

facebook

Dr. NMS

or: How Facebook Learned to Stop Worrying and Love the Network

Jose Leitao [jleitao@fb.com]



ZERO IMPACT NETWORK



Jose



Mikel

Jose

Mayuresh

David



Jose Leitao added a new photo

18 mins · 🌐



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We'll be talking about



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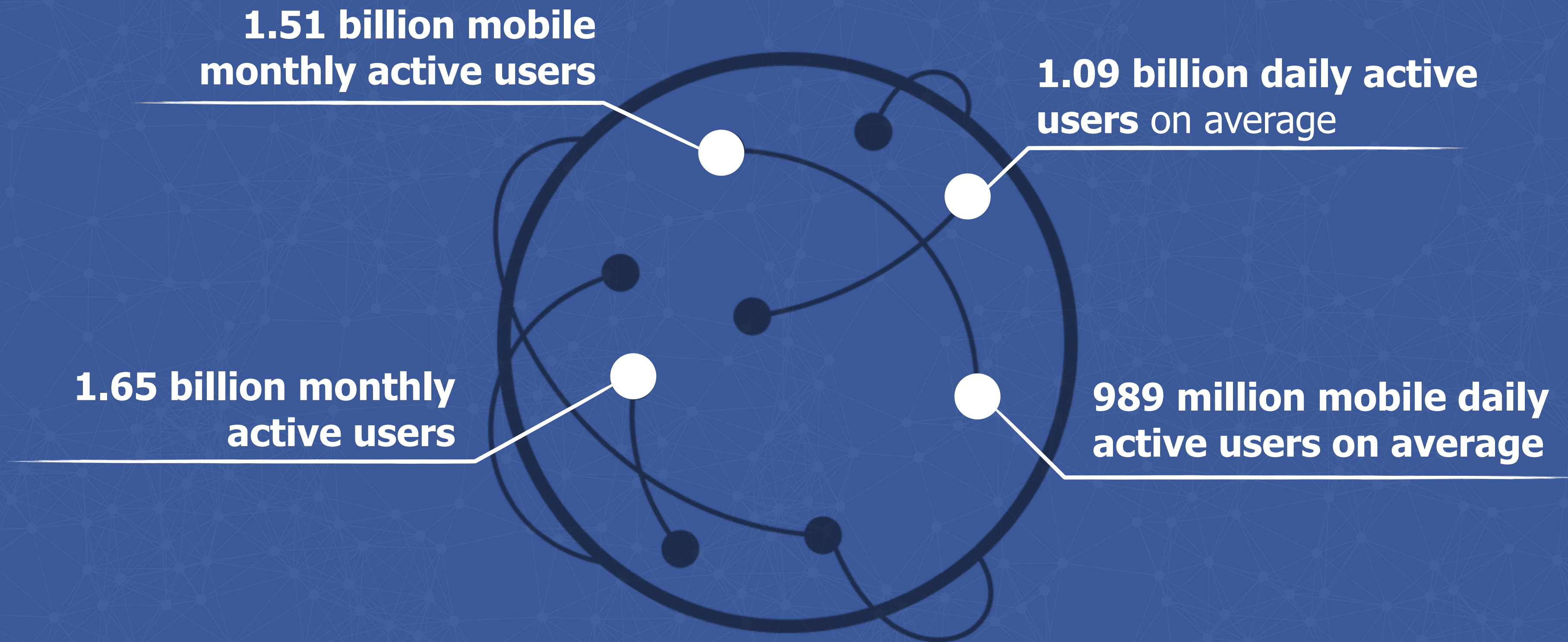
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An astronaut in a white spacesuit is floating in space, with the Earth visible through the helmet. The astronaut's arms are outstretched. In the background, there is a control panel with various buttons and a small framed picture of a yellow sun on a blue background.

Facebook scale

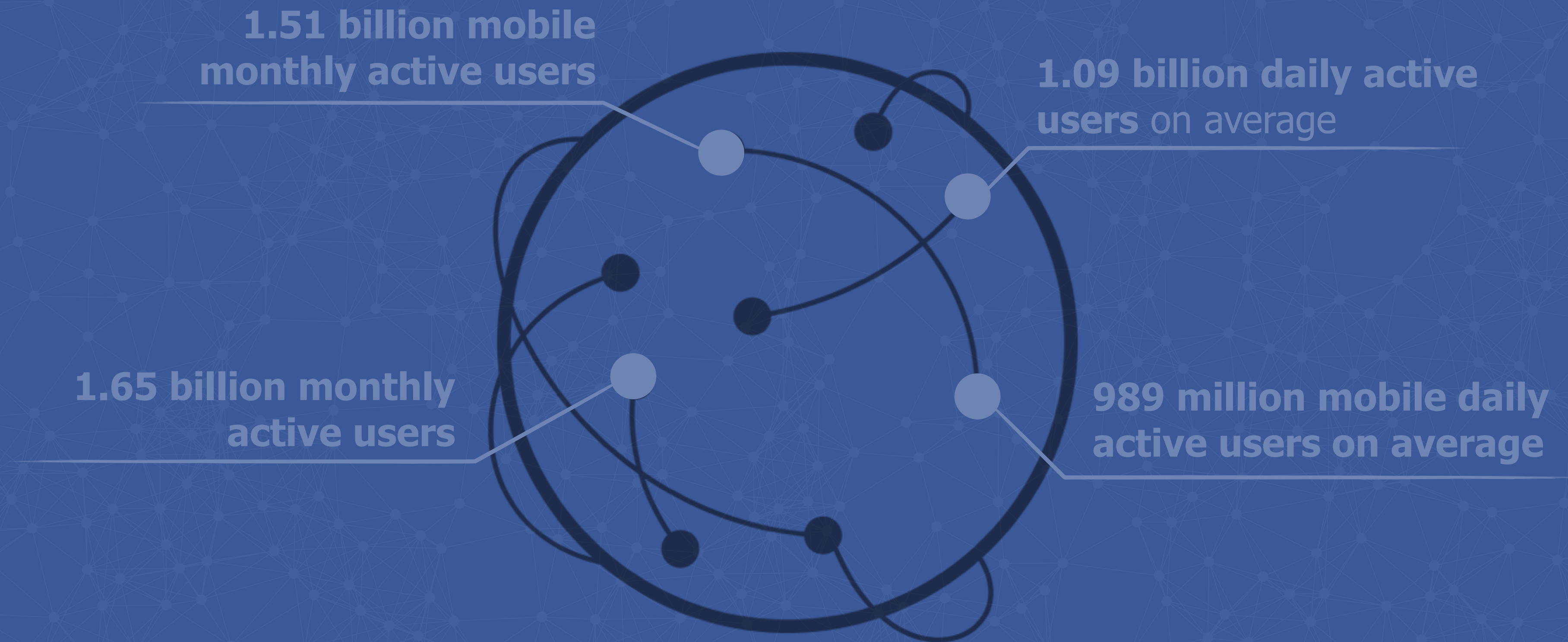
Facebook scale

as of March 2016



Facebook scale

as of March 2016



Approximately 84.2% of our daily active users are outside the US and Canada

An aerial photograph of a busy city intersection, likely in Japan, featuring a large crosswalk with white stripes on a dark asphalt road. A black sedan is stopped at the intersection. Several pedestrians are crossing the street, some holding umbrellas. A bus stop shelter is visible on the right side of the image. The entire image has a blue tint.

What does that mean for the Facebook Network?

An aerial photograph of a sprawling urban landscape, likely Tokyo, viewed from a high vantage point. The foreground is dominated by lush green, forested hills. The middle ground is a dense sea of multi-story buildings and apartment complexes. In the far distance, a large, white, dome-shaped stadium is visible on the right side. The sky is a hazy, overcast grey. Overlaid on the center of the image is the text 'Lots of traffic and global footprint' in a large, white, sans-serif font.

Lots of traffic and global footprint

Network traffic

Machine to
machine

Machine
to user



**Engineers build robots,
robots manage
the network.**

Now, let's talk about



Facebook Defined Networking



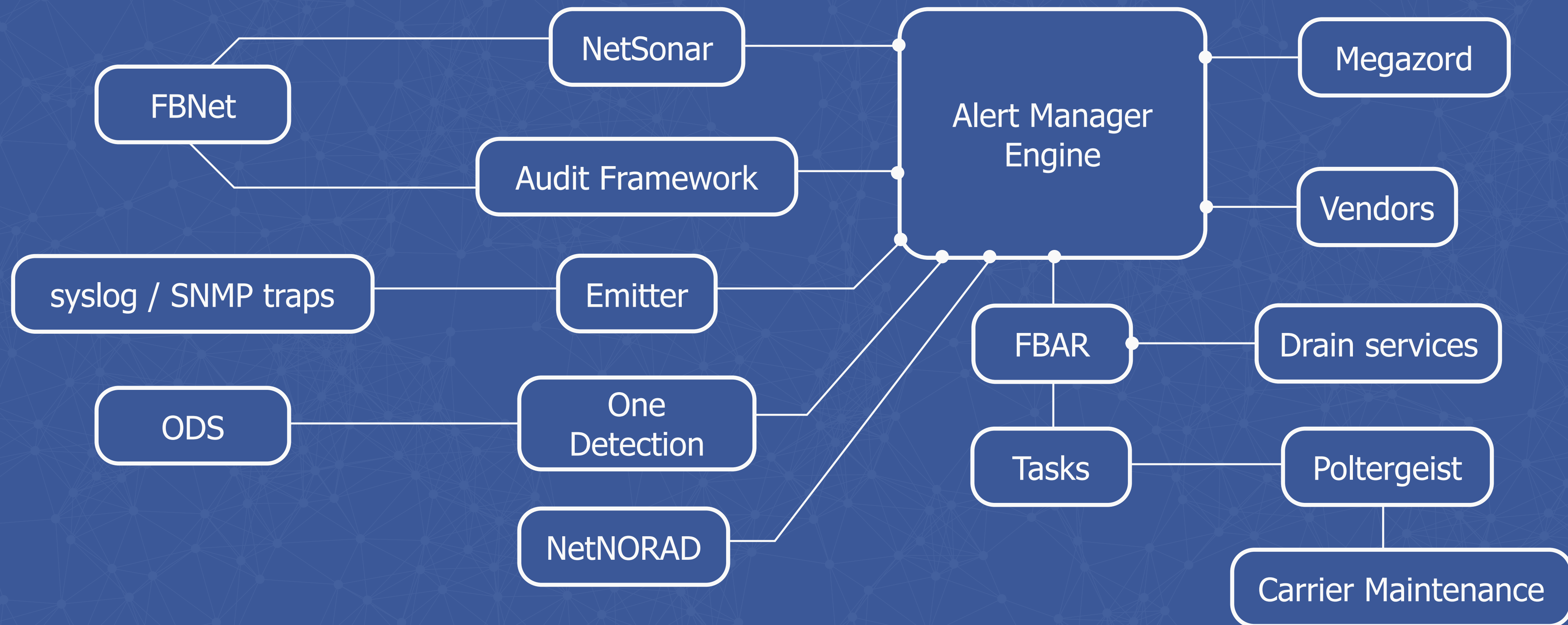
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Facebook Defined Networking

Facebook Defined Networking



Facebook

FBNet

The brains to help guide our robots run the network



👍 Like

💬 Comment

➦ Share

Facebook Def

NetNORAD

Our Packet Loss detection system



Like

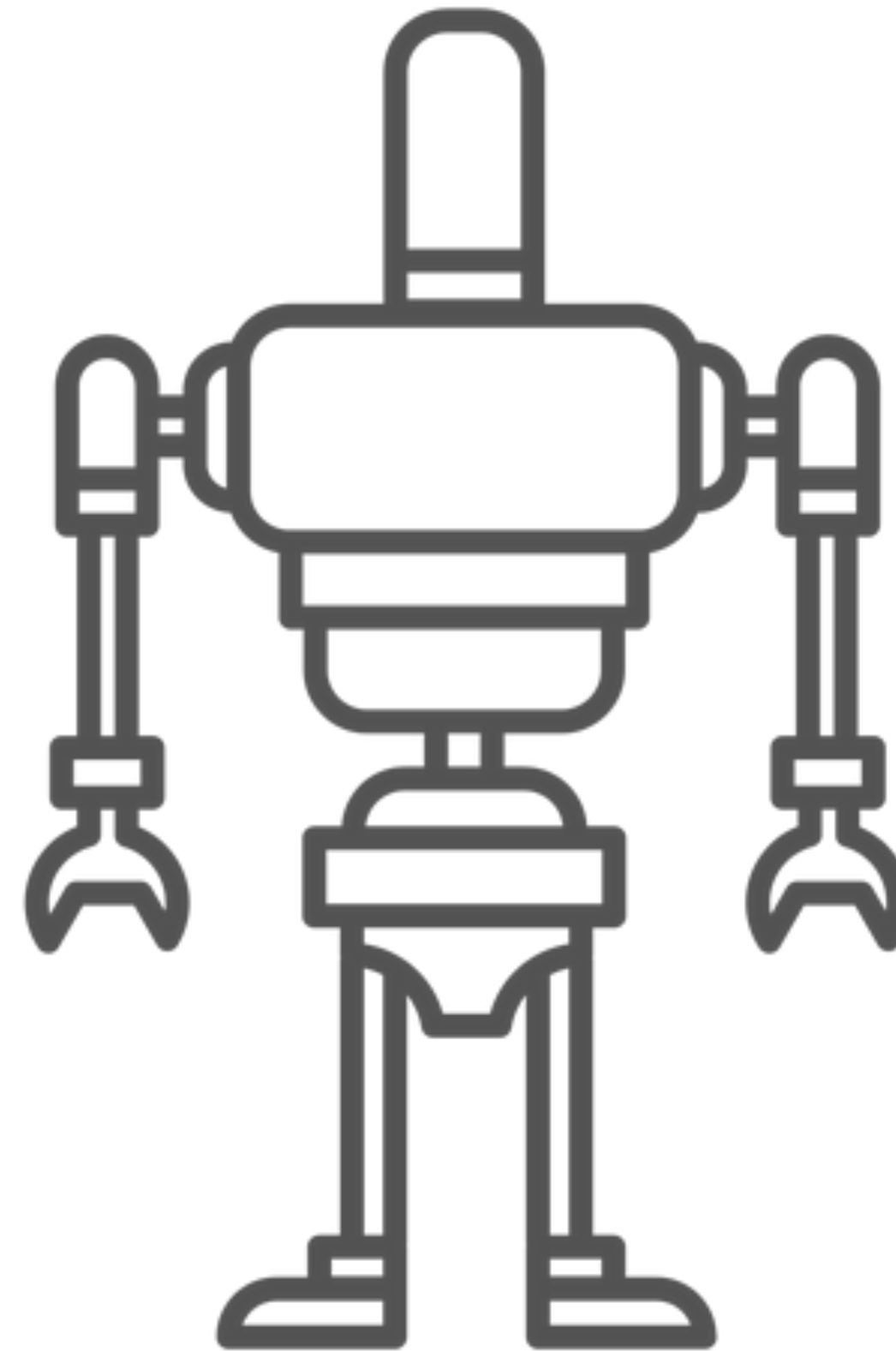
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Facebook

Megazord

Our alarm correlation engine



👍 Like

💬 Comment

➦ Share

Megazord

Vendors

Train services

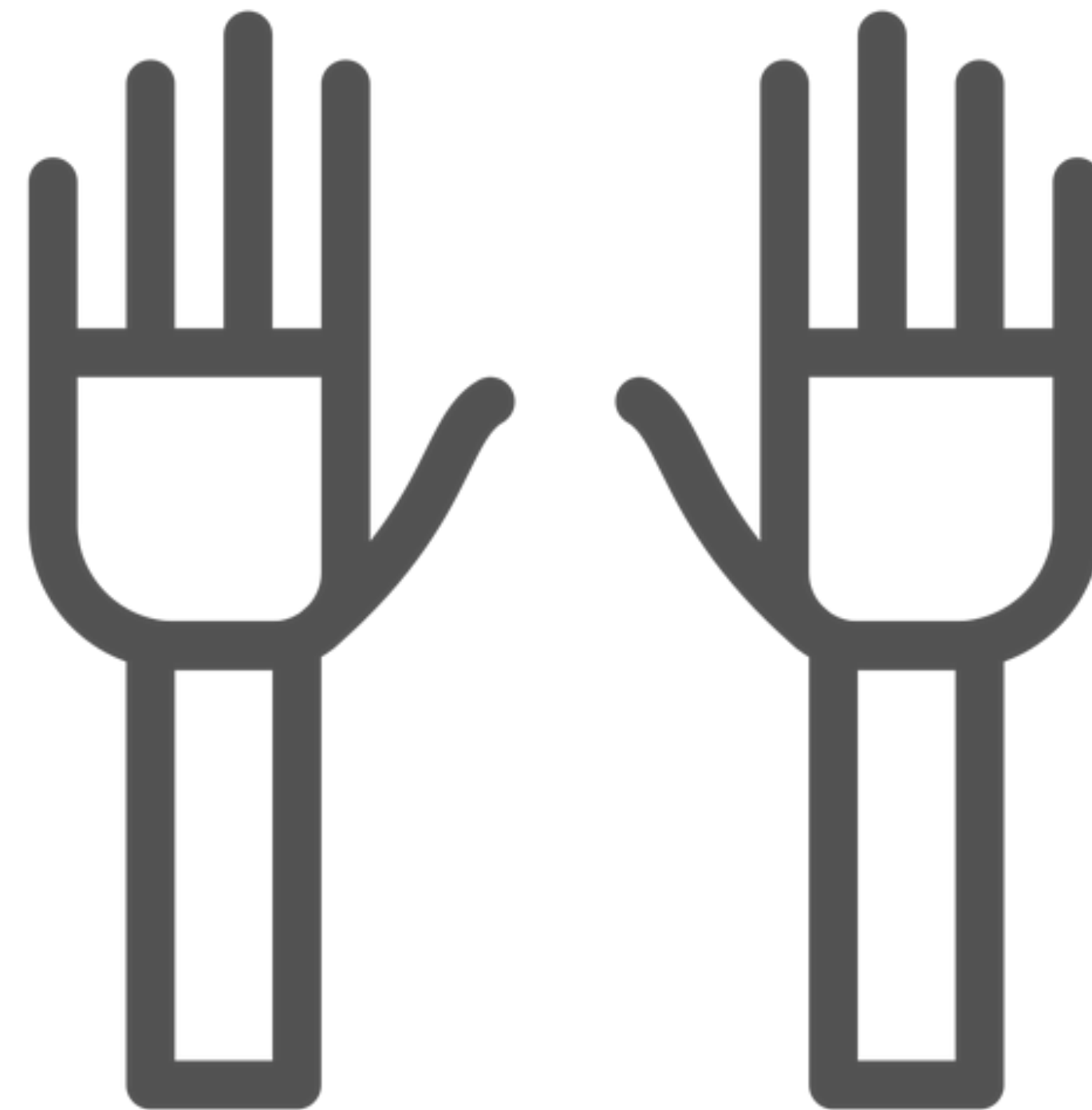
Pottergeist

Carrier Maintenance

Facebook

Drain Services

The movers of traffic on the network devices



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Networking

FiberNet

syslog / SNMP traps

ODS

Megazord

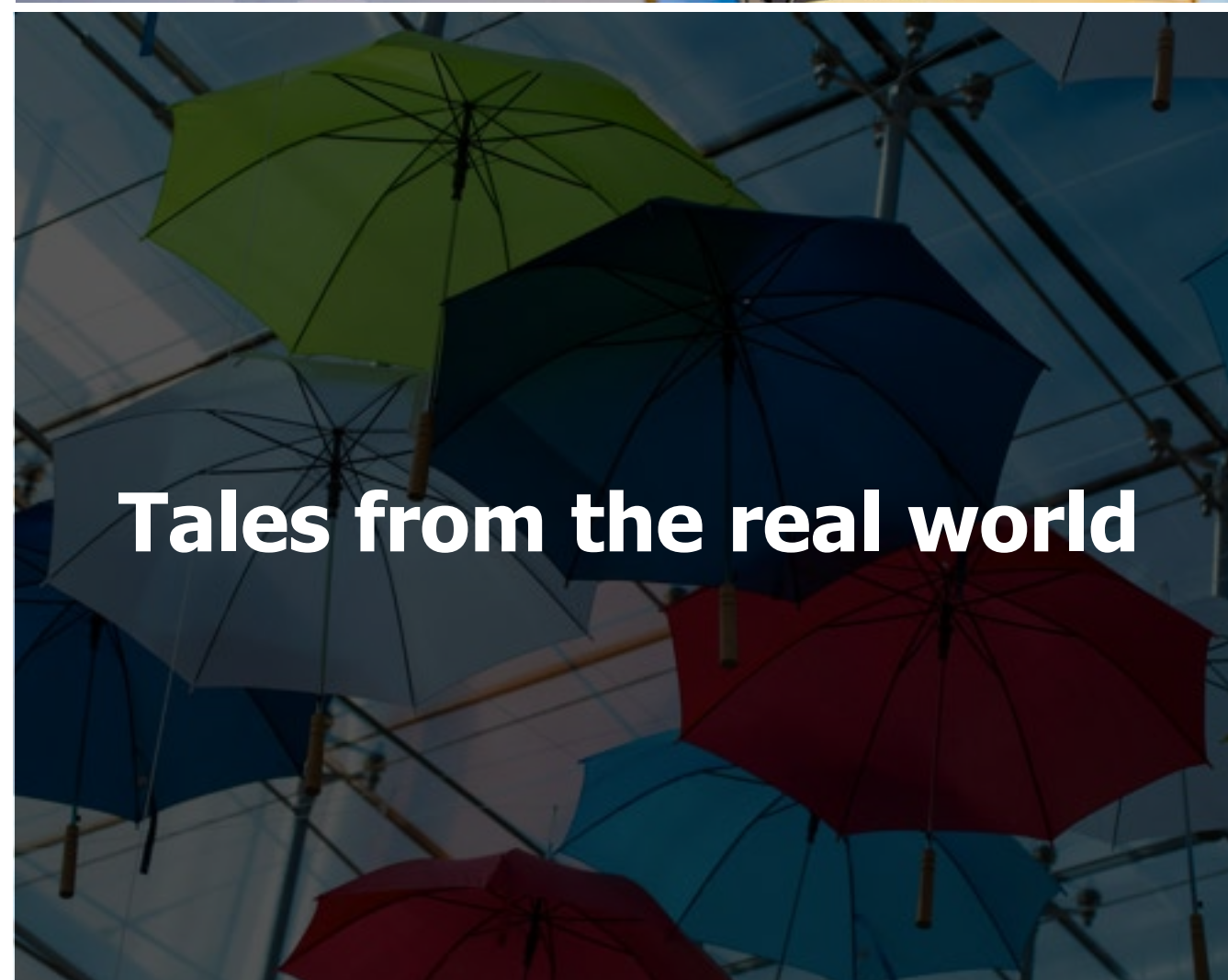
Vendors

Drain services

Pullerpoint

Carrier Maintenance

Now, let's talk about



Tales from the real world



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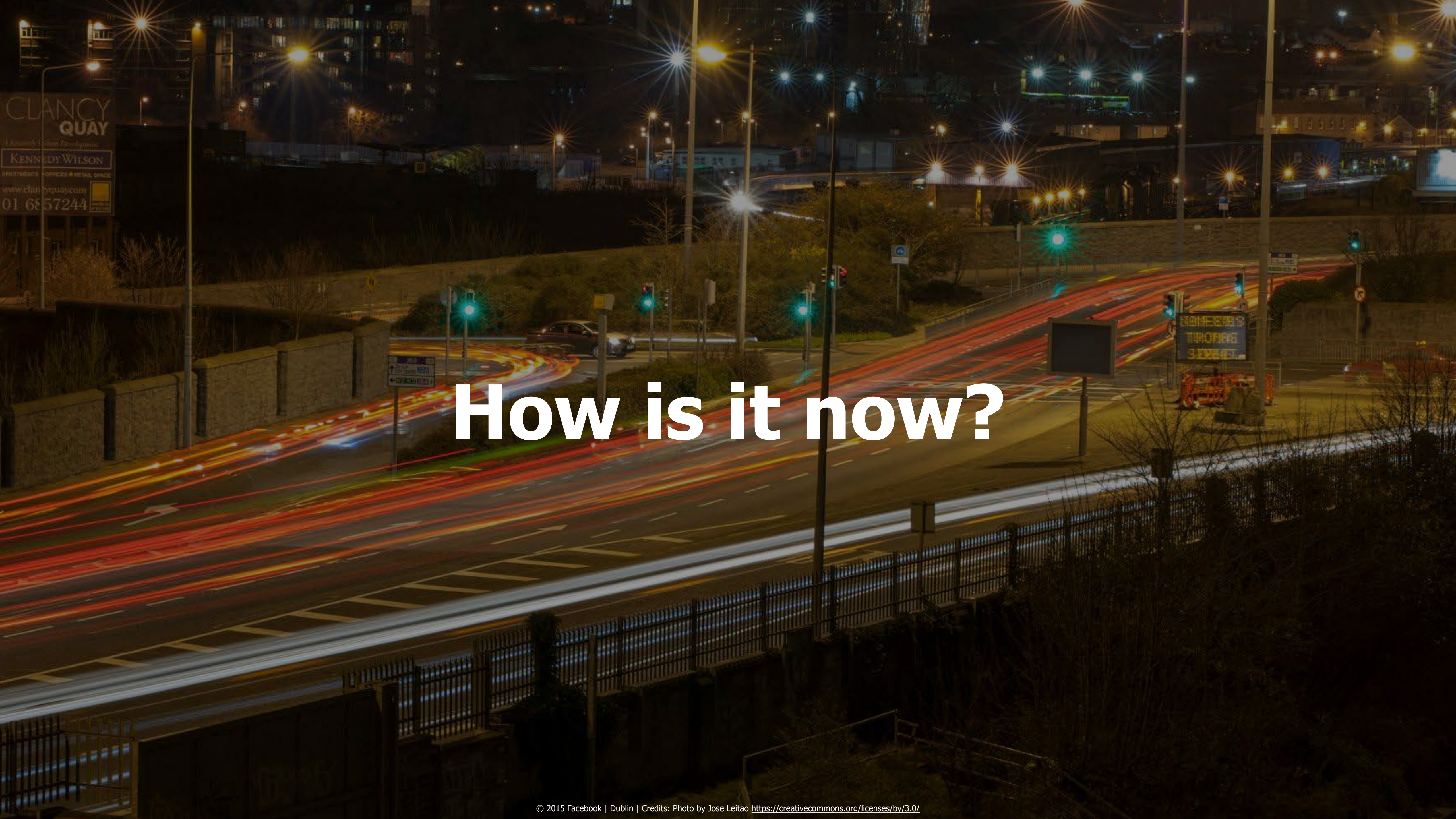
Tales from the real world

Circuits @ scale

Manual approach



Hybrid approach

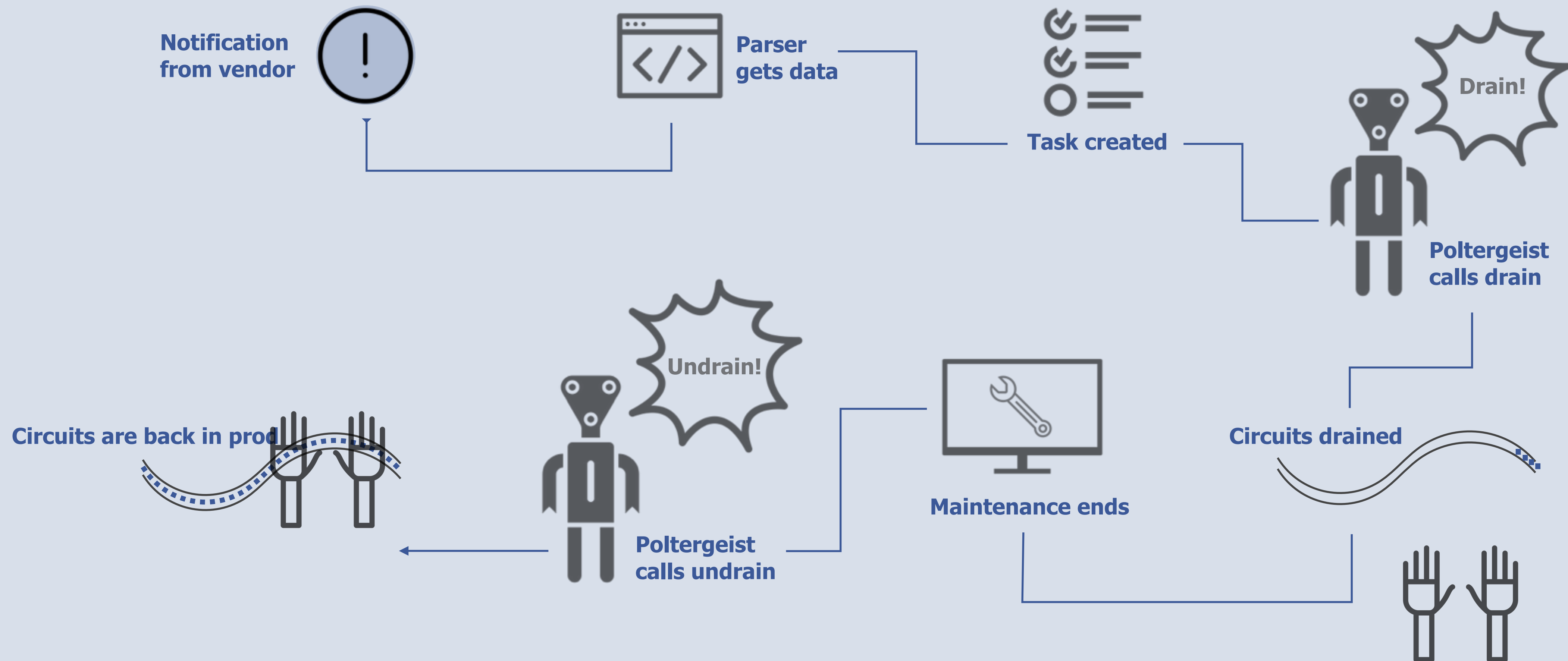


How is it now?



Fully automated

How is it now?



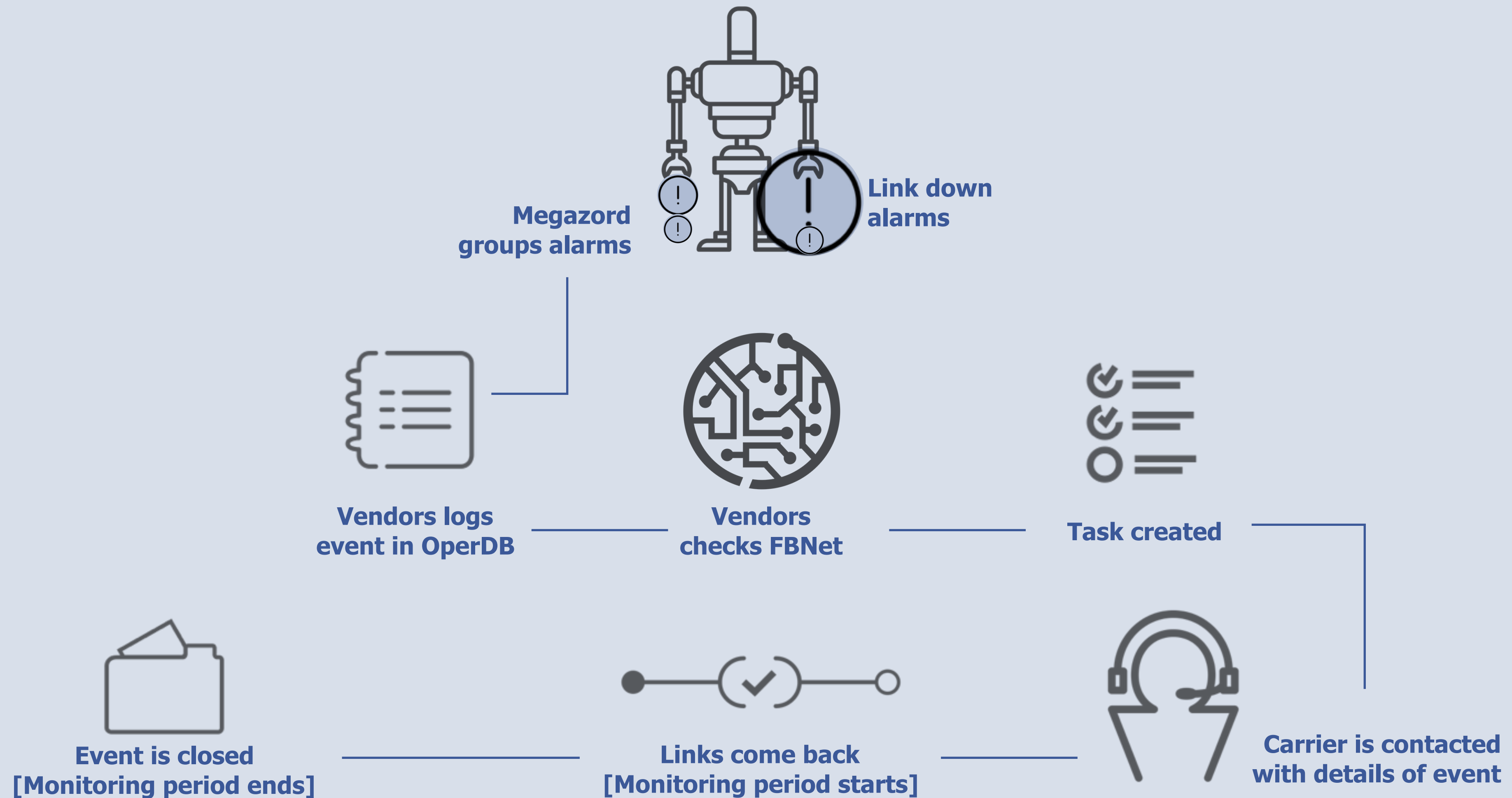
A large school of hammerhead sharks swimming in clear blue water. The sharks are seen from below, showing their distinctive hammer-shaped heads and long, pointed snouts. They are swimming in various directions, creating a sense of movement and depth. The water is a deep, clear blue, and the sharks are silhouetted against it.

What about fiber-eating sharks?

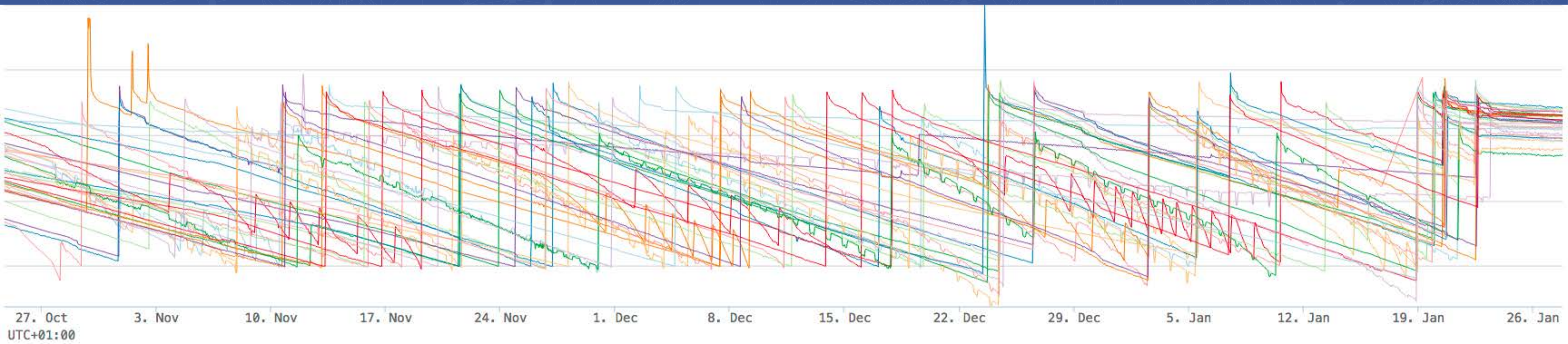
Seriously...



How is it now?



Something different



The memory leak debacle

Free memory over time



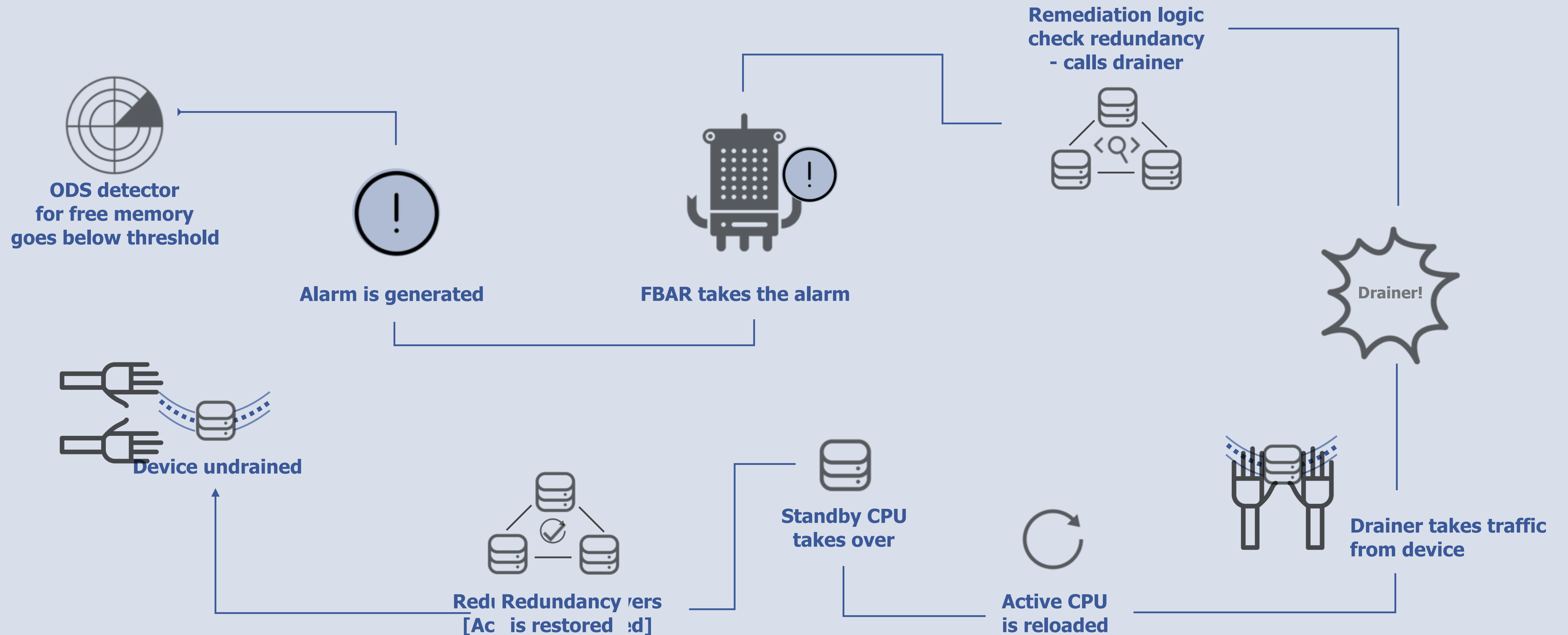
The background of the image is Raphael's famous fresco, 'The School of Athens'. It depicts a group of ancient Greek philosophers in a grand, vaulted hall. Plato and Aristotle are at the center, walking towards the viewer. Plato points his right index finger to the sky, while Aristotle holds his right hand palm-down, gesturing towards the earth. They are surrounded by other philosophers like Pythagoras, Euclid, and Socrates, each engaged in various intellectual activities. The architecture is highly detailed, with a coffered ceiling and statues in niches. The overall scene represents the pinnacle of human knowledge and reason.

How would this be solved with humans?



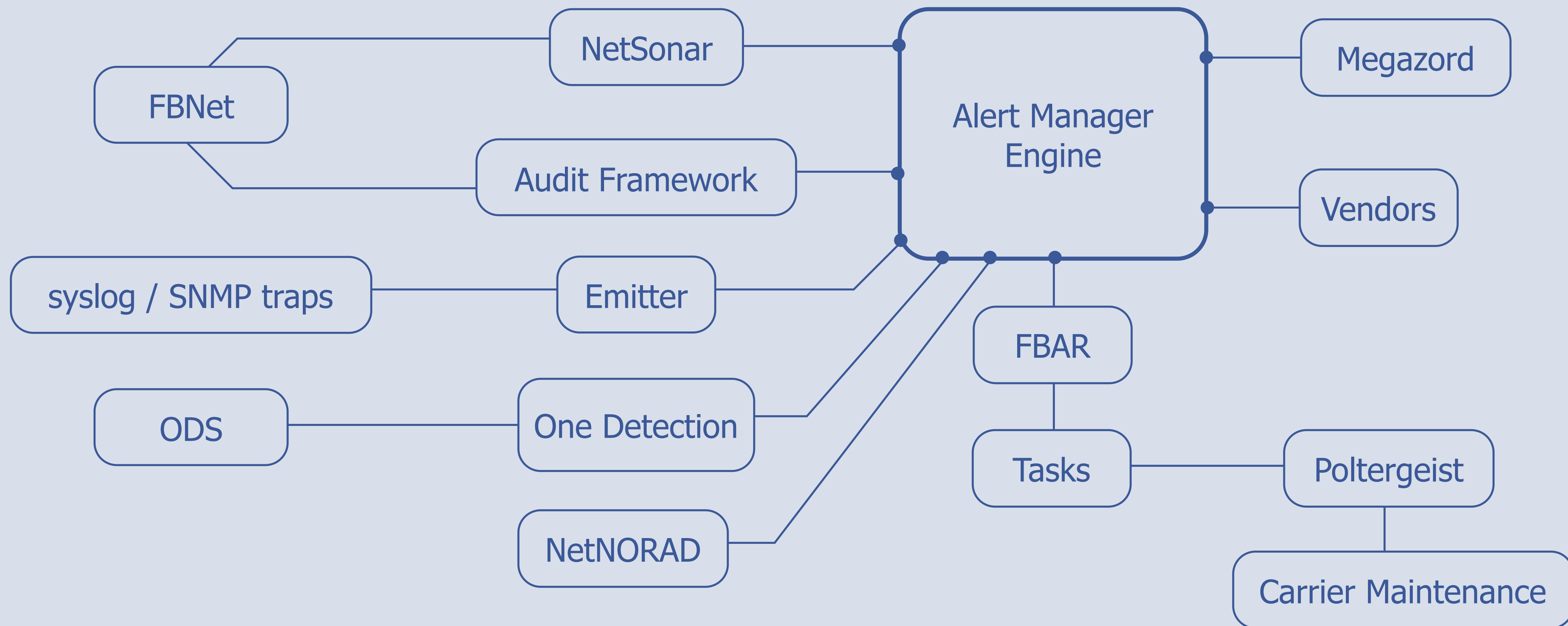
Lots of them + coffee

How is it now?



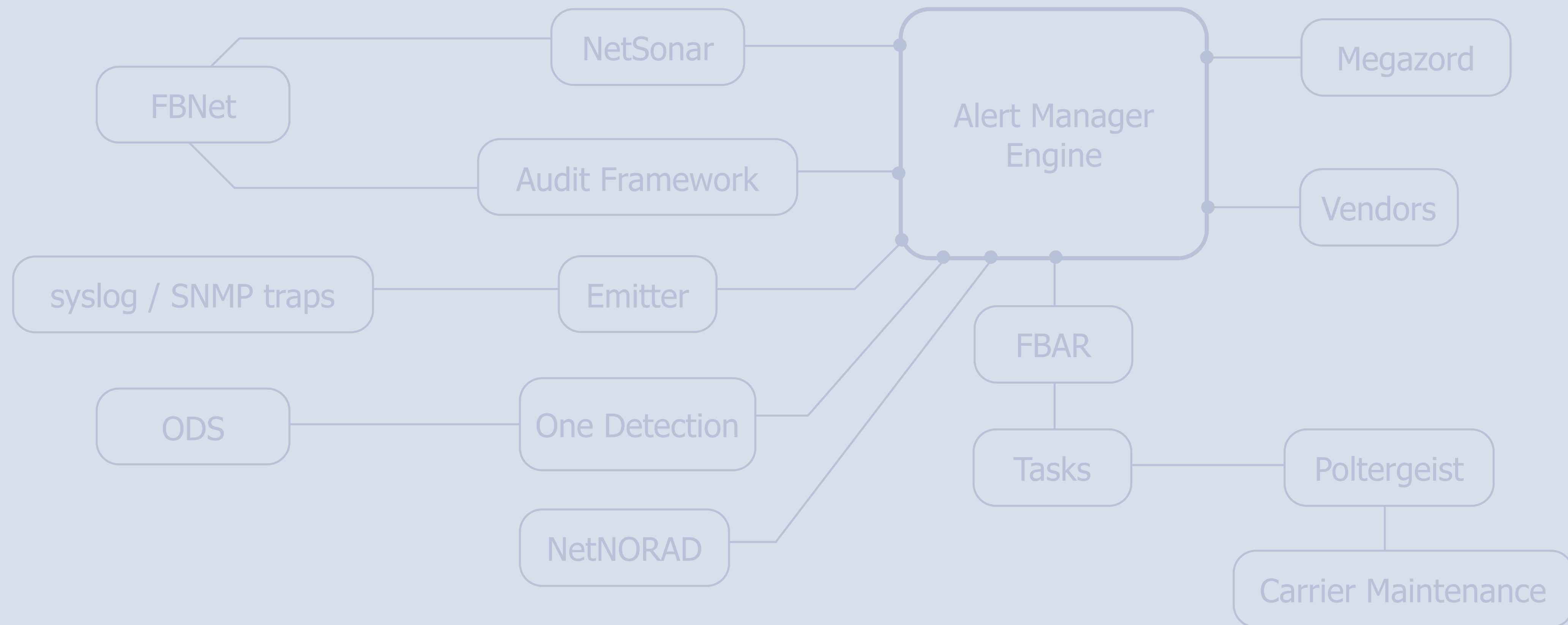
Facebook Defined Networking

all components in action



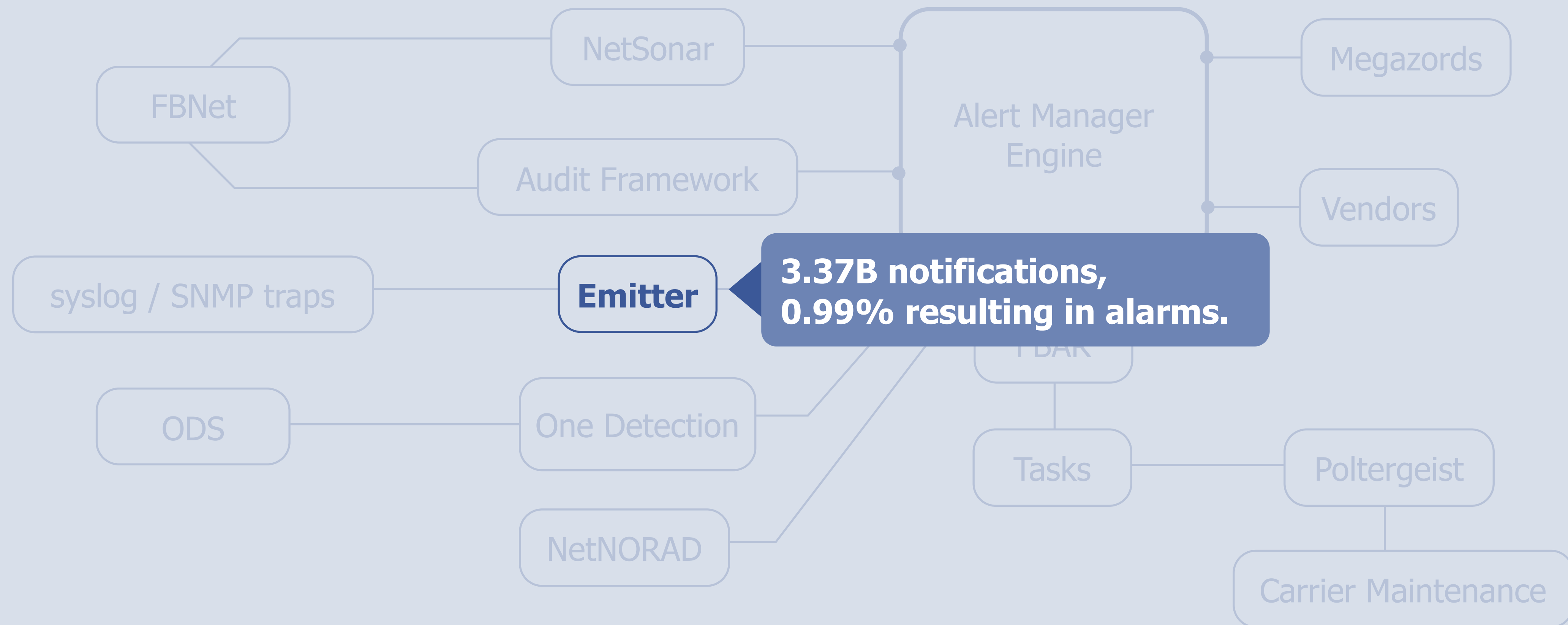
So, in 30 days...

all components in action



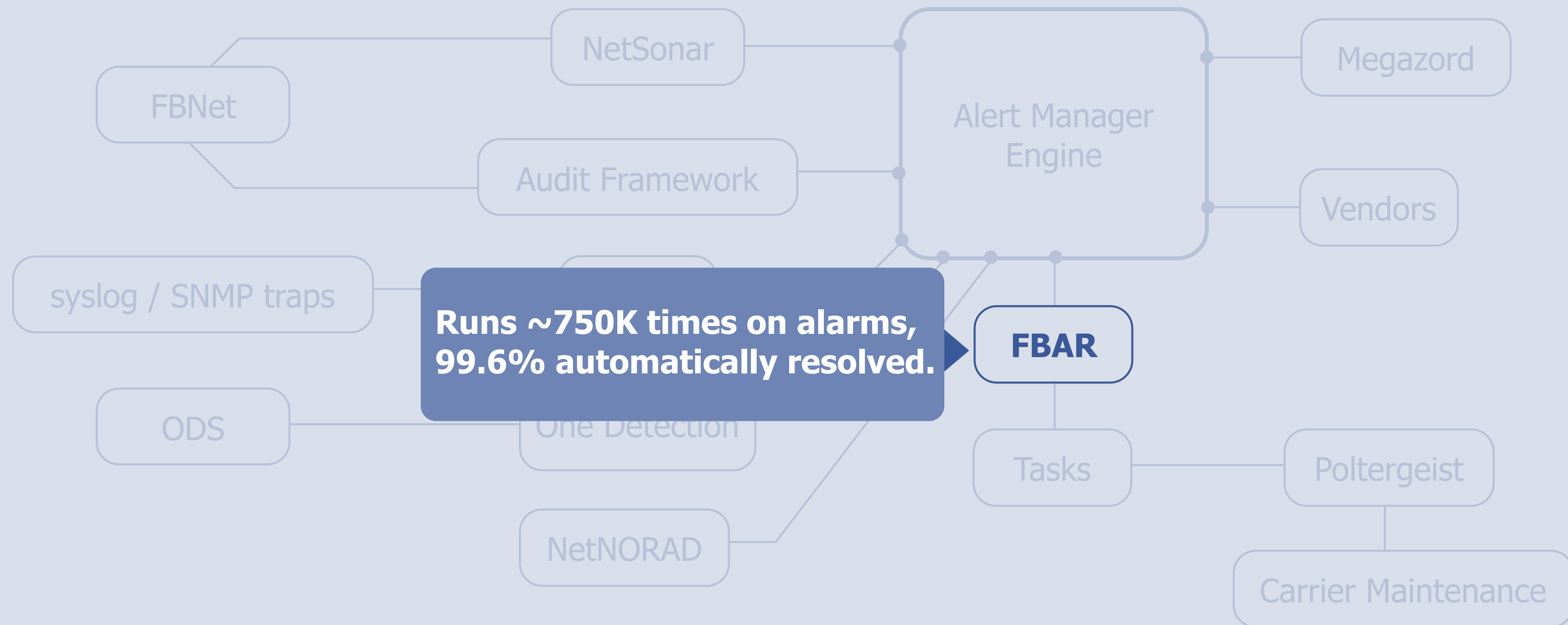
So, in 30 days...

all components in action



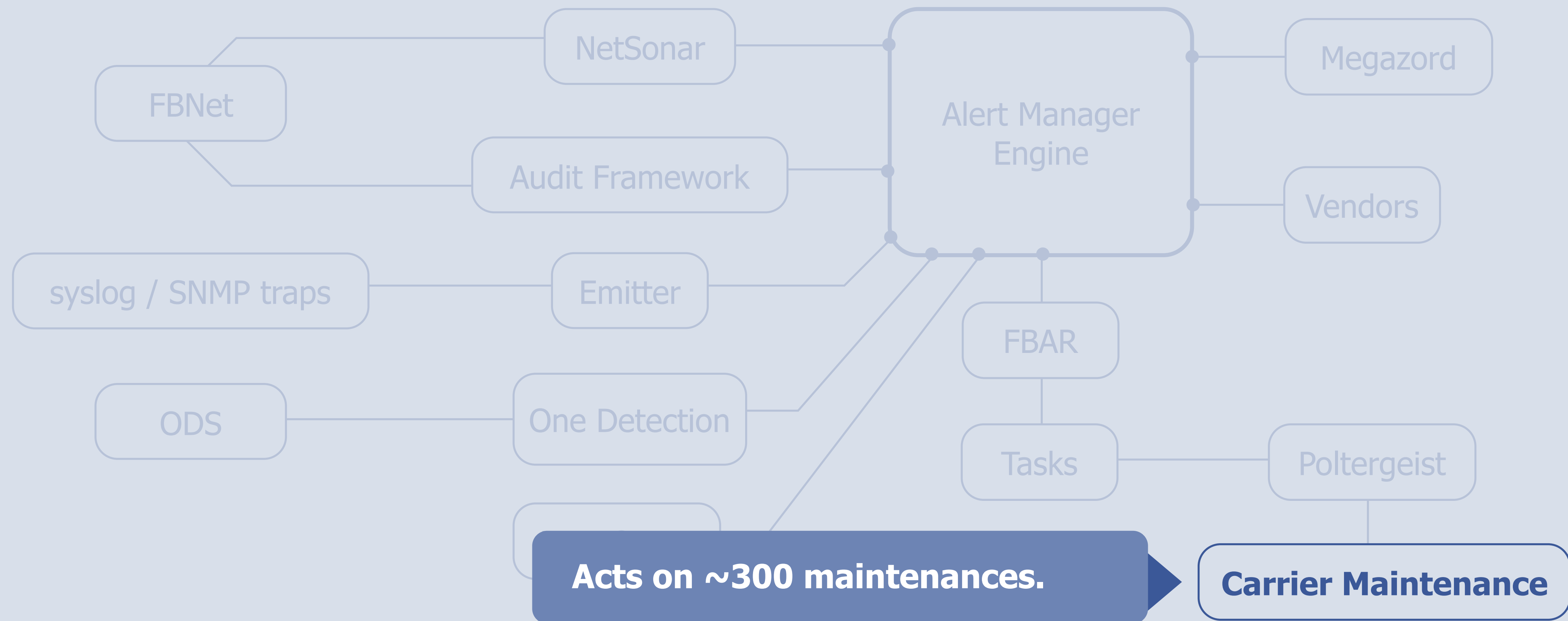
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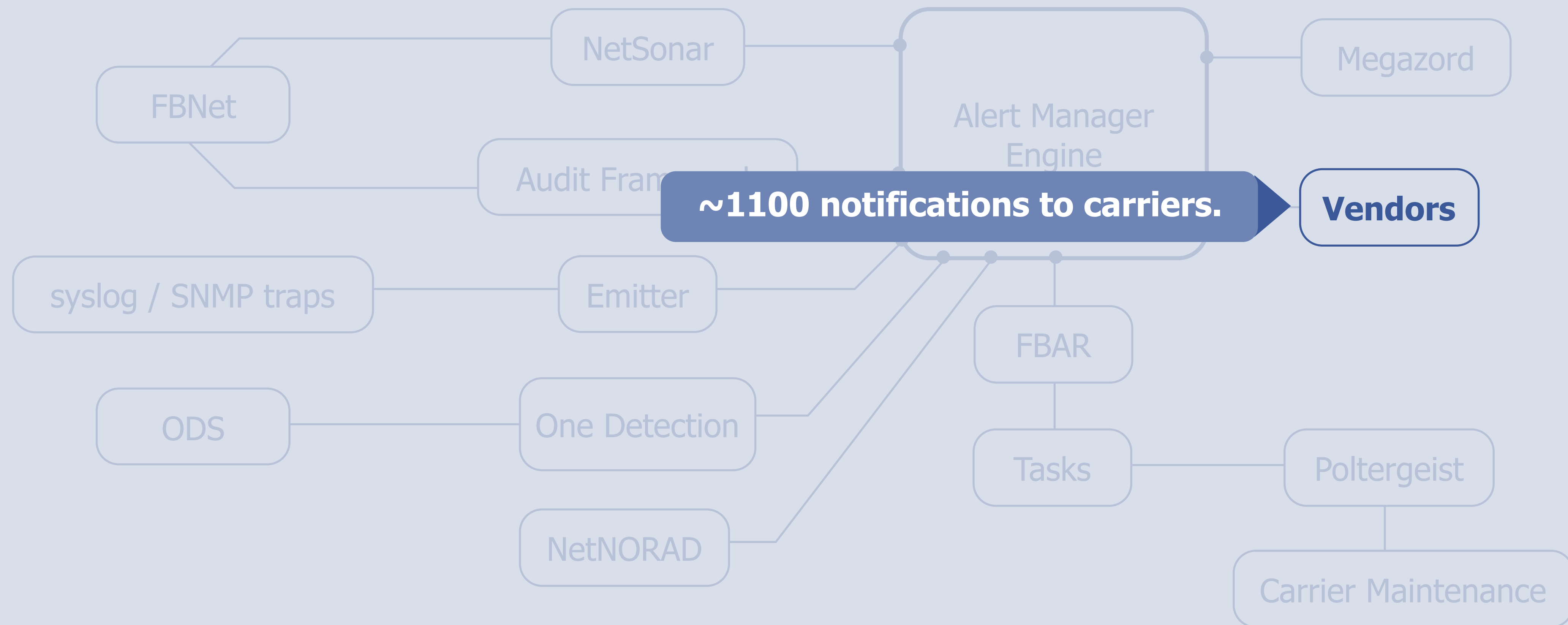
So, in 30 days...

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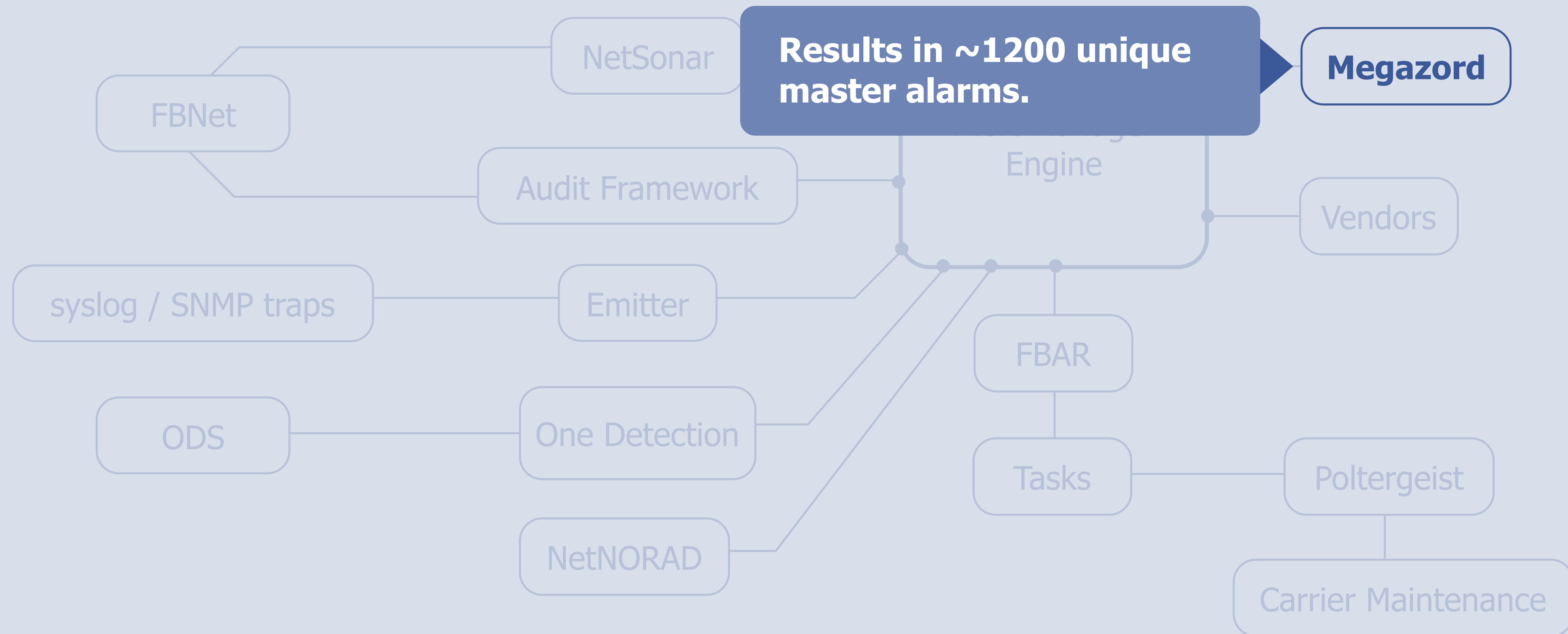
So, in 30 days...

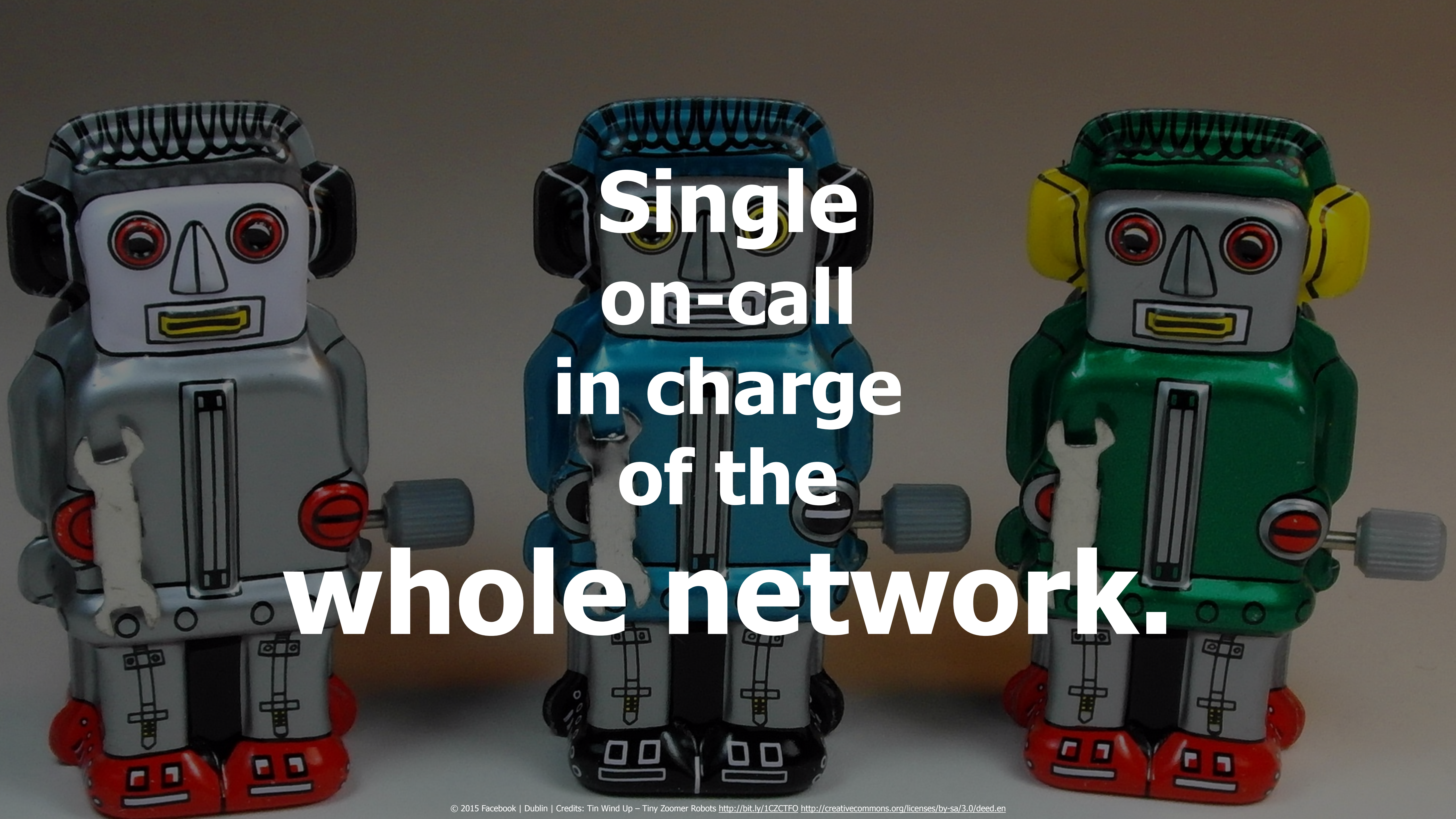
all components in action



So, in 30 days...

all components in action



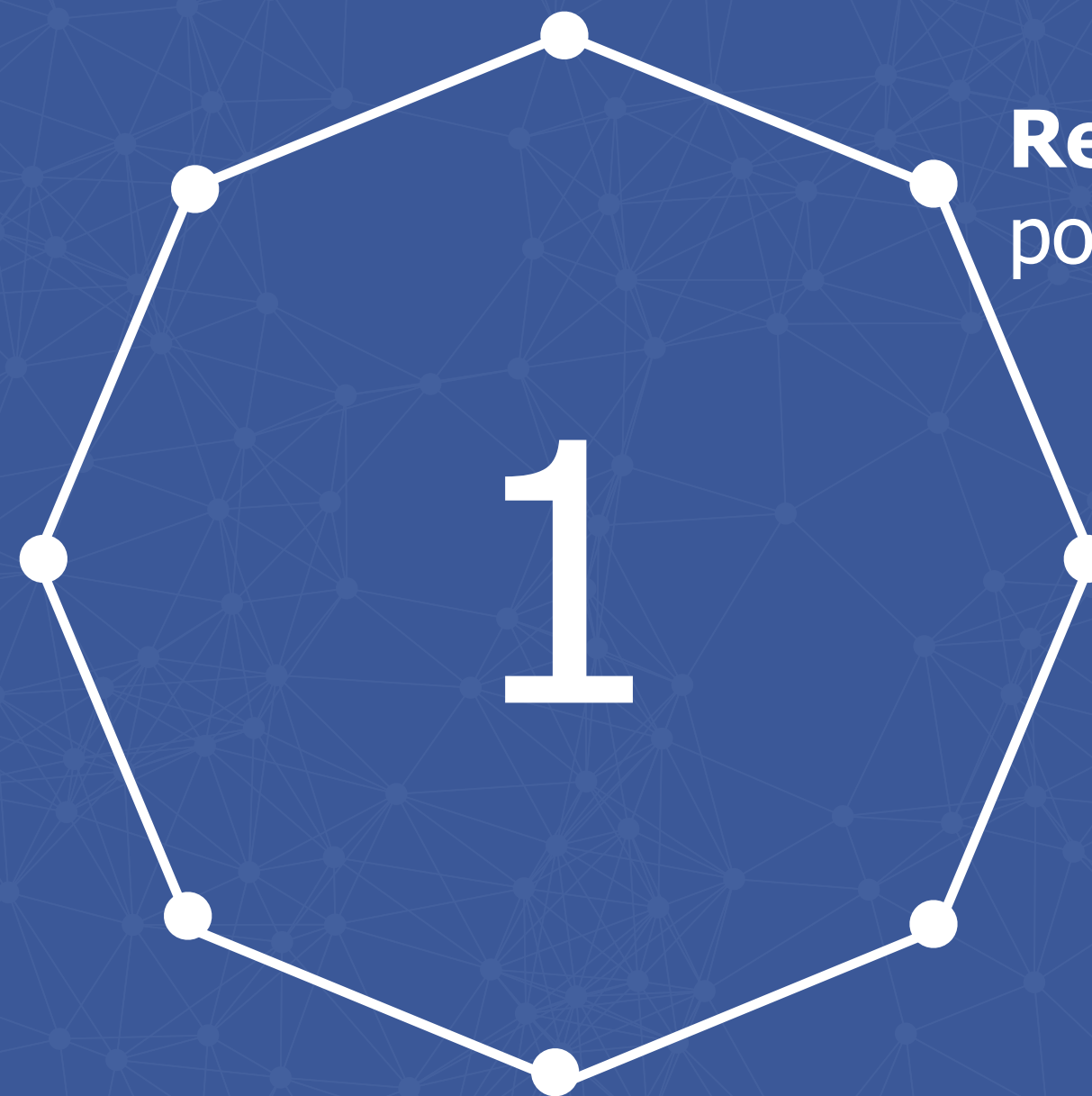


Single
on-call
in charge
of the
whole network.



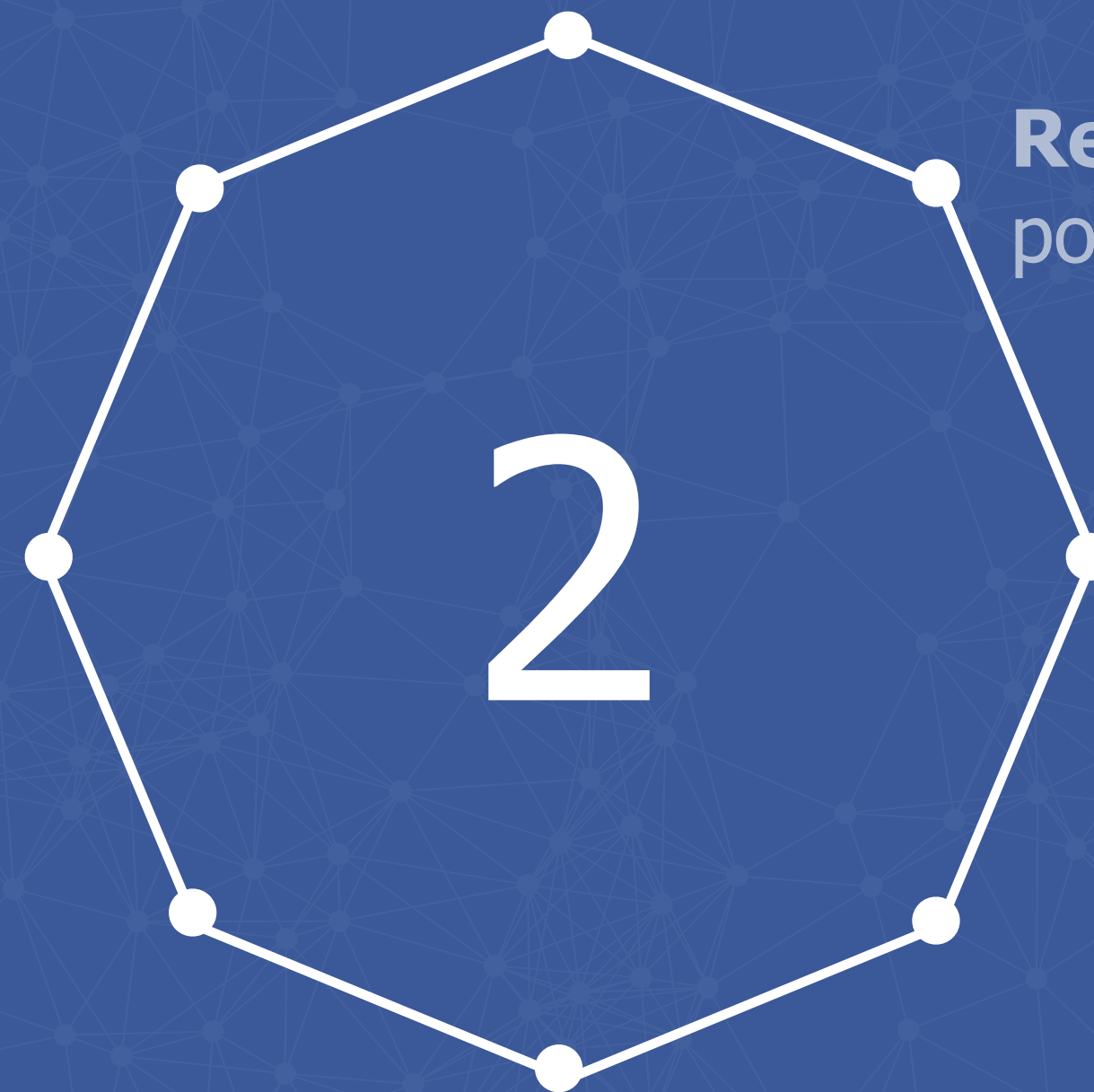
Lessons Learned & Recommendations

8 Lessons Learned & Recommendations



Re-use existing code/tools when possible and when it makes sense.

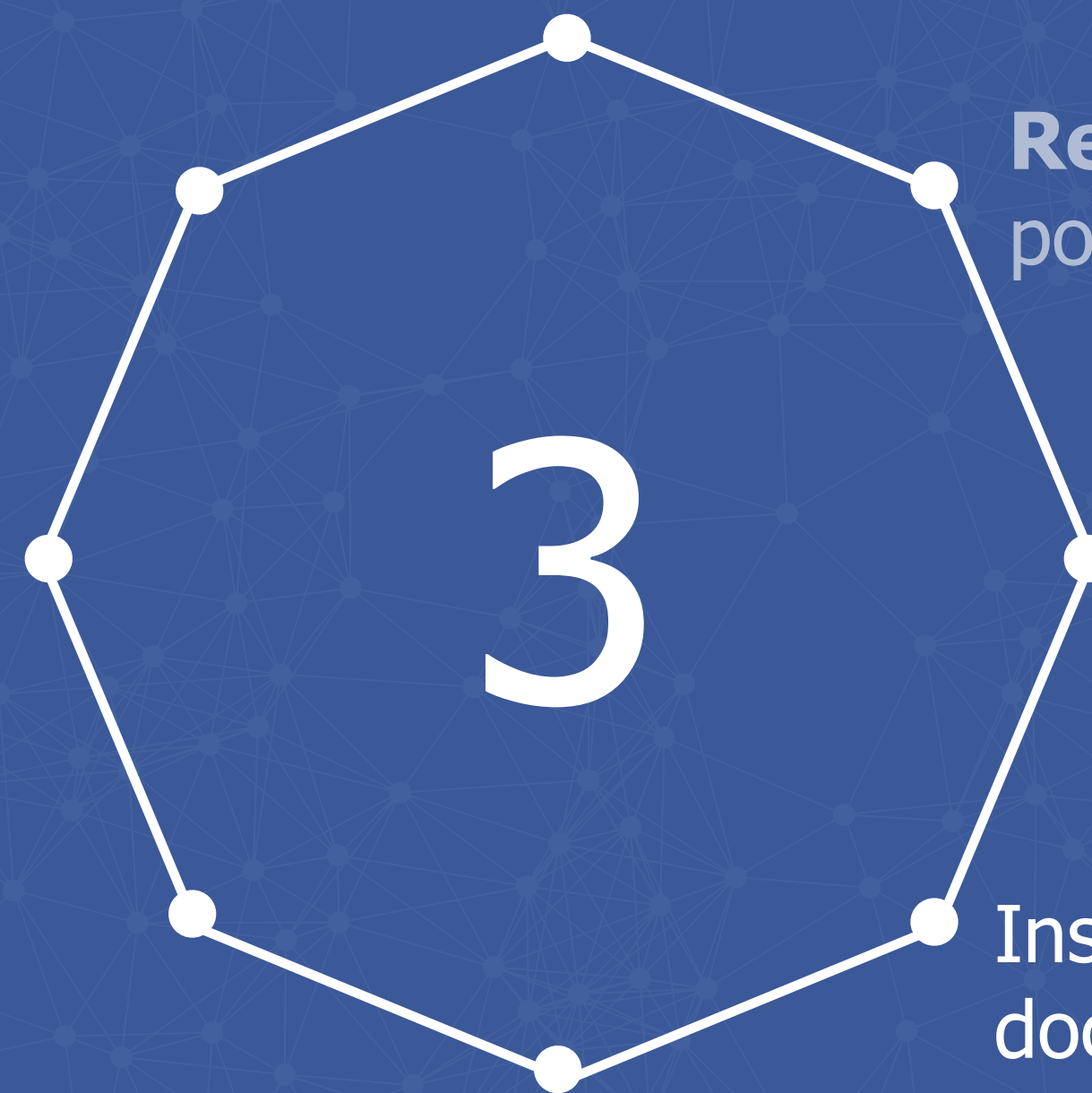
8 Lessons Learned & Recommendations



Re-use existing code/tools when possible and when it makes sense.

Hacks quickly become **important tools.**

8 Lessons Learned & Recommendations

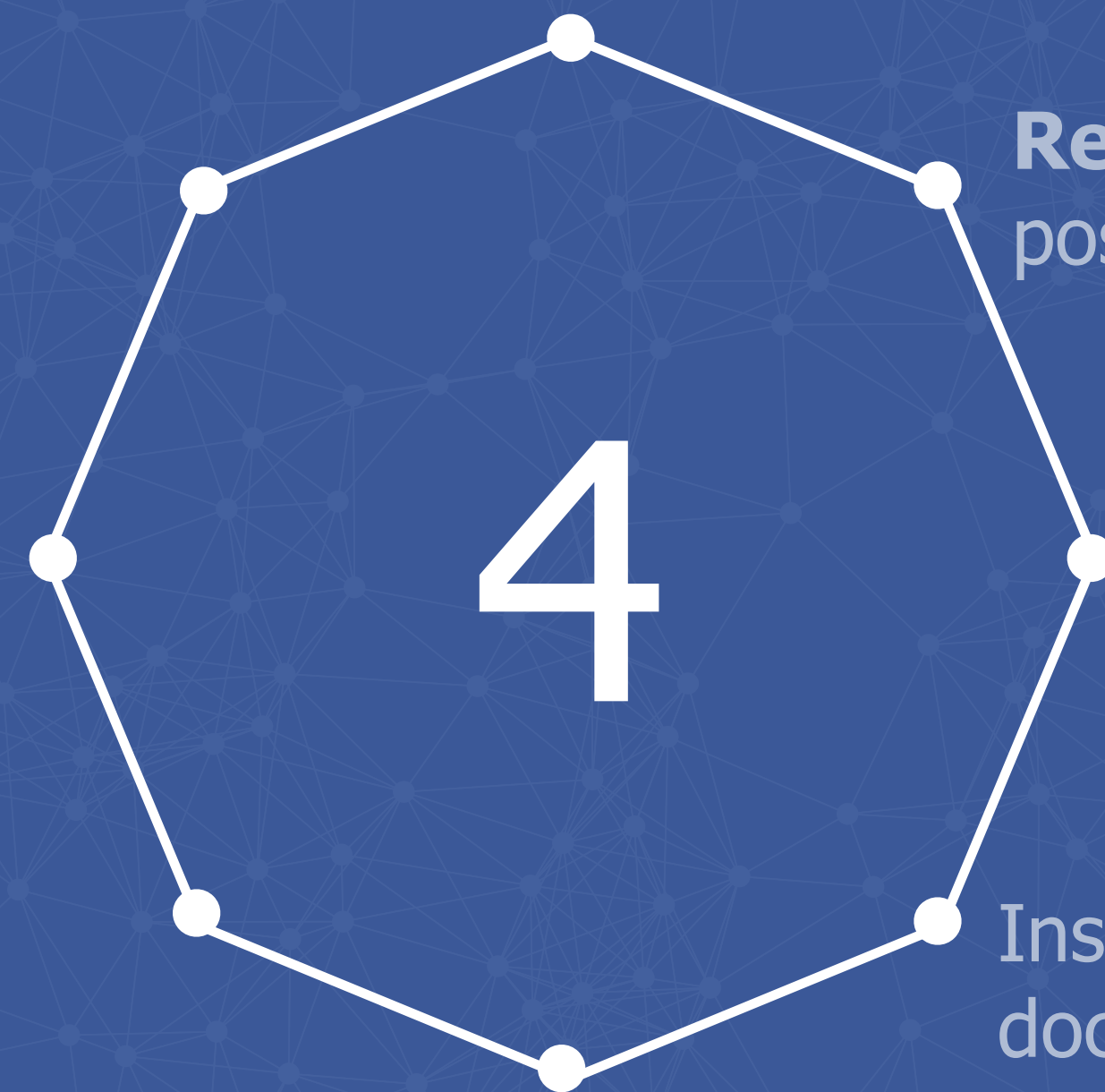


Re-use existing code/tools when possible and when it makes sense.

Hacks quickly become **important tools**.

Instrument / unit-test / document **all the things**.

8 Lessons Learned & Recommendations



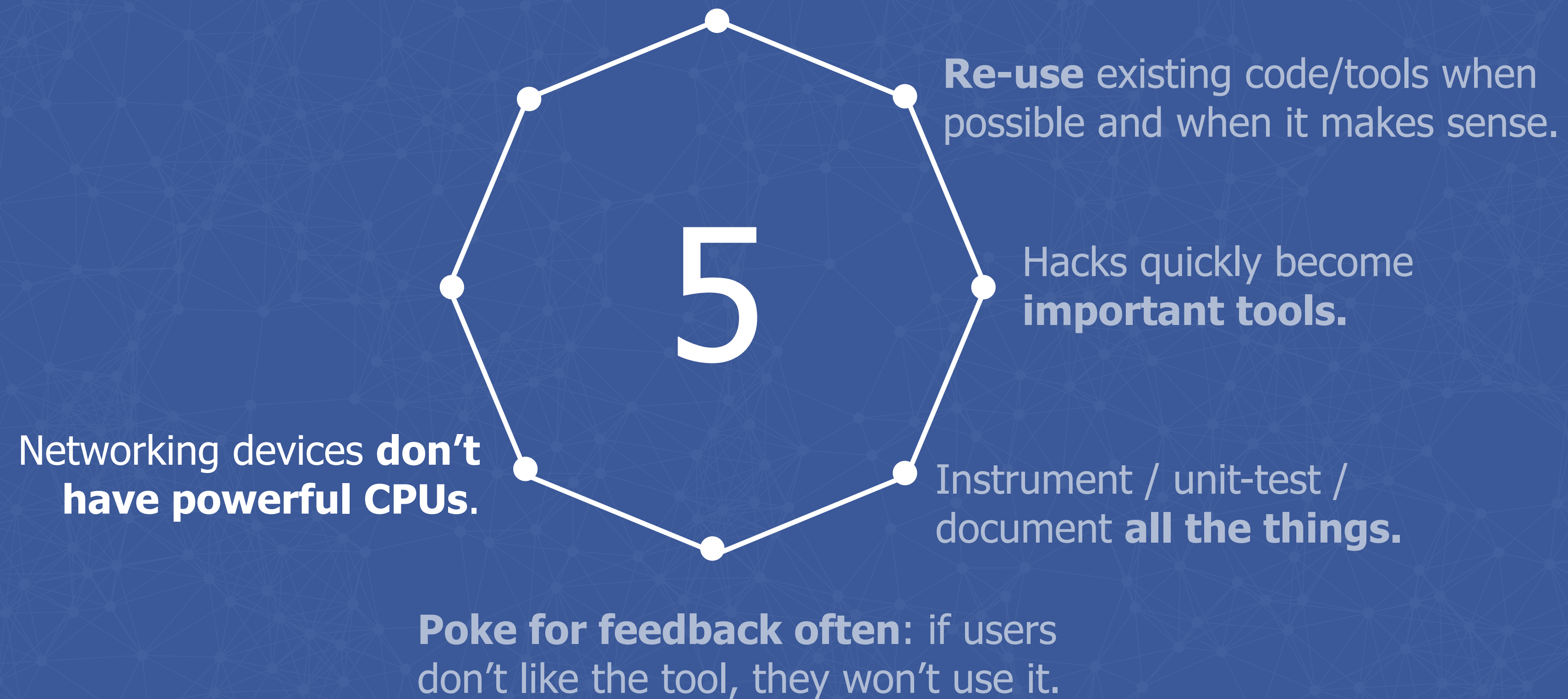
Re-use existing code/tools when possible and when it makes sense.

Hacks quickly become **important tools**.

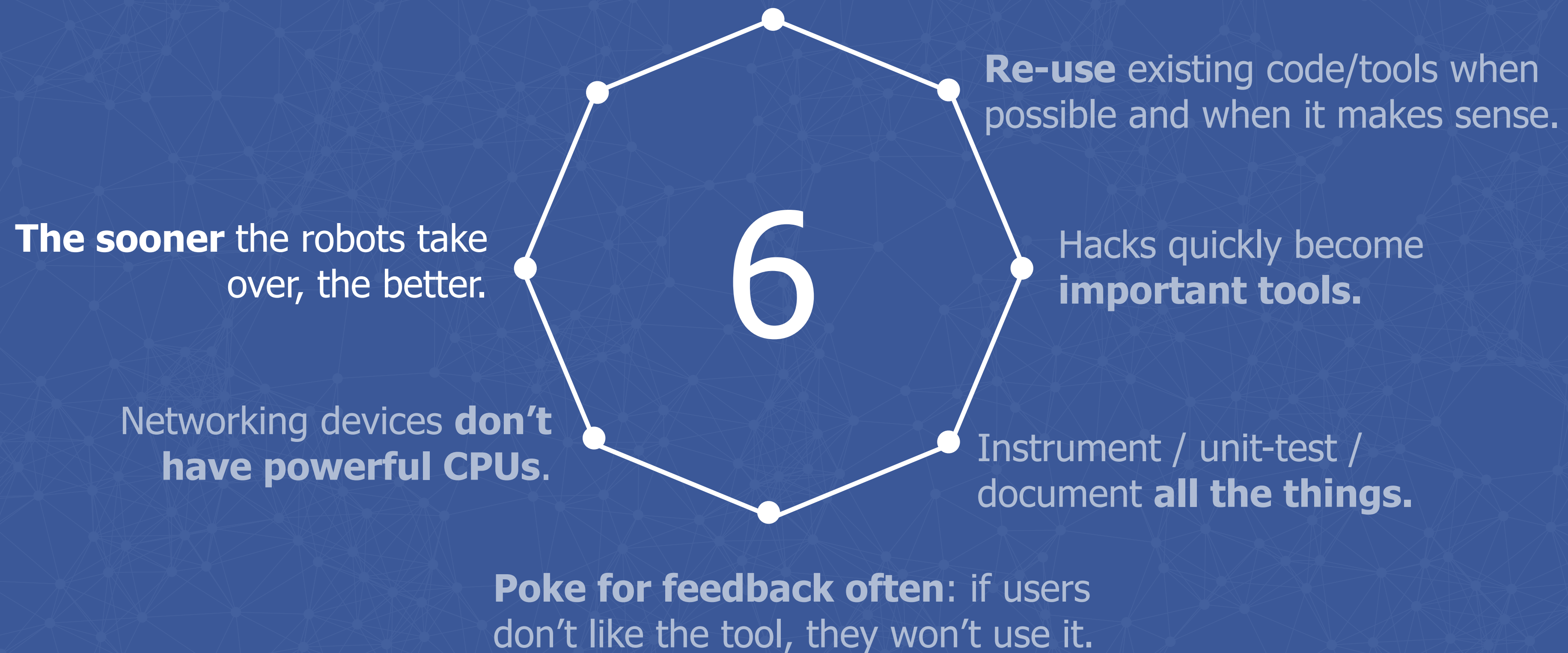
Instrument / unit-test / document **all the things**.

Poke for feedback often: if users don't like the tool, they won't use it.

8 Lessons Learned & Recommendations



8 Lessons Learned & Recommendations



8 Lessons Learned & Recommendations

Talk is cheap, **focus on impact.**

Re-use existing code/tools when possible and when it makes sense.

The sooner the robots take over, the better.

Hacks quickly become **important tools.**

Networking devices **don't have powerful CPUs.**

Instrument / unit-test / document **all the things.**

Poke for feedback often: if users don't like the tool, they won't use it.

7

8 Lessons Learned & Recommendations



This journey is 1% finished



What's in the near future?

The journey is 1% finished



**FBOSS / Wedge / 6-pack
feature parity**



PCE



**Better visibility in the
WDM space and
correlation between
the Optical / IP worlds**



**Continuous
development of
existing tools**

 Like

 Comment

 Share


```
import faster_detection
import faster_recovery
import less_stress

if network.is_automated:
    return 'Relax'
else:
    Visit( '#netengcode' )
```





**WHAT WOULD
YOU DO IF
YOU WEREN'T
AFRAID?**

POSTER BROUGHT TO YOU BY YOUR FRIENDS AT  THE FACEBOOK ANALOG RESEARCH LABORATORY

