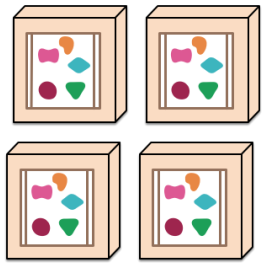
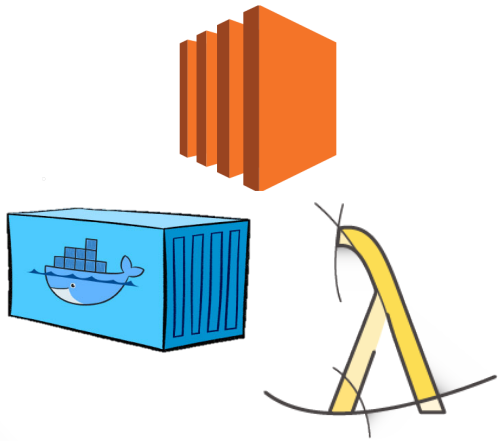
Towards Omnia: a Monitoring Factory for Quality-Aware DevOps

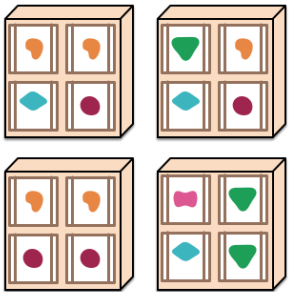
Apr 27th, 2017

Marco MIGLIERINA
Damian A. TAMBURRI

Dev- to Ops: We are moving faster and faster





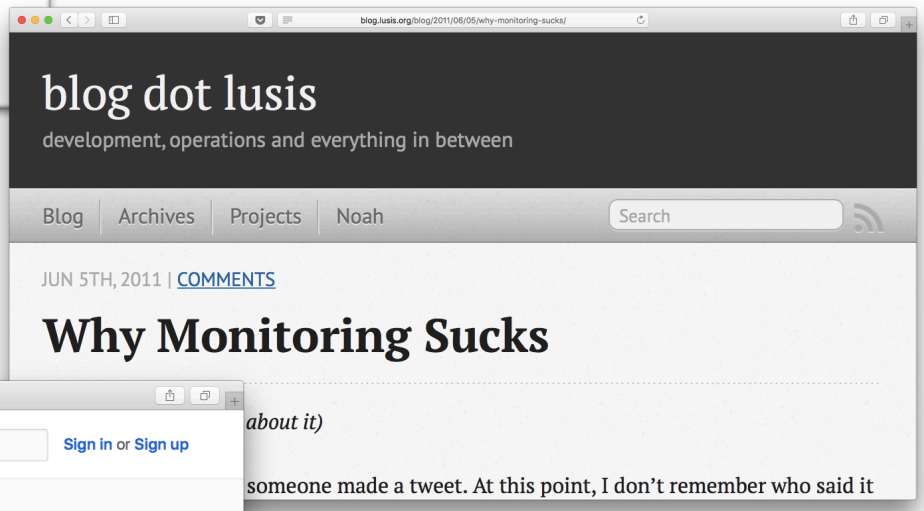


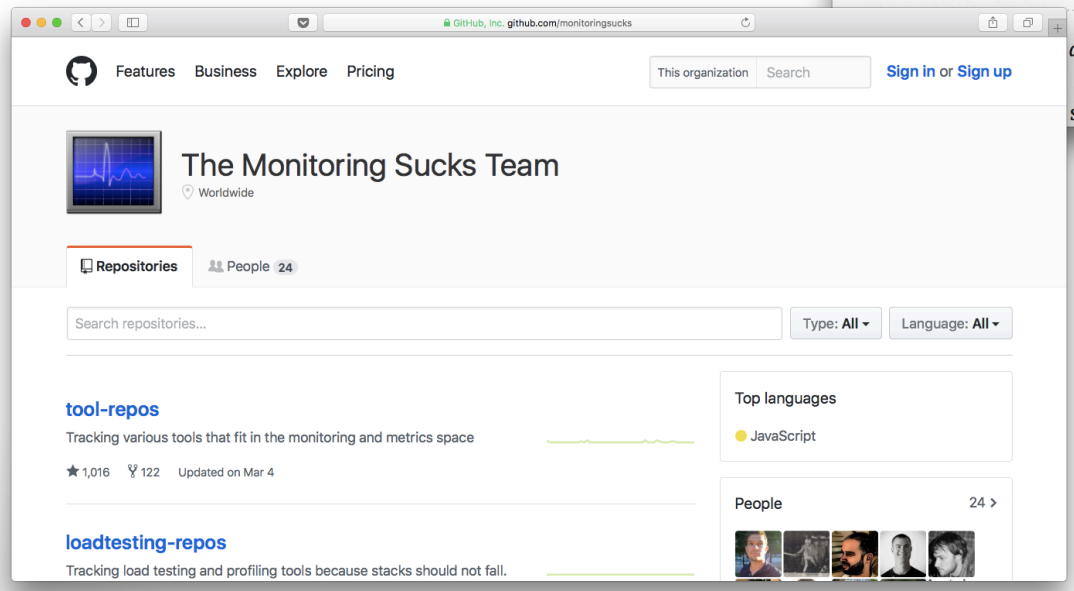
Figures from: http://martinfowler.com/articles/microservices.html and https://www.slideshare.net/CiscoDevNet/enabing-devops-in-an-sdn-world

Observability is essential

Monitoring lagging behind

…back in 2011





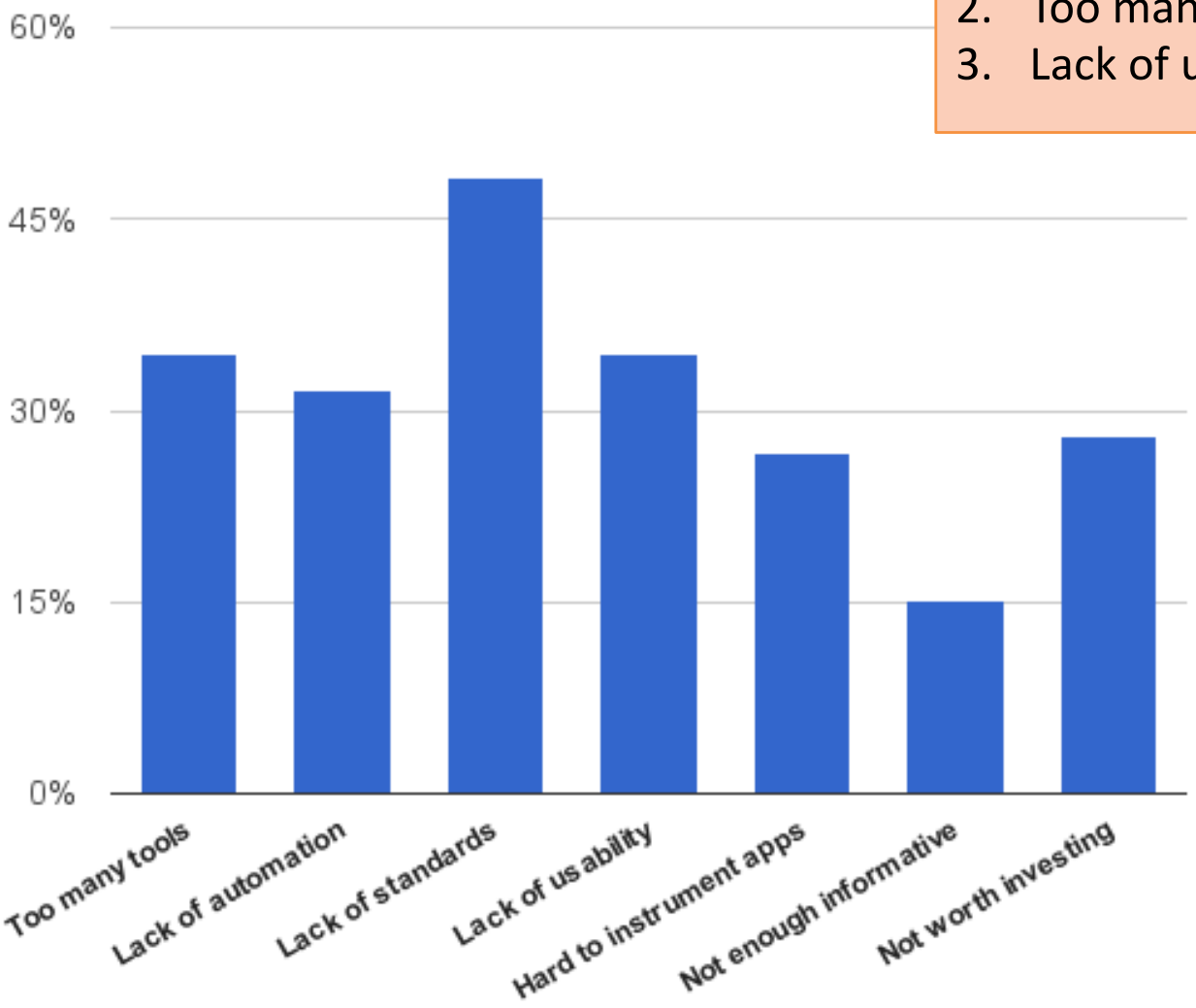
Since then… proliferation of tools and solutions

144 practitioners surveyed

M. Miglierina. Monitoring Modern Distributed Software Applications: Challenges And Solutions. PhD thesis, Politecnico di Milano, 2017.

Main perceived drawback in monitoring?

1. Lack of standards
2. Too many tools
3. Lack of usability



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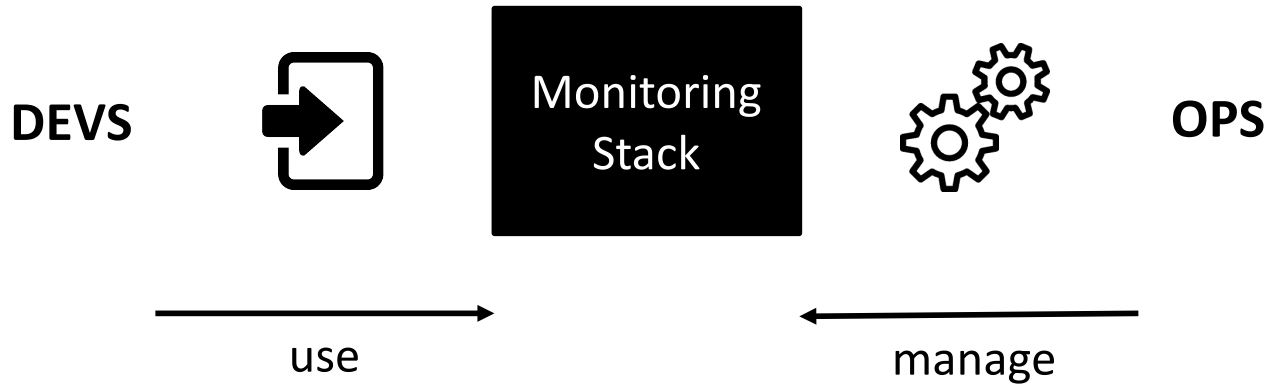
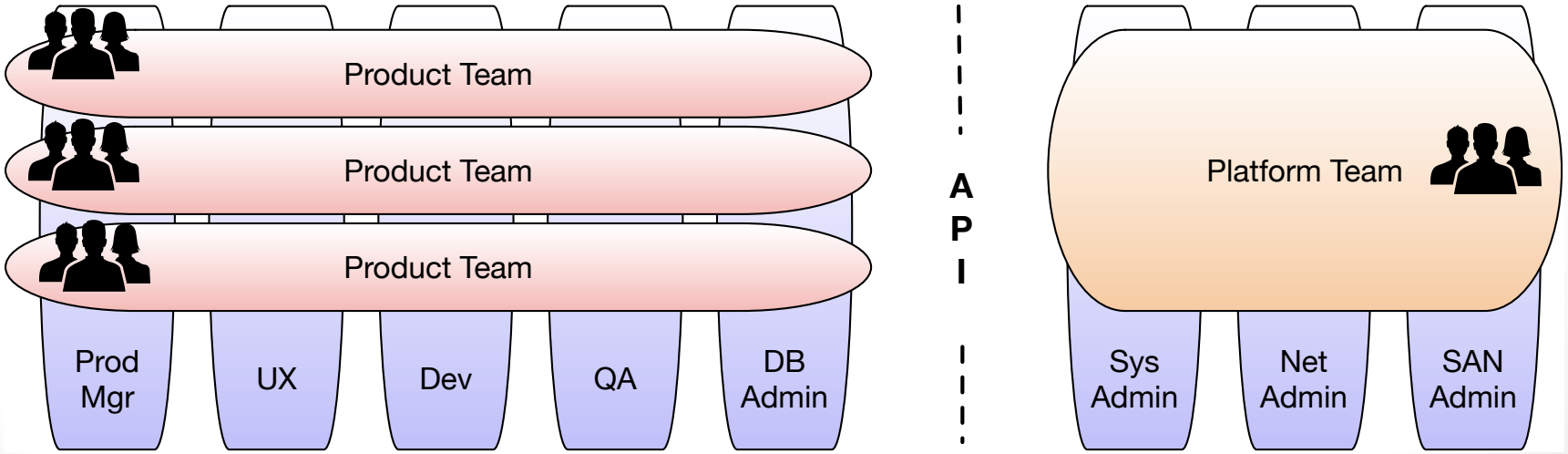
Omnia

- **Main objectives**
  - reduce learning curve and entry cost to monitoring
  - an attempt of standardization
- **How?**
  - One, interoperable, self-service monitoring interface for devs
  - A simple monitoring factory for ops



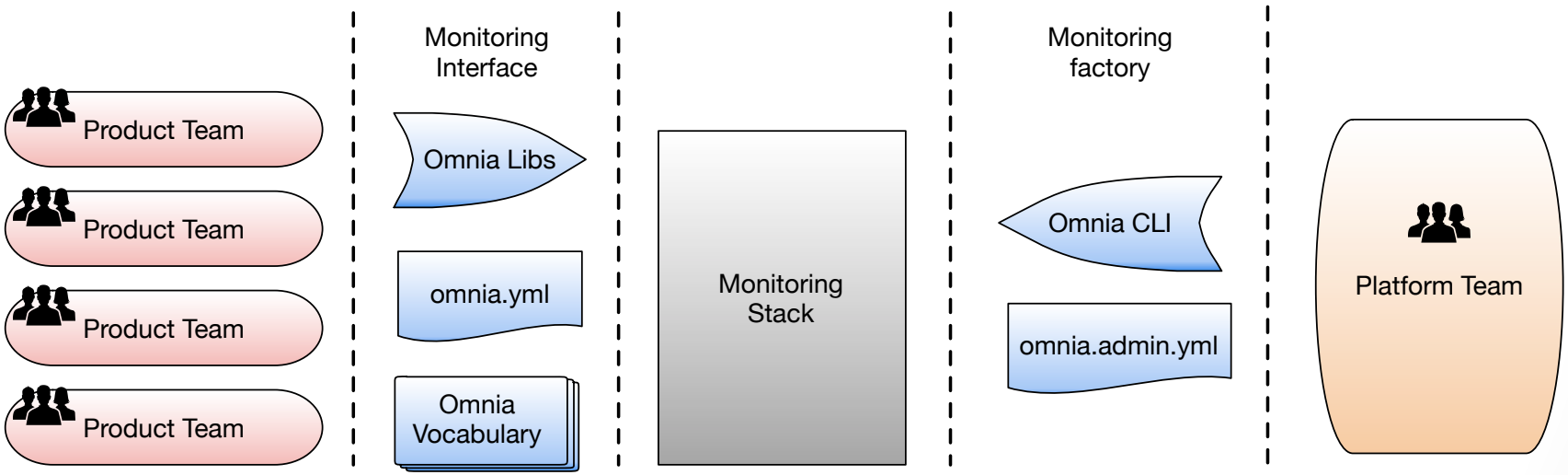
Reference team organization

- Product teams
  - each responsible of its microservice
  - independent workflows
- Platform team
  - provide infrastructure support
  - cross functional wrt product teams

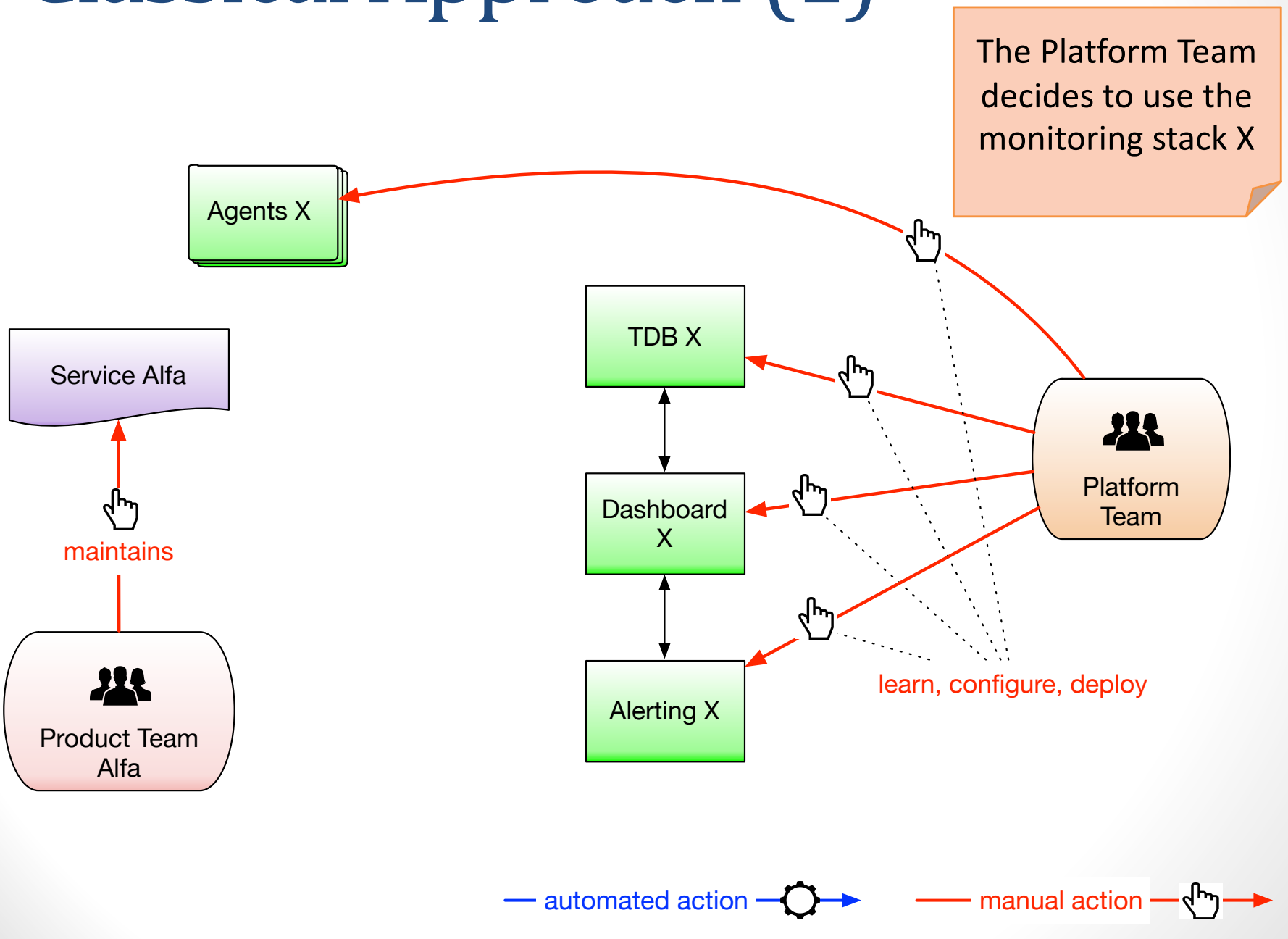


Team organzation at Netflix: https://www.nginx.com/blog/adopting-microservices- at-netflix-lessons-for-team-and-process-design/

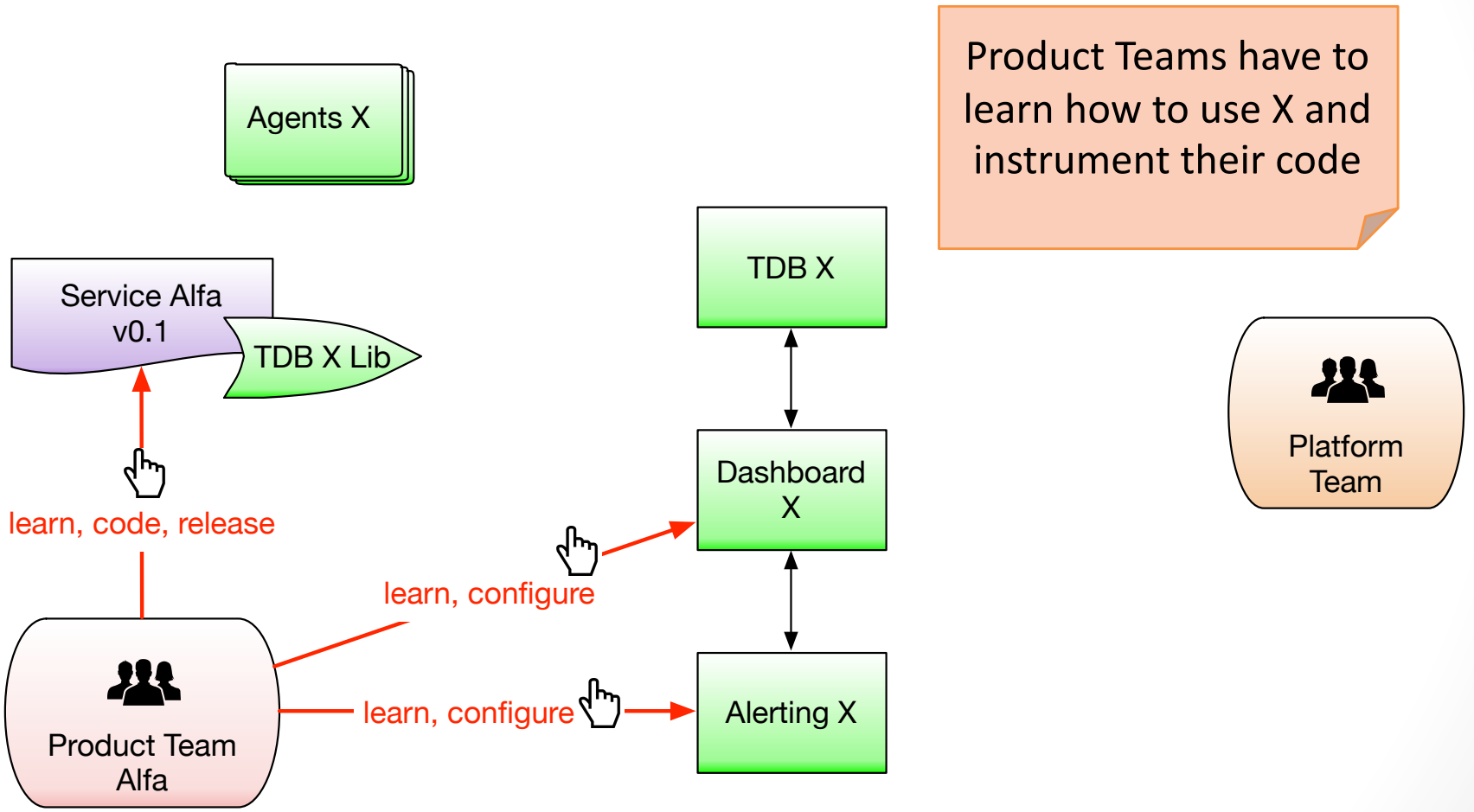
The Omnia components



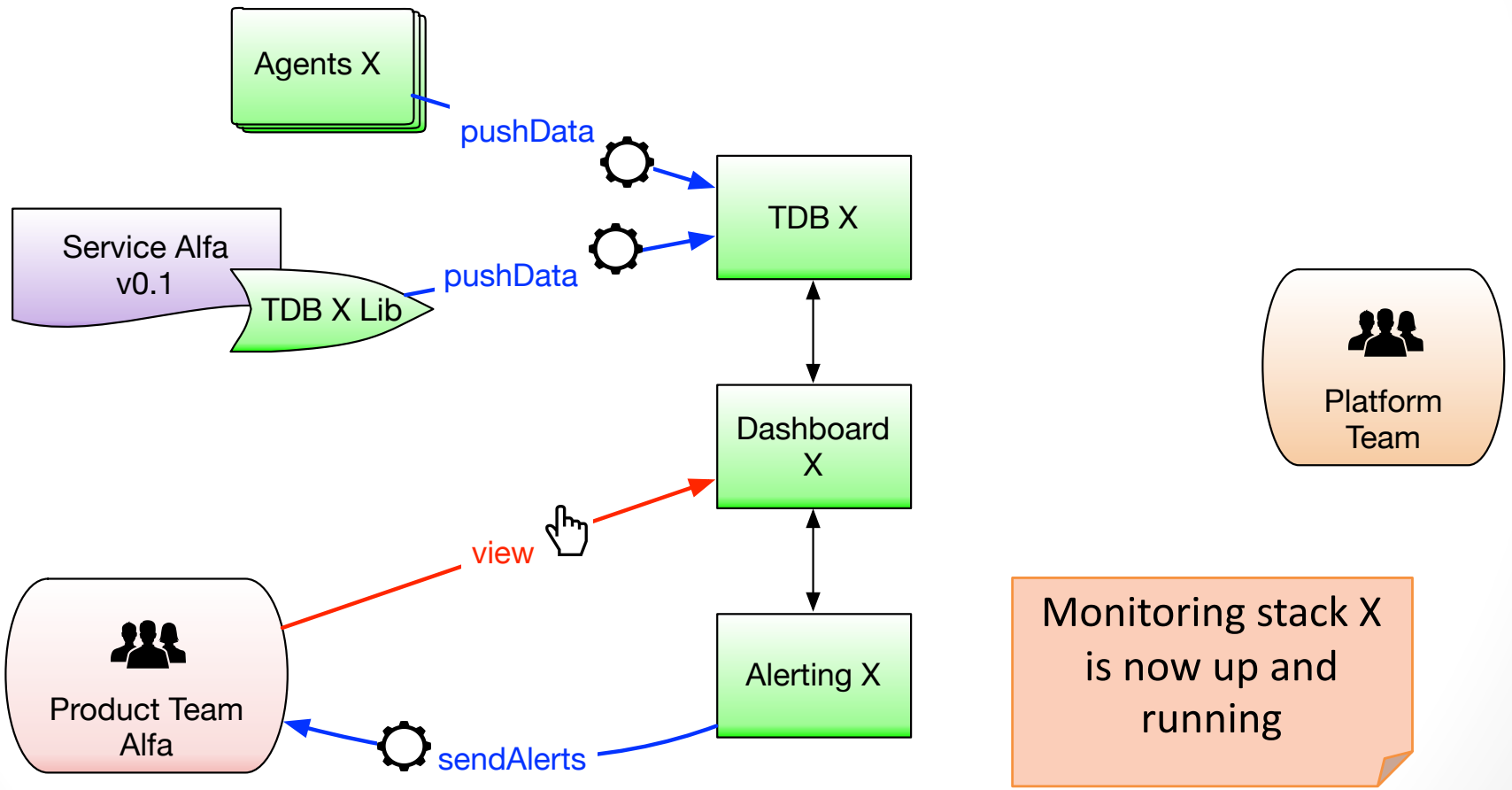
Classical Approach (1)



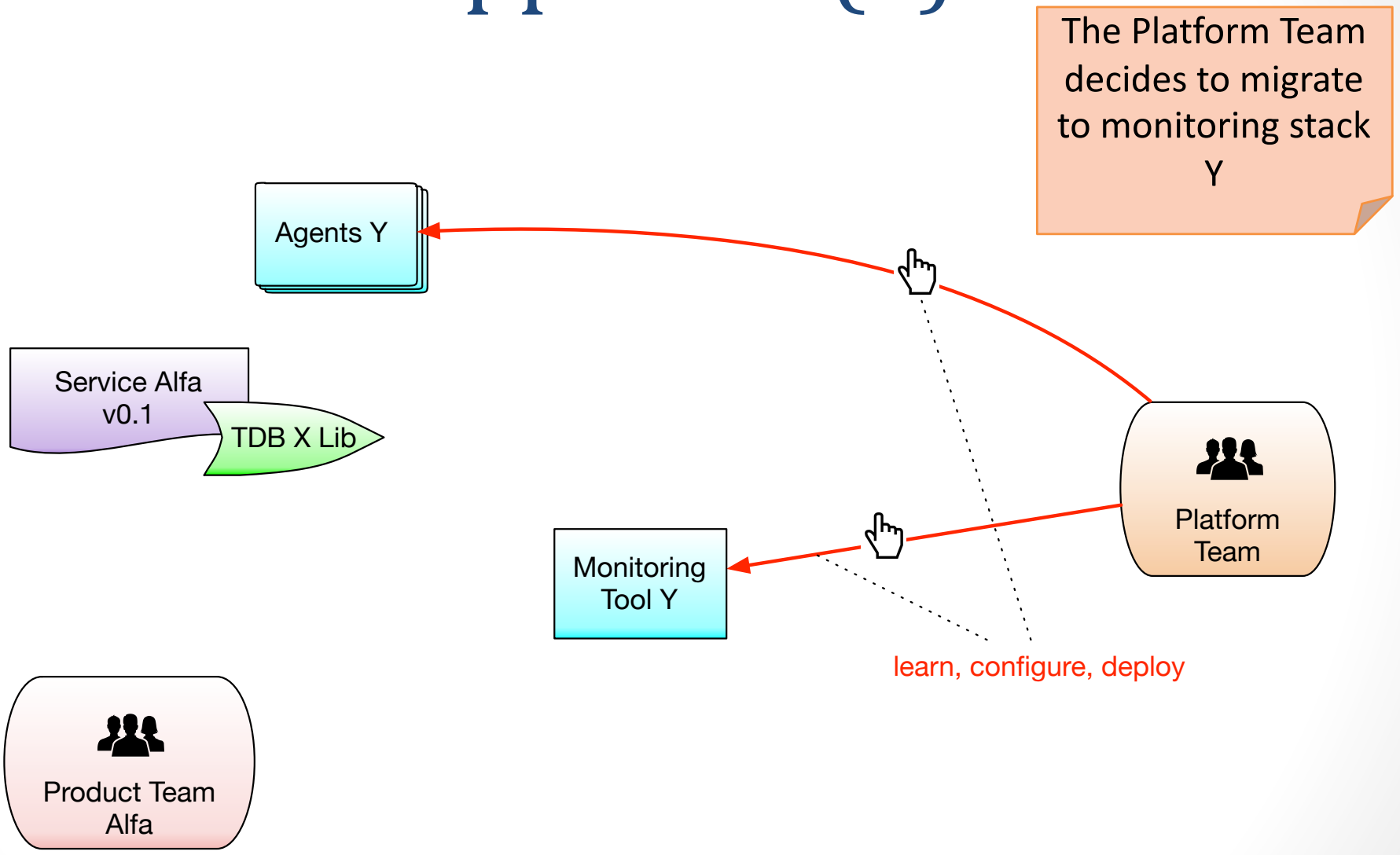
Classical Approach (2)



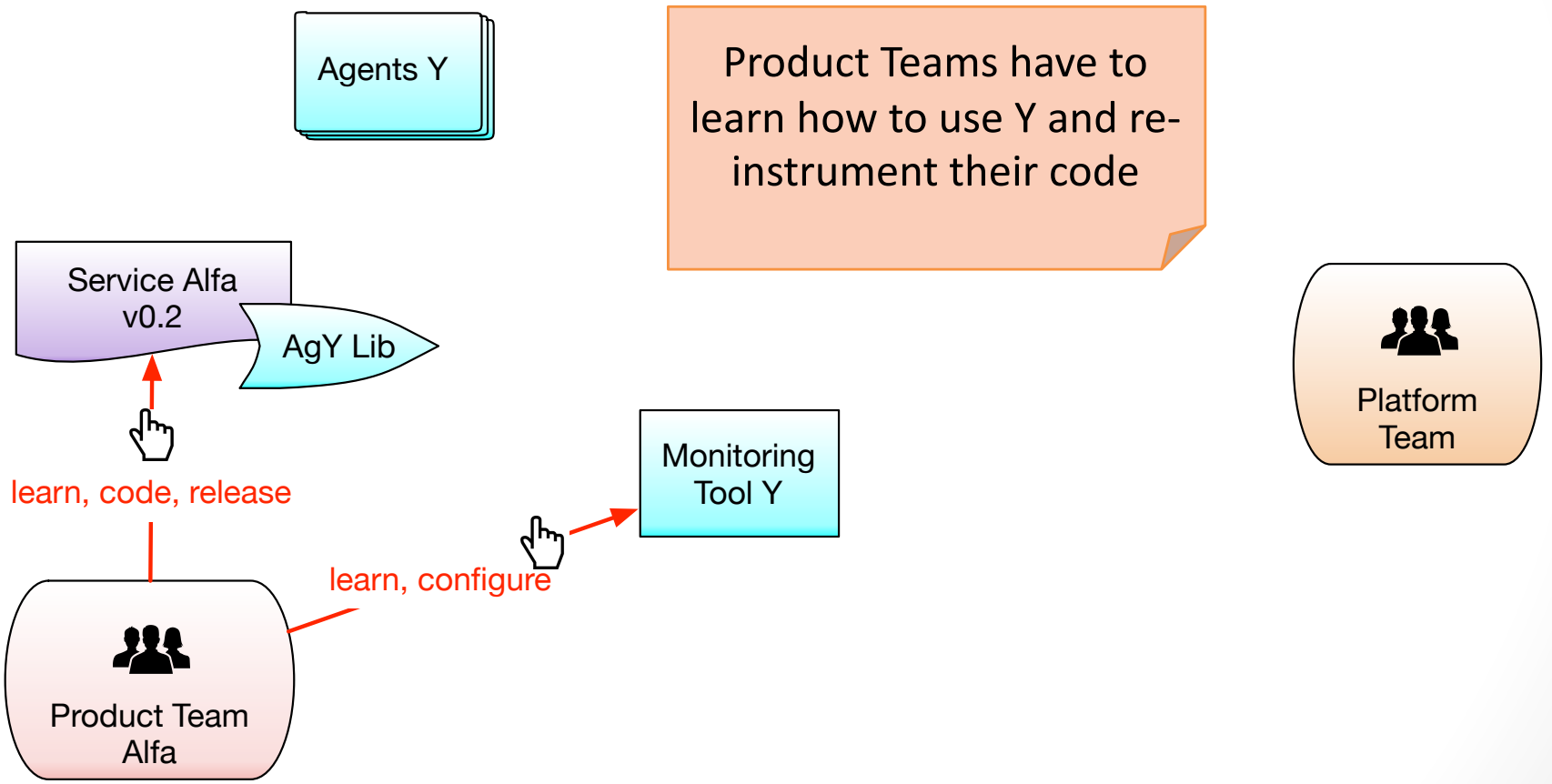
Classical Approach (3)



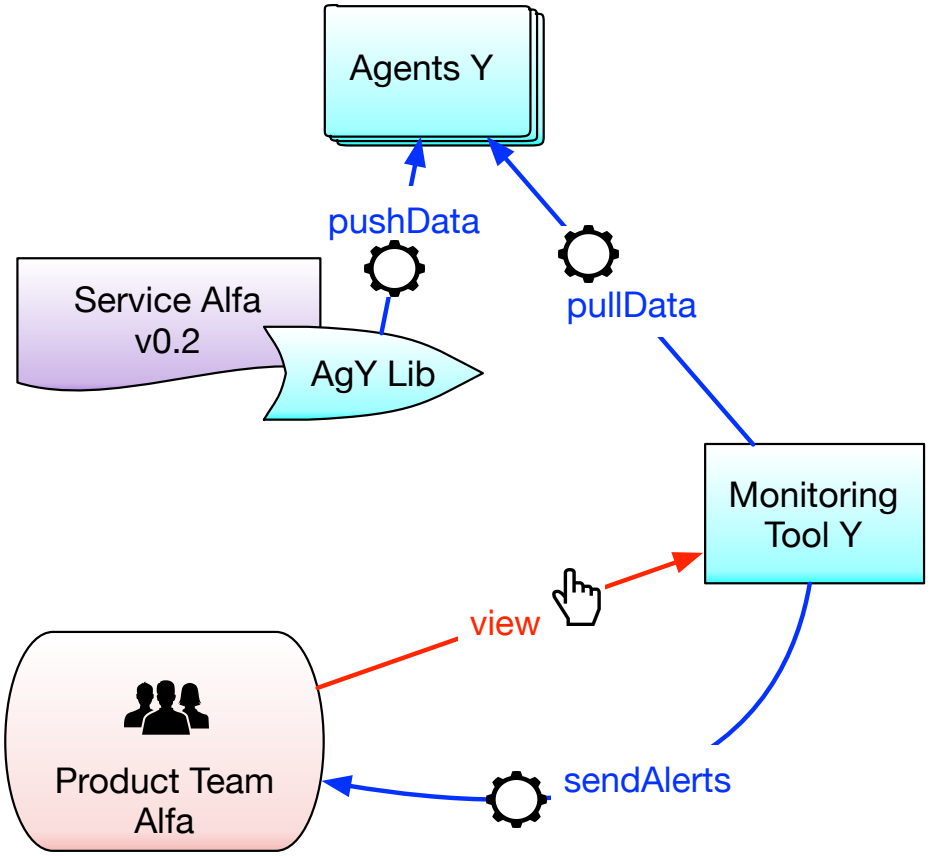
Classical Approach (4)

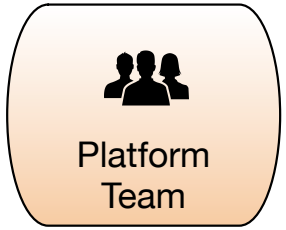


Classical Approach (5)



Classical Approach (6)





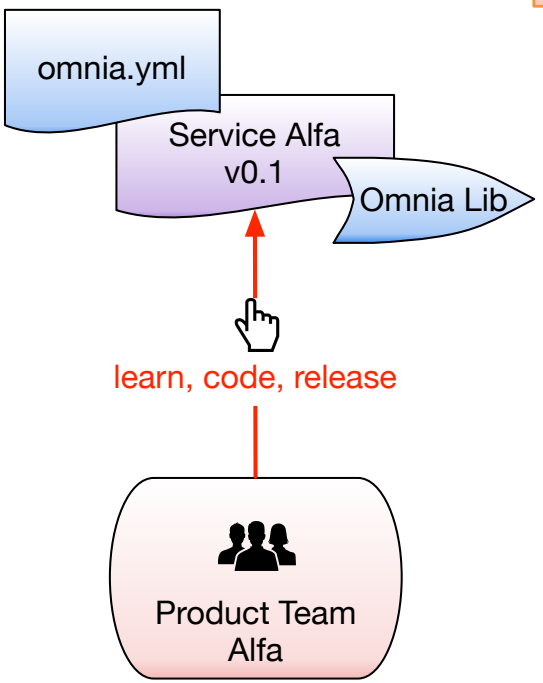
Monitoring stack Y is now up and running

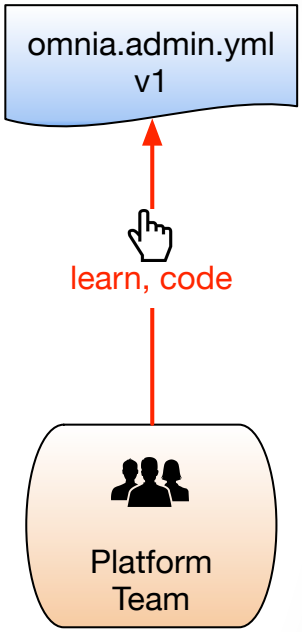
automated action

manual action

Omnia-based approach (1)

By using Omnia a single learning step is required for all teams

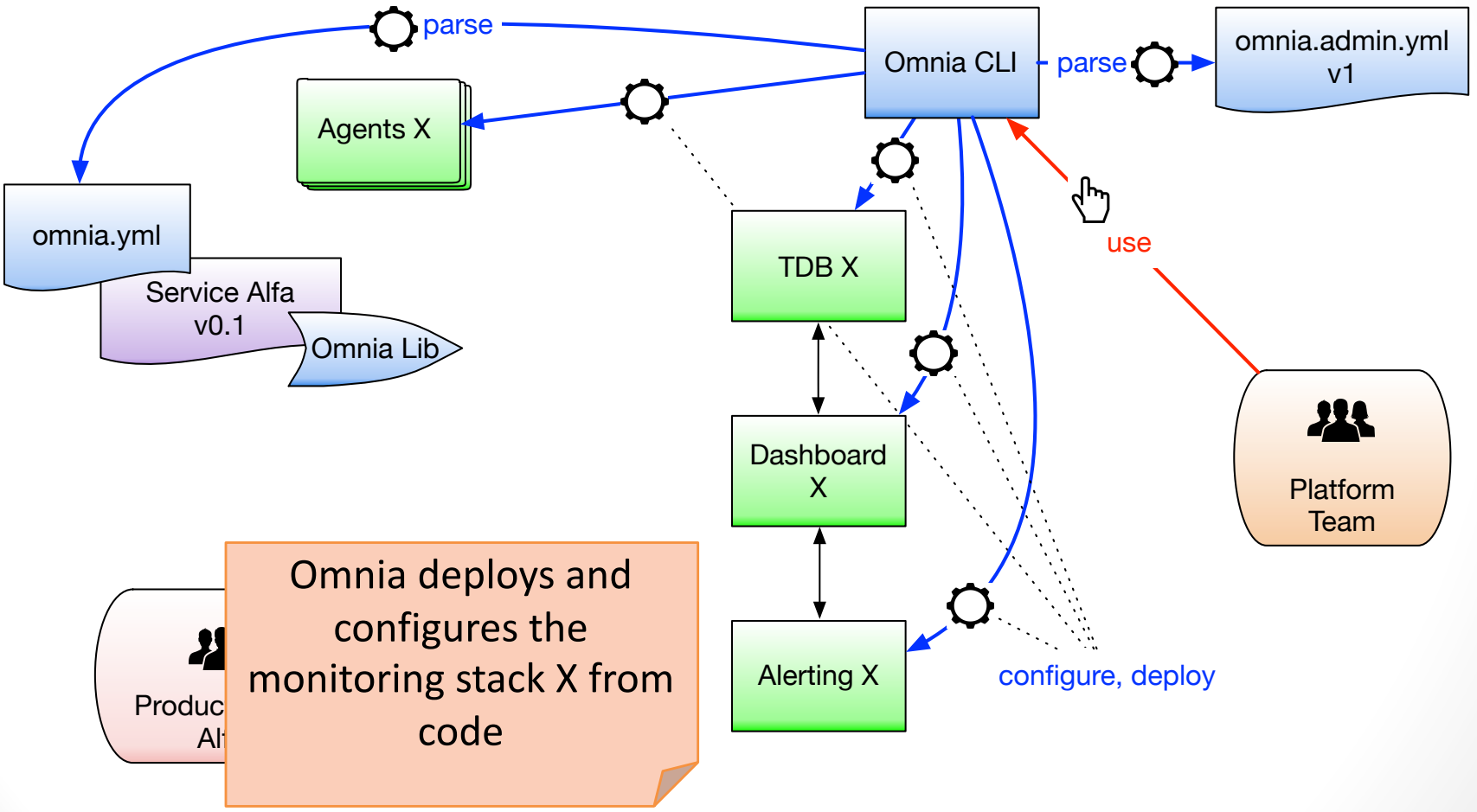




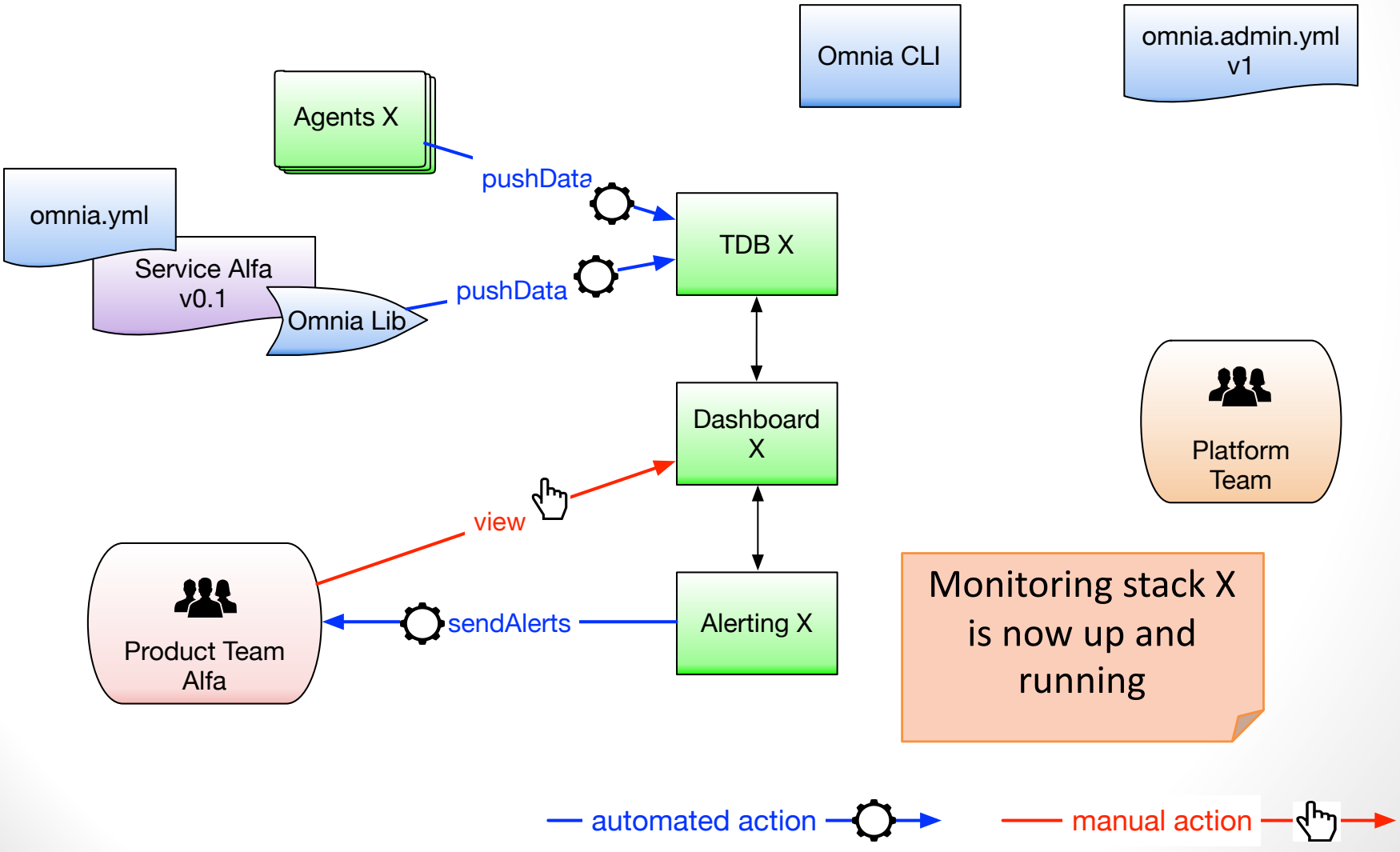
automated action

manual action

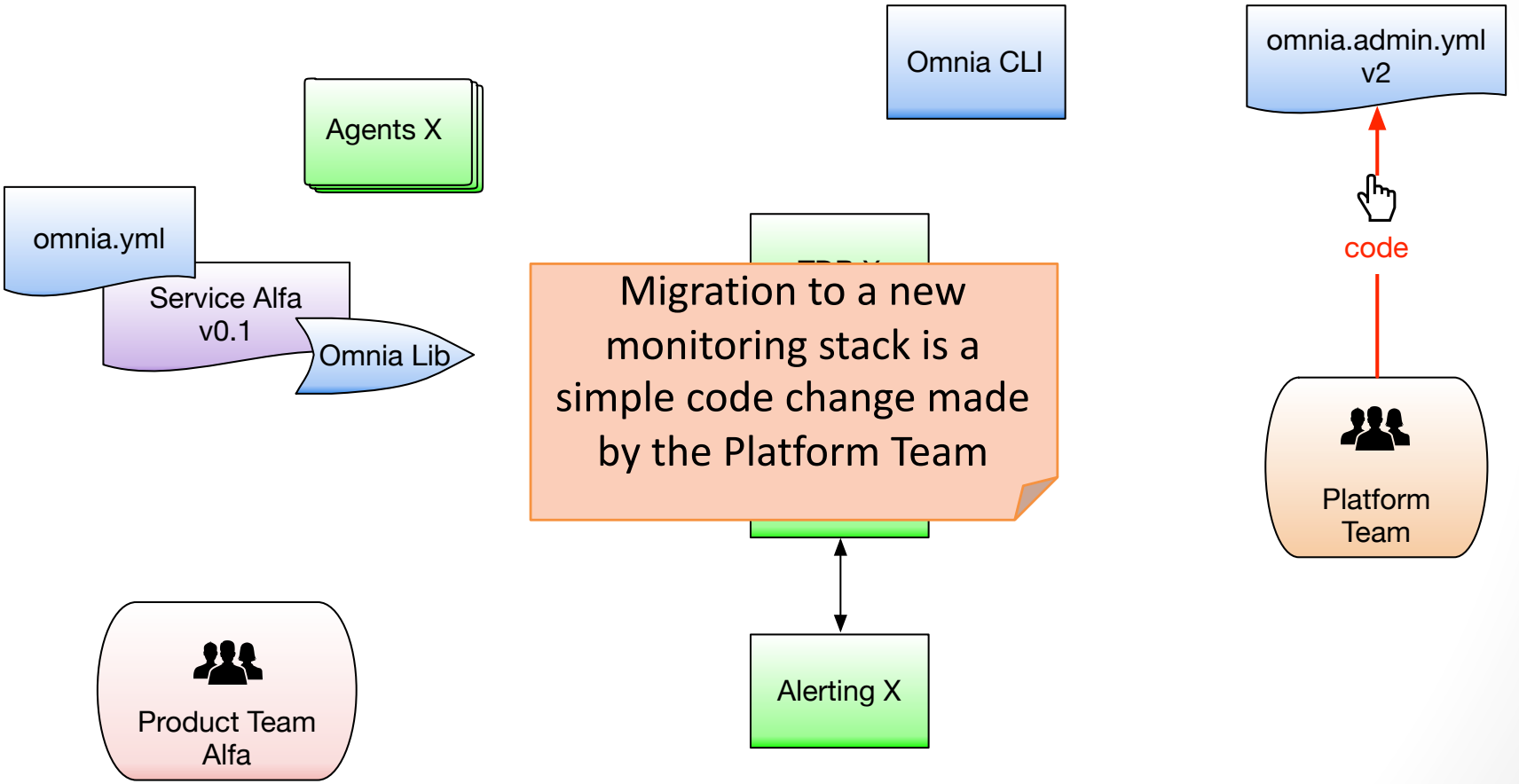
Omnia-based approach (2)



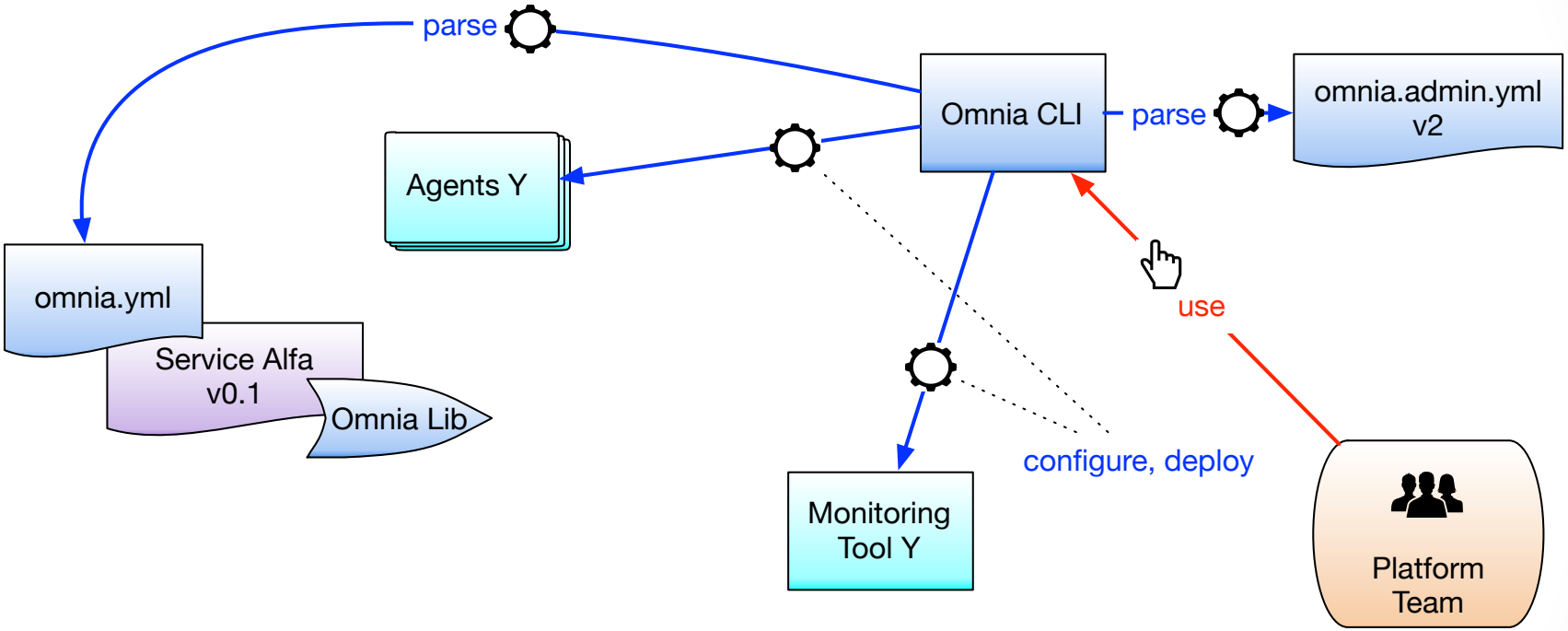
Omnia-based approach (3)



Omnia-based approach (4)



Omnia-based approach (5)

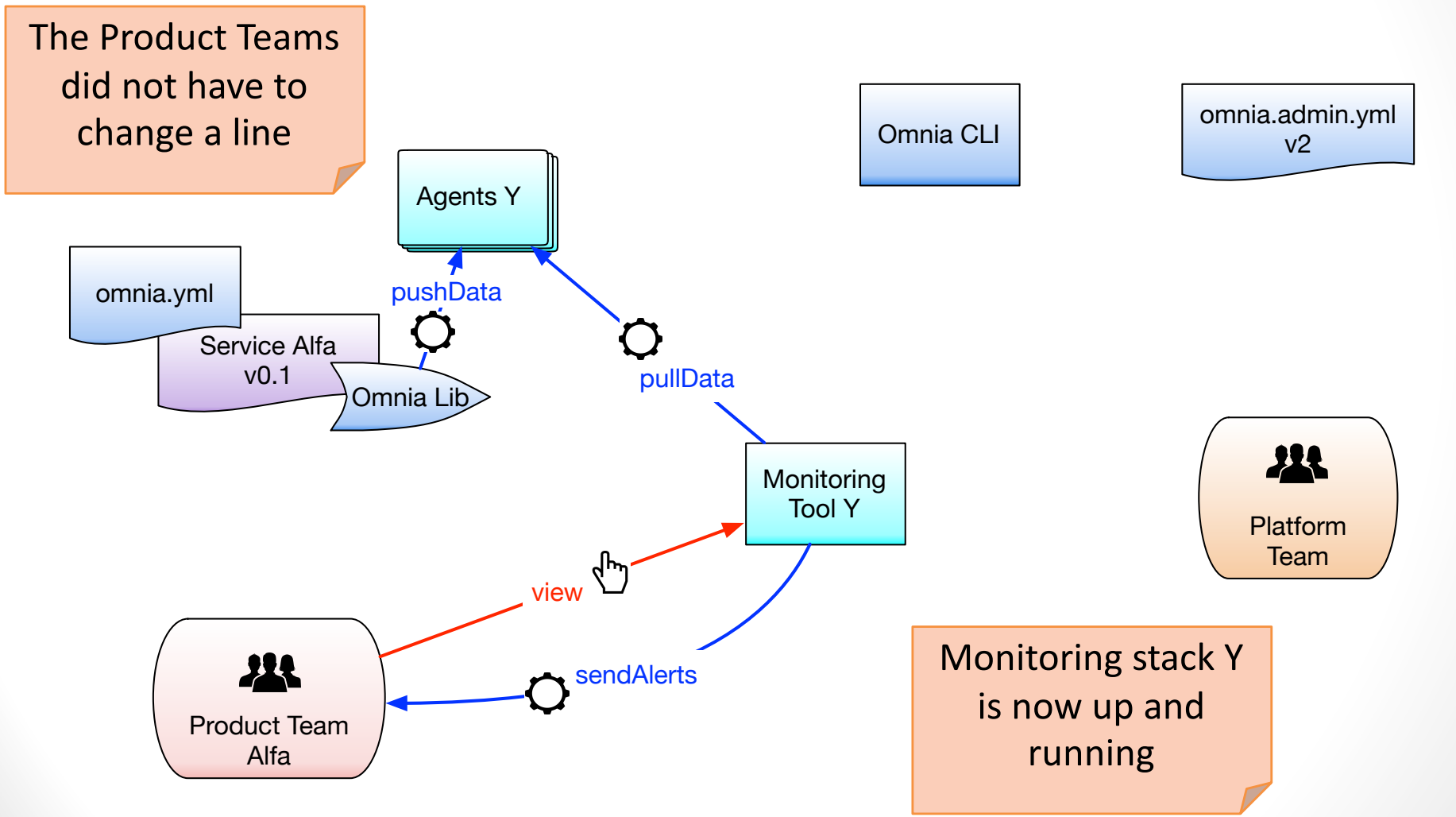


Omnia takes care of reconfiguring and redeploying the stack

automated action

manual action

Omnia-based approach (6)



Omnia Libs

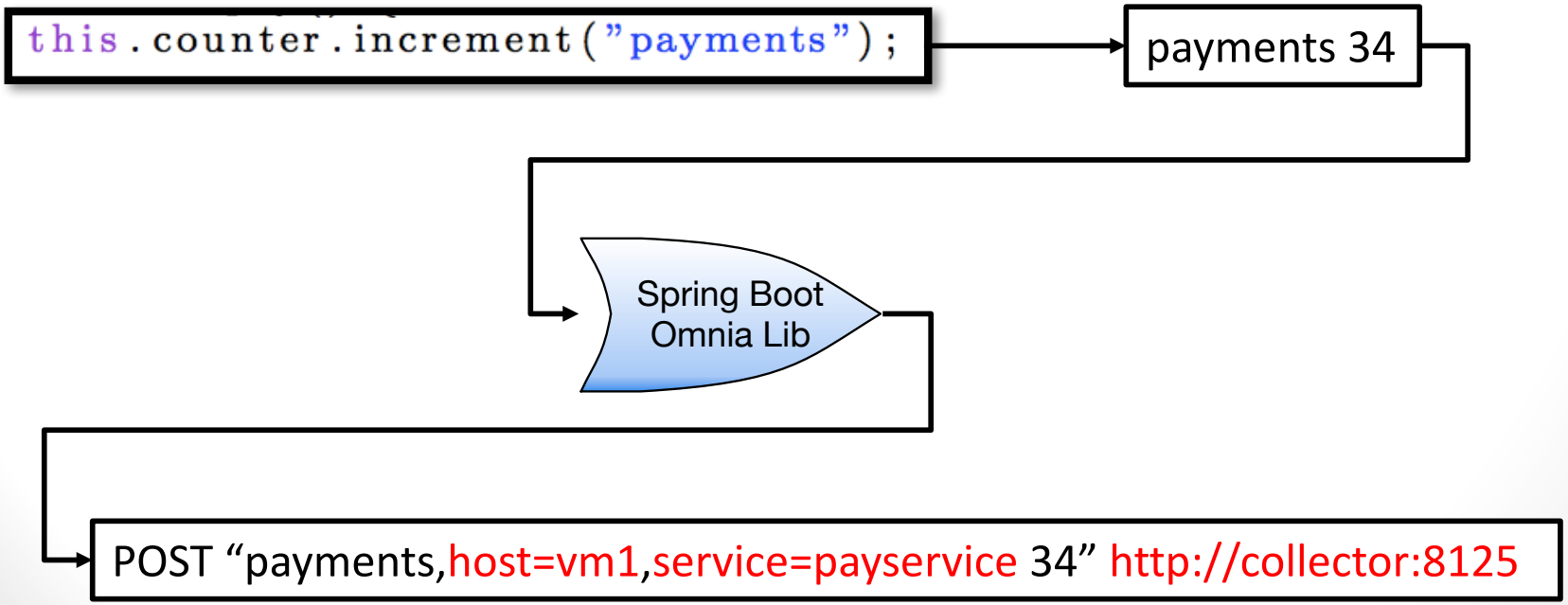
- Requirements:
  - independent of the monitoring stack
  - minimize instrumentation overhead
- Example:

```
@Service
public class MyService {
    private final CounterService counter;

    @Autowired
    public MyService(CounterService counter) {
        this.counter = counter;
    }

    public void pay() {
        // perform the payment
        ...

        // monitoring
        this.counter.increment("payments");
    }
```

Omnia Lib for Spring Boot

Under the hood

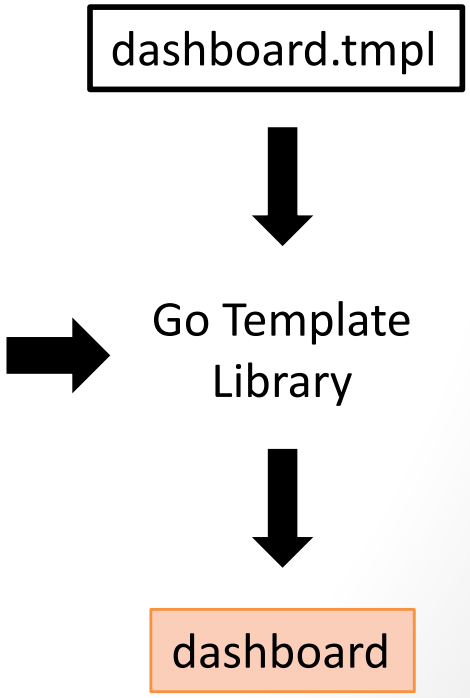
- Convention over configuration:
  - statsd (w/ influxdb tag ext.) protocol
  - automated meta-data decoration
  - default endpoint
- Example:



Omnia.yml: monitoring config as code

- Requirements
  - independent of the monitoring stack
  - versionable with the code
- Example:

```
dashboard:
  timeseries:
    - metric: payments
      compute: rate
    - metric: heap_memory_usage
      compute: average by host
    - metric: cpu_usage_user
      compute: average by host
    - metric: mem_used
      compute: average by host
actions:
  email:
    - condition: cpu_usage_user > 0.8
```



The Omnia vocabulary

- Shared vocabulary for resources

Resource	Description
host	a physical or virtual machine
service	an application
service_id	a unique identifier for an instance of an application
container_id	a unique identifier for a Linux container
container_image	a Linux container image

- and for metrics

Host metrics	Java metrics
cpu_usage_user	*heap_memory_usage*
cpu_usage_system	*thread_count*
cpu_usage_idle	*loaded_class_count*
mem_used	*garbage_collection_time*
mem_used_percent	*thread_count*

Monitoring infra as code

omnia.admin.yml example:

```
provisioner:
  name: docker
  args:
    username: mmiglier
    images_tag: latest
tools:
  telegraf:
    roles:
      - agent
      - collector
    pushes_to:
      - influxdb
  influxdb:
    roles:
      - tdb
  grafana:
    pulls_fr
      - infl
    roles:
      - das
      - act
teams_repos:
  - "github.com/mmiglier/service
  - "github.com/mmiglier/service
```

Reusing existing adapters

v2

```
provisioner:
  name: docker
  args:
    username:
    images_tag
tools:
  collectd:
    roles:
      - collector
      - agent
    pushes_to:
      - collectd_exporter
  collectd_exporter:
    roles:
      - agent
  prometheus:
    pulls_from
      - collec
    roles:
      - tdb
      - actior
  grafana:
    pulls_from:
      - prometheus
    roles:
      - dashboard
teams_repos:
```

Reusing existing monitoring tools

Reusing existing provisioning tools

Conclusion

- Contributions
  - Reduce entry cost and learning curve to monitoring
  - Application of DevOps practices to monitoring
  - Attempt of standardization
- Threats to validity
  - A common interface may simplify tools characteristics
  - However:
    - initial approach to monitoring has simple requirements
    - it could push tool vendors to implement missing features
    - the approach could be applied to existing or new tools
- Future work
  - Extensive evaluation using real world examples