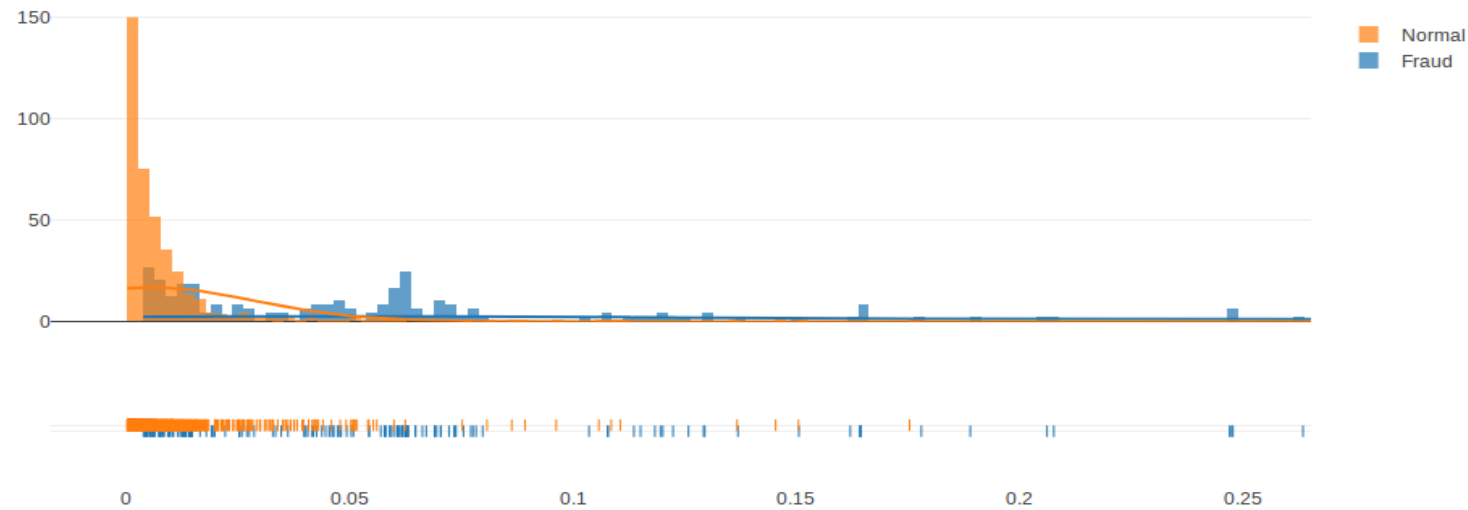
Moving from rules into ML



Moving from rules into ML



What about velocity rules?
They can be replaced by a similarity model



Was this configuration seen among last 10000 users?



- MacBook Air 13'
- macOS Mojave 10.14.5
- 1,6 GHz Intel Core i5
- Google Chrome – not up to date
- Positive flight time
- VPN
- User-agent Spoofing
- ... over 5000 other traits

The key is to have huge volumes of data to fuel the engine



Hardware, software and browser intelligence

- GPU characteristics
- GPU detection
- Virtual machine detection
- Number of processor cores
- Mobile device detection
- Mobile emulation detection
- Battery
- Server OS detection
- DOM rendering engine anomalies
- HTML quirks
- Special cookies (based on HTML technologies, self regenerating)
- Popular fraudster's tools detection
- Spoofing detection
- Incognito mode detection
- Browser quirks
- Various fingerprints



Behavioural data collection

- Mouse/Touchpad movements
- Swipes/Touches or scrolls
- Keystroke dynamics
- Gyro readings
- Accelerometer
- Clipboard usage



Network intelligence

- IP geolocation
- TCP/IP stack analysis and anomalies detection
- Connection type detection (Wi-Fi, cellular) based on low level network analysis and/or browser features checks
- OS Fingerprinting
- VPN/Proxy/Tunneling detection
- Tor detection
- Public IP leak /Local IP leak
- Server-based connection detection



ML can go through **125 times more variables** and find complex correlations that increase accuracy of predictions



5,000+ attributes

Nethone



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