



LOGICALIS

NEP@L

Network Programmability @bstraction Layer

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NEP@L Mentor

```
function($DbLast, $clientLast) {
    $DbLast = $clientLast;
    $words = Str_Replace(" ", "", Str_Replace(",", ";", $DbLast));
    $check = explode(" ", $check);
    if ($check[0] == "description") {
        $DbLast = $check[1];
    }
    for ($i = 0; $i < count($words); $i++) {
        if (strlen($words[$i]) > 7) {
            echo json_encode(array("id" => $DbLast, "name" => $words[$i]));
        } else if (isset($_POST['get'])) {
            $id = (int)$_POST['get'];
            if ($id > 0) {
                echo json_encode($o->GetLinkData($id));
            }
        }
    }
}

function GetLastId() {
    $result = $o->GetLinksData($_POST['getM']);
    if ($result) {
        $lastId = $result[0];
        return $lastId;
    }
    return null;
}

function query($how, $what, $parameters) {
    $result = $o->RateLink($how, $what, $parameters);
    if ($result) {
        $show = htmlspecialchars($result['linkClass'], ENT_QUOTES);
        echo "";
        echo \$result\['linkClass'\];
        \$what = htmlspecialchars\(stripslashes\(\$result\['what'\]\)\);
        echo \$what;
        echo "";
    } else {
        echo "-1";
    }
}
```

Agenda

- CLI Interface vs Programmatic interface
- Why Autommation
- NEP@L Framework
- How NEP@L works
- Programmability: what we did
- Demo Automation Cisco ACI

THINGS

CHANGED



LOGICALIS

The Value-Proposition for Programmability

```
# By Ed Scrimaglia  
# Status dispositivos
```

```
import requests  
import sys  
import json  
from pprint import pprint  
  
def getOrganizaciones(_apikey):  
    url = "https://api.meraki.com/api/v0/123456/devicesStatuses"  
  
    headers = {  
        'x-cisco-meraki-api-key': _apikey,  
        'Content-Type': 'application/json'  
    }  
  
    r = requests.get(url, headers=headers, timeout=10)  
    r.raise_for_status()  
    return r
```

```
[  
  {  
    "name": "Access Point MR33",  
    "serial": "Q2PD-V2DQ-2JX6",  
    "mac": "0c:8d:db:95:79:dd",  
    "publicIp": "190.111.211.47",  
    "networkId": "L_591660401045801690",  
    "status": "online",  
    "lanIp": "10.1.10.3"  
  },  
  {  
    "name": "Sec_MX64W_IC",  
    "serial": "Q2MN-QWHR-GJ9M",  
    "mac": "e0:55:3d:8b:7f:a0",  
    "publicIp": "190.111.211.47",  
    "networkId": "L_591660401045801690",  
    "status": "online",  
    "usingCellularFailover": false,  
    "wan1Ip": "10.54.152.14",  
    "wan2Ip": null  
  },  
  {  
    "name": "Cam_MV21_IC",  
    "serial": "Q2BV-KVX9-PM9T",  
    "mac": "e0:55:3d:84:8c:95",  
    "publicIp": "190.111.211.47",  
    "networkId": "L_591660401045801690",  
    "status": "online",  
    "lanIp": "10.1.10.2"  
},
```

And who are you?

60% Network Engineer or Architect

14% Very familiar with Python and programming basics

41% OK with Python and programming basics

45% Not familiar with Python and programming basics

My own profile:

Softnet



Cisco Systems



Hewlett Packard



Entrepreneur



Italtel Inc



Logicalis



1993

CCIE 1996

1996

Consulting Eng

2004

LATAM Manager

2011

SW Entrepreneur C++

2014

Engineering Director

2017

Programmability
Automation

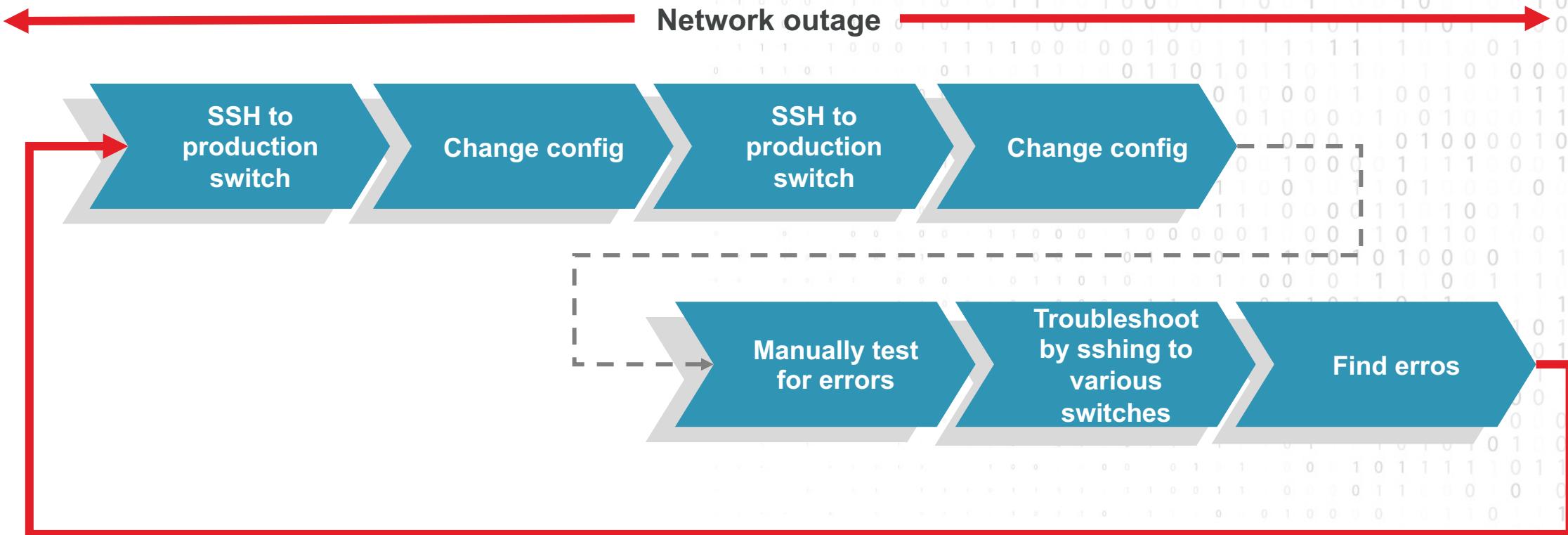
WHY

AUTOMMATION

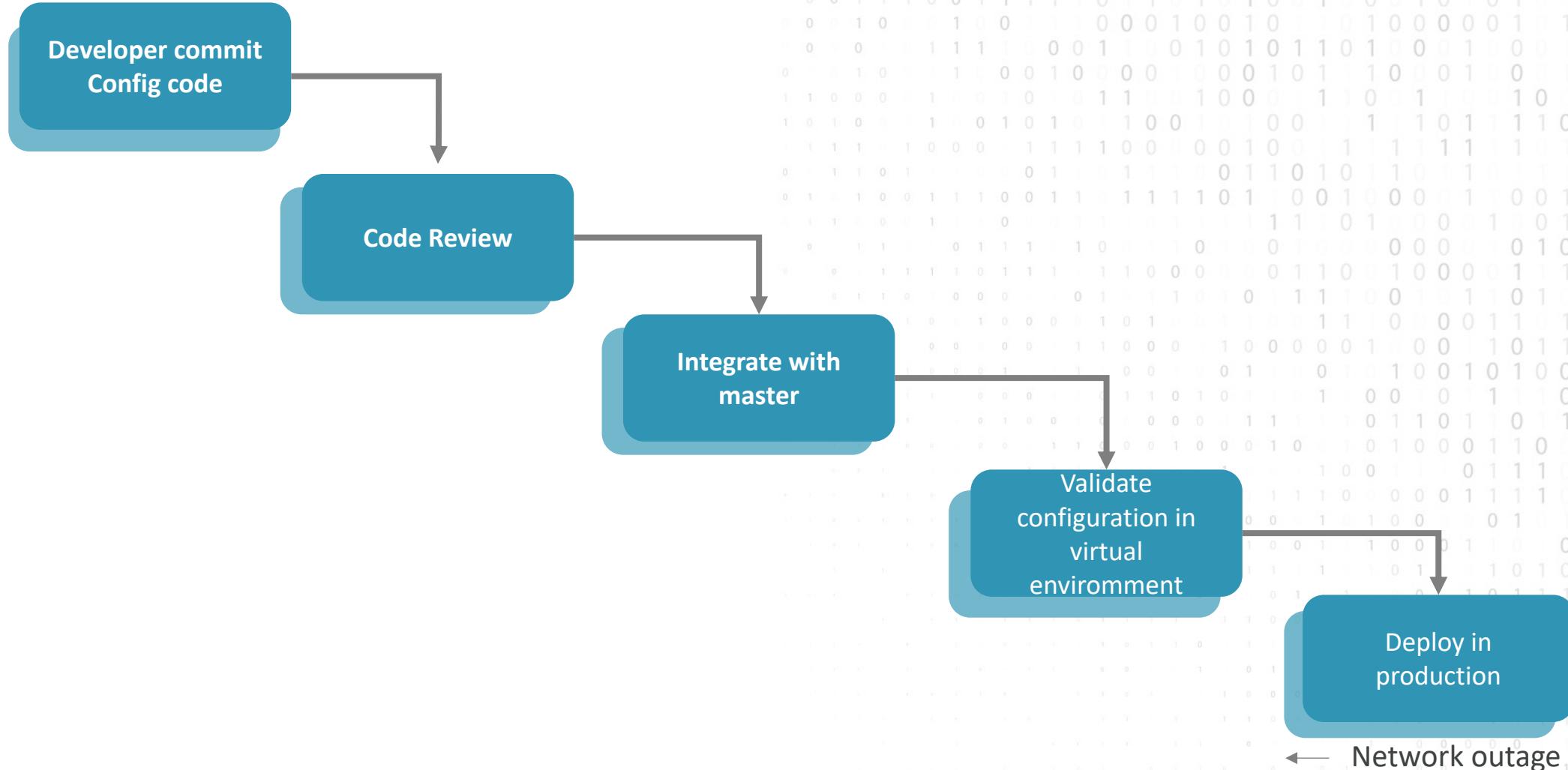


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Manually configuration process – Network outage



Automated provisioning – Network outage



* Only as long as it takes to run code

NEP@L



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Did you know?

What is the level of automation?



Is it good to have a lot of automation?



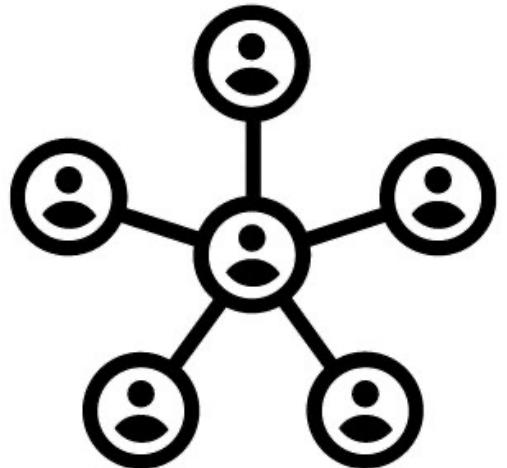
When all this Began?

*"Automation may be a good thing,
but don't forget that it began with
Frankenstein."*

Anonymous Quote

We need a culture... A true culture of automation

Organizational Strategic



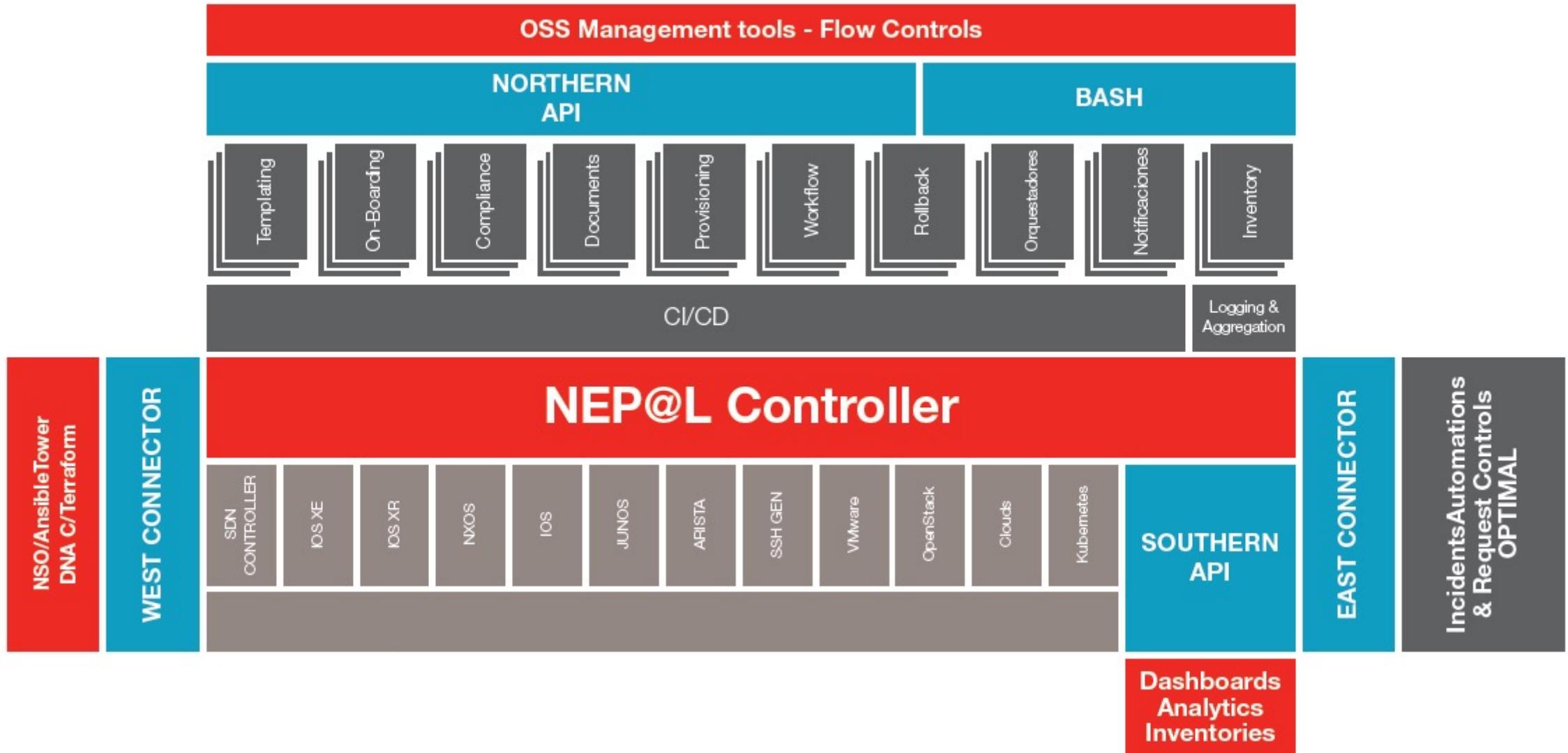
Engineers Transformation



Testing is not an option

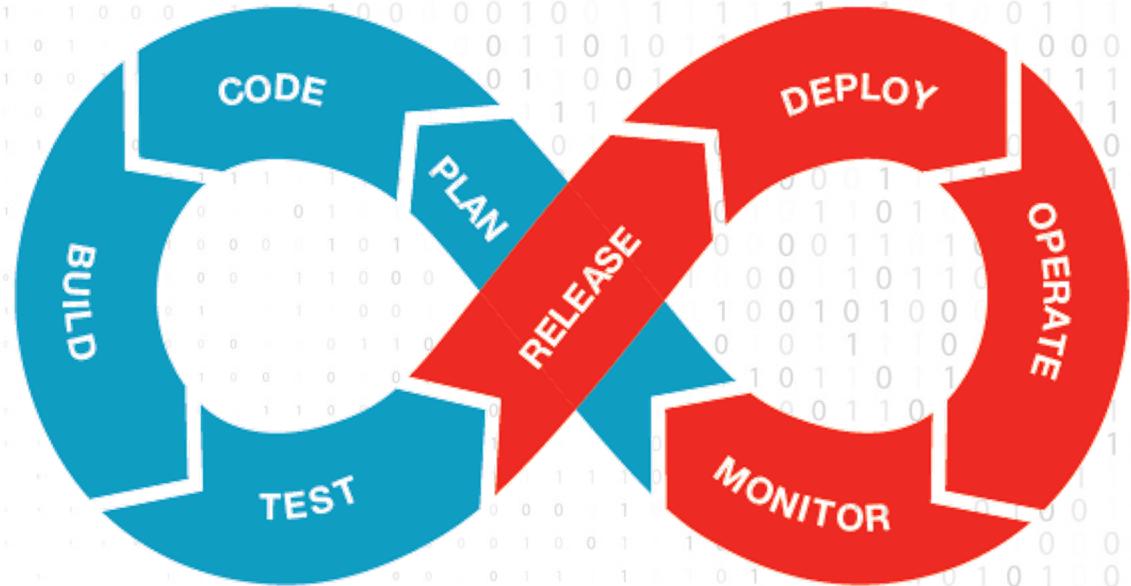


NEP@L – Automation Framework at Logicalis

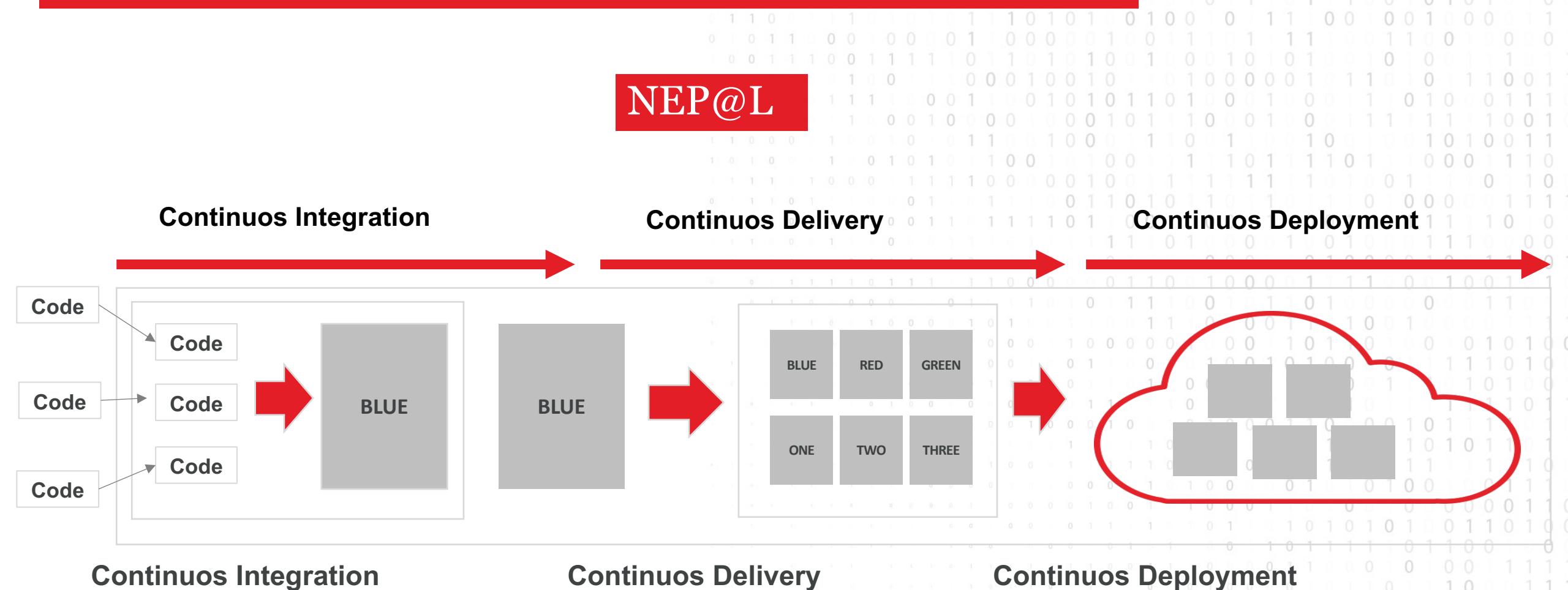


Continuos Integration/Continuos Development

Continuous Development (CI/CD) is a continuous process in which developers and testers collaboratively create, validate and delivery new code



Continuos Development Process Flow– CI/CD



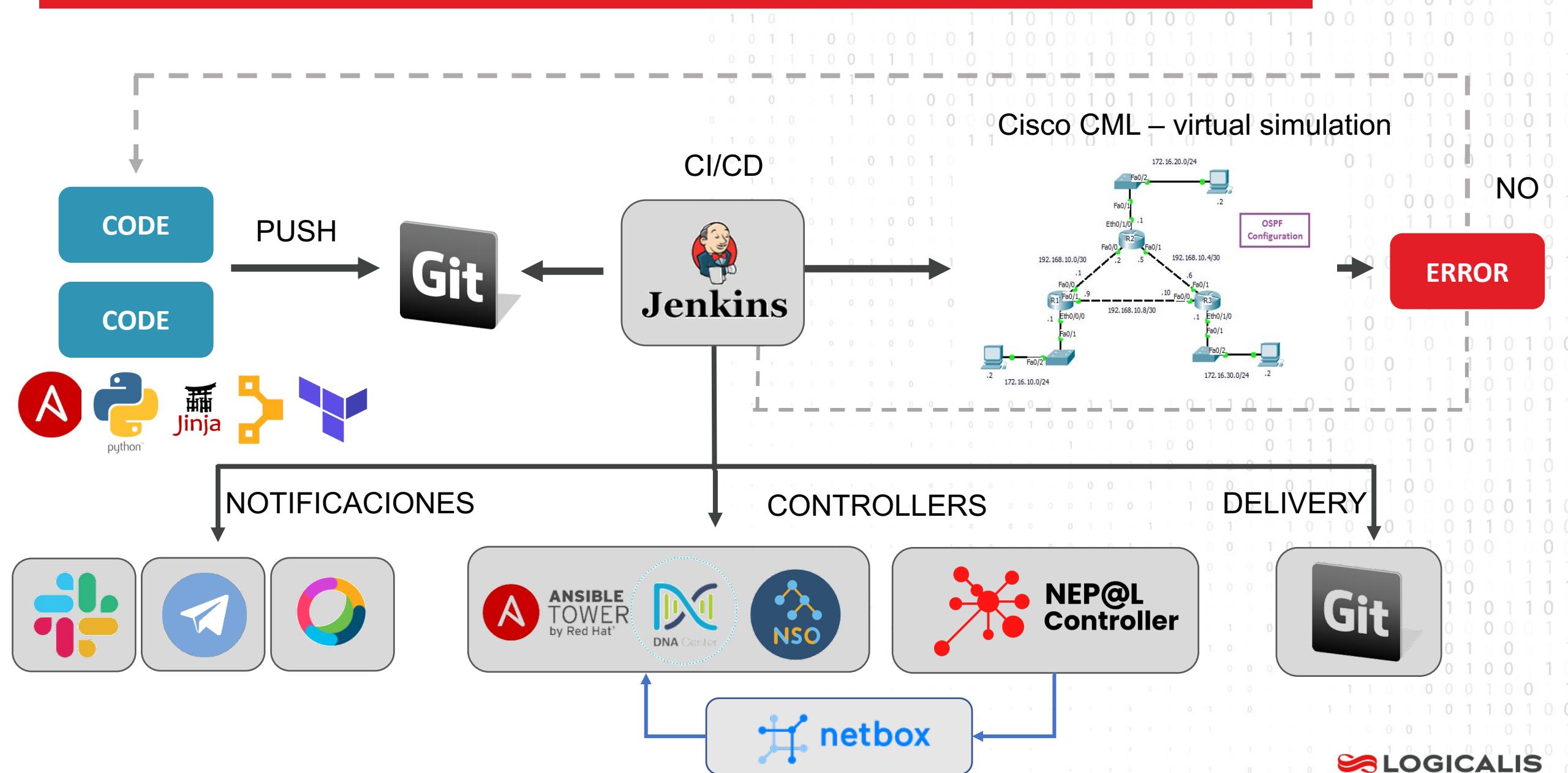
Continuos Integration

Continuos Delivery

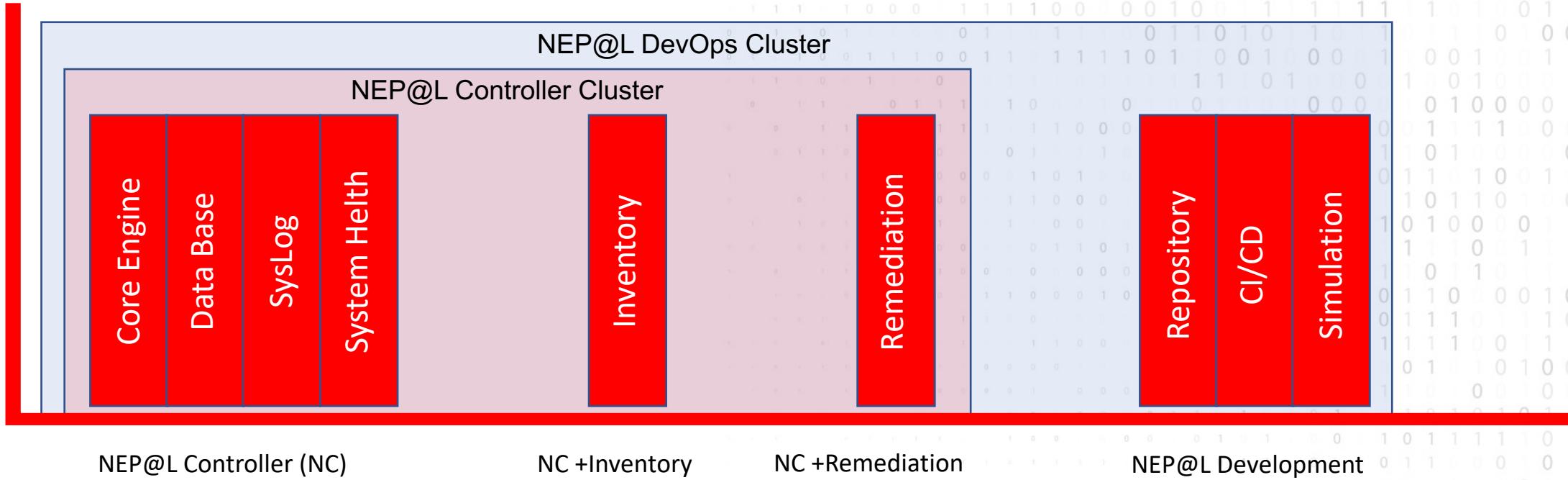
Continuos Deployment



Workflow & Tools Integration – How NEP@L works



NEP@L DevOps Modularity



New features incorporated since Oct 2019

- ElasticSearch: Syslogin, index tool for object Database
- NetBox: Inventory system
- Vagrant: VMs management (VMware, OpenStack)
- MongoDb: Object Database
- Release 2.0 of our NEP@L Controller
- Terraform
- Hashicorp Vault (Credential Manager)
- TIC Stack (influxDb,Chronograf, Telegraf & Kapacitor)

Use Cases already developed

- Massive Cisco IOS update
- Massive Nokia SROS update
- SDN Cisco ACI automation
- ACL NSO Service
- BGP Route Reflector
- MPLS-L3-VPN, BGP RR & OSPF to CPEs
- MPLS-L3-VPN, BGP RR & BGP to CPEs
- MPLS-L3-VPN, BGP RR & BGP-OSPF to CPEs
- IPAM & DCIM Population
- Inventory Integration (Source of Truth)
- DHANY (Device configuration & Compliance enforce)
- NetFlow NSO Service

Ansible modules created

- `nepal_copy.py`
- `nepal_dirflash.py`
- `nepal_model_validation.py`
- `nepal_sros_chg_bof.py`
- `nepal_sros_copy.py`
- `nepal_sros_dirflash.py`
- `nepal_sros_reboot.py`
- `nepal_sros_upd_boot.py`
- `nepal_srvnow.py`
- `nepal_mongodb_search`
- `nepal_mongodb_server.py`
- `nepal_mongodb_init.py`
- `nepal_mongodb_search.py`
- `nepal_mongodb_save.py`
- `nepal_codcompliance.py`
- `nepal_diff.py`
- `nepal_nso_action.py`

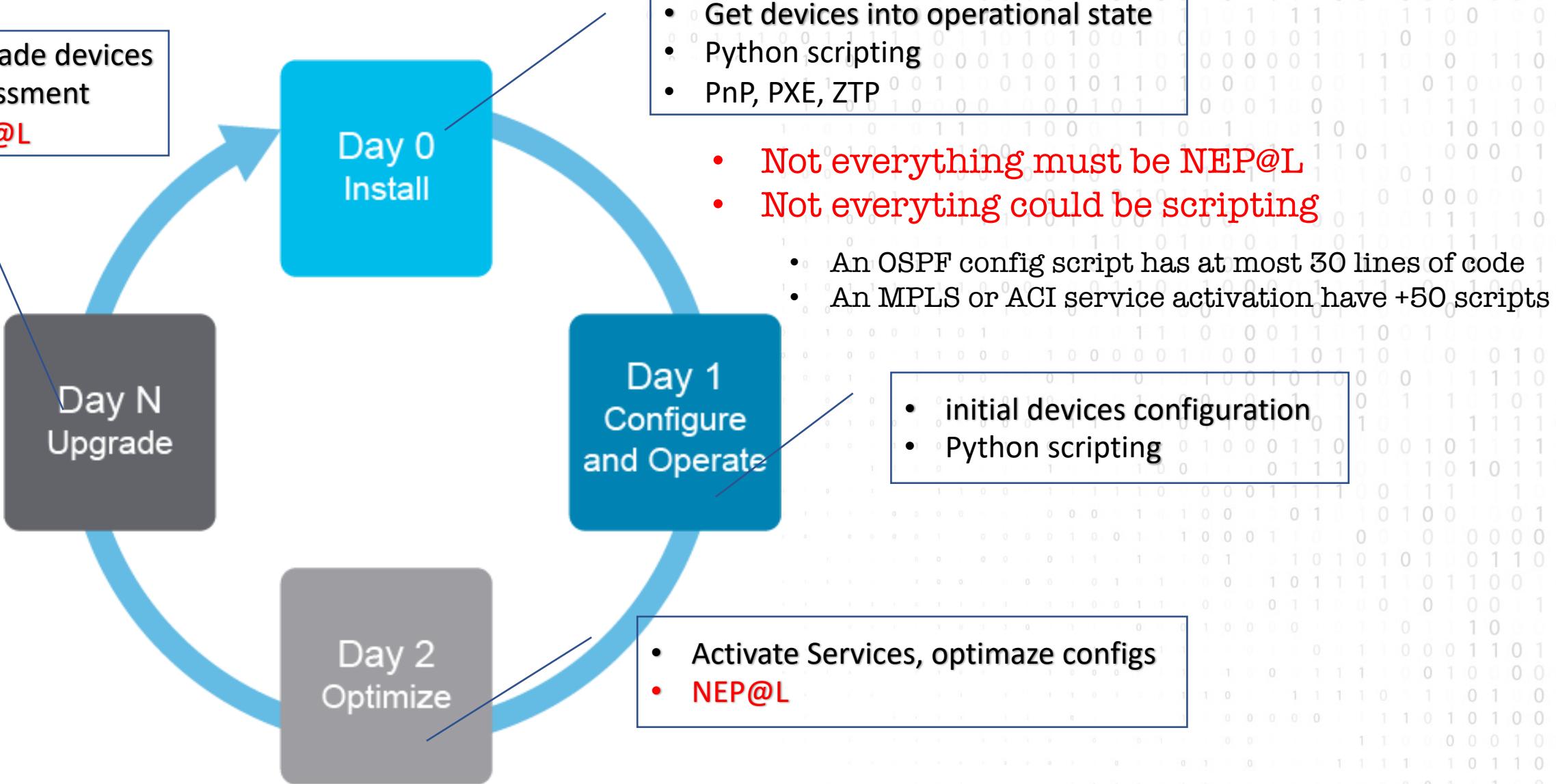
Roadmap: 2020/2021 planned projects

- NFV/VNF Mobile Use Case
- DHANY Use Case (telco and large enterprise operations)
- NEP@L Controller Release 2.1
- Traffic Generator integration
- Machine Learning **
- DNAC Integration Use Case
- SDN Wan Use Case

** Not Commitment

Device Automation Life Cycle - DALC

- Upgrade devices
- Assessment
- NEP@L



Networks are no longer
Configured...

They are programmed

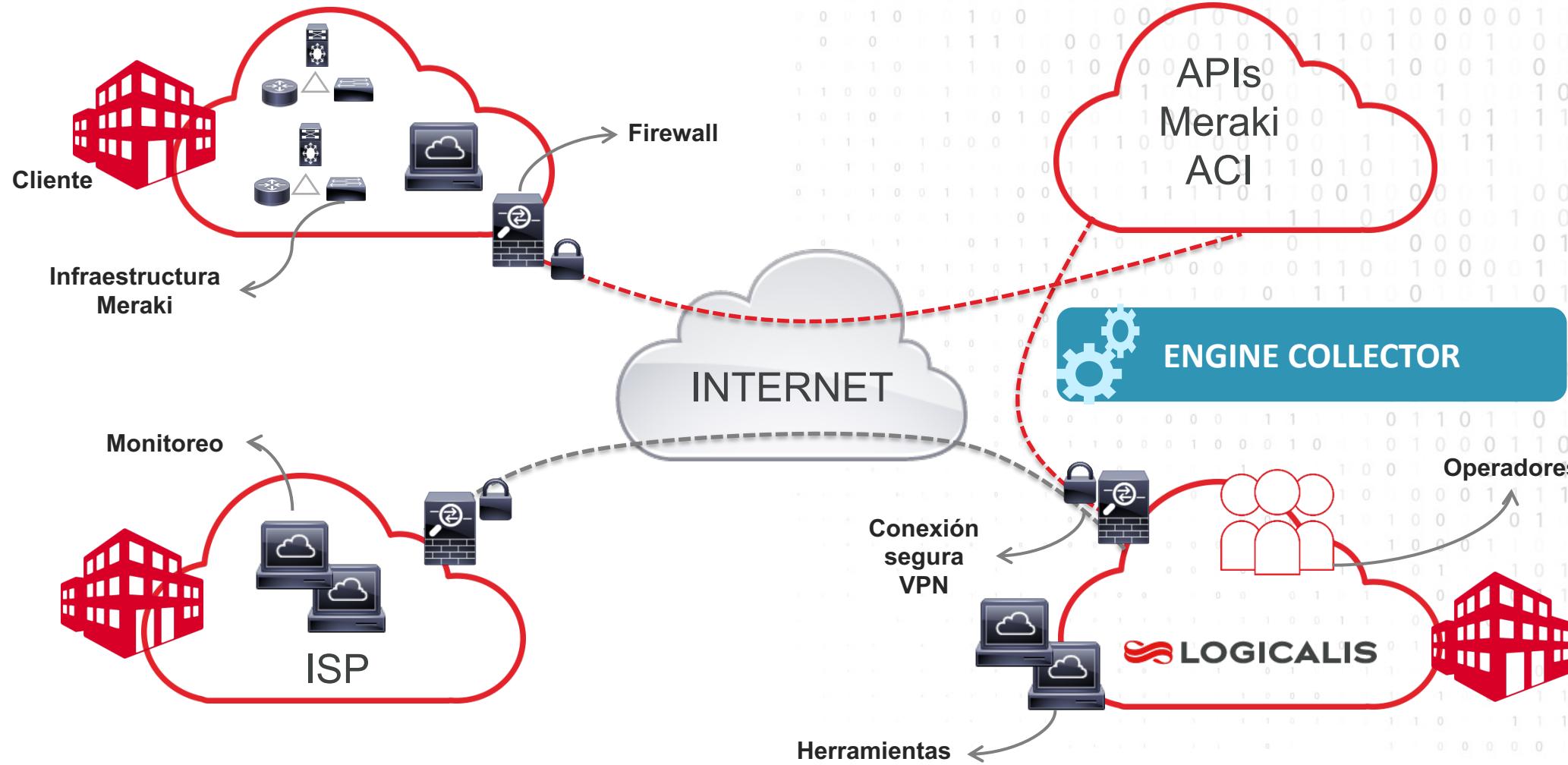
PROGRAMMABILITY PARADIGM

WHAT WE DID



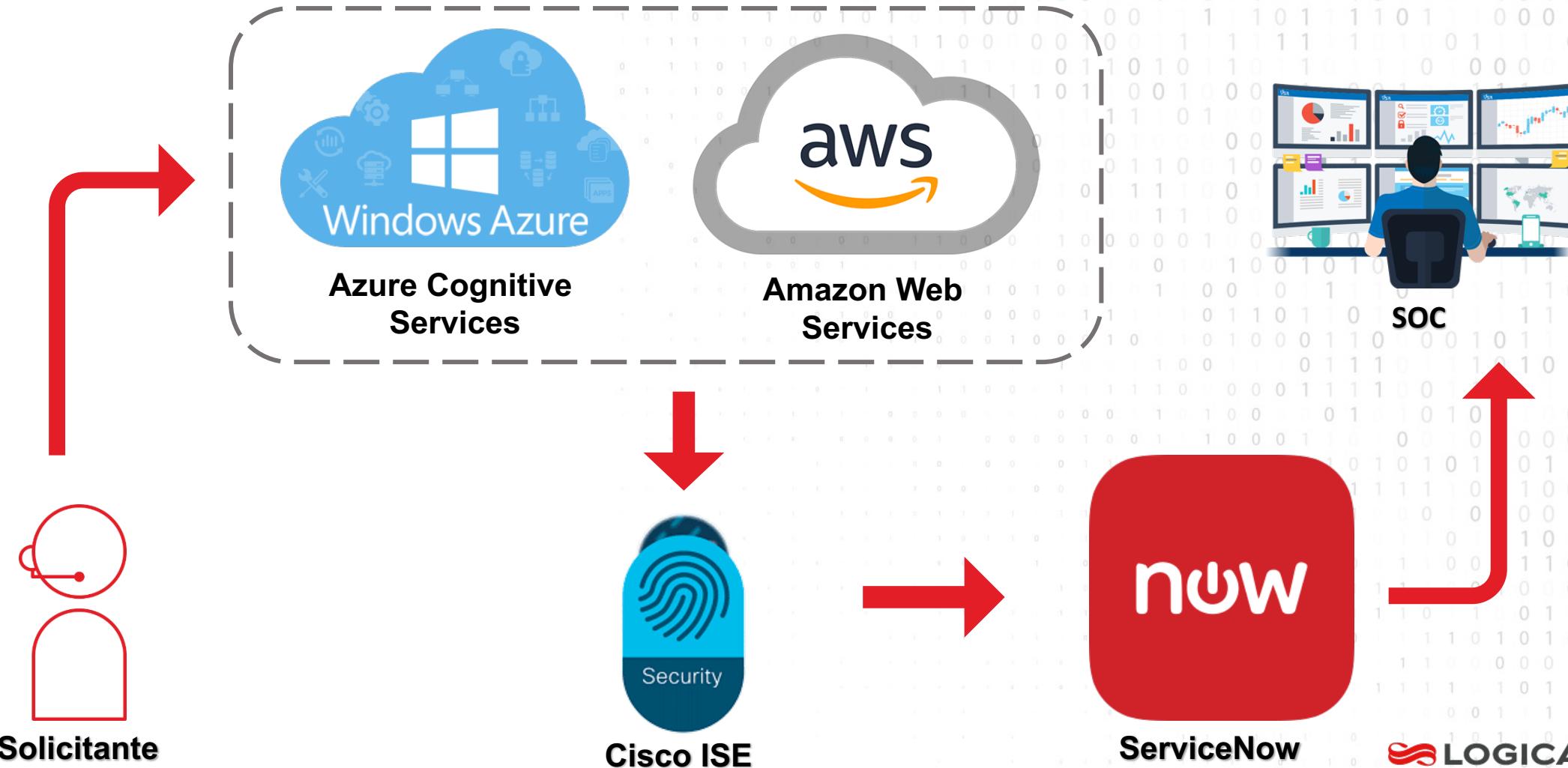
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Incident management – Collector Engine & Service Now (2017)

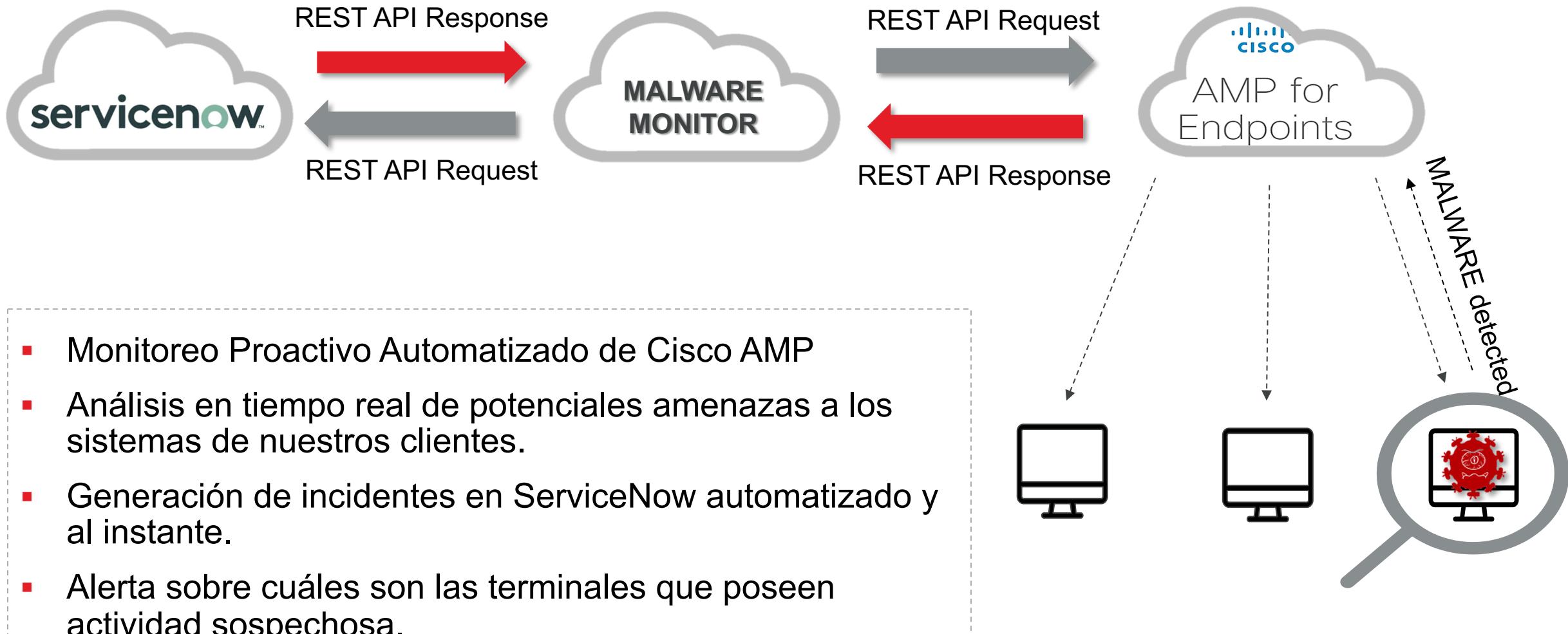


Logicalis Grazier prototype (2019)

- Login mediante Reconocimiento Facial
- Integración SOC
- Integración con Service Now
 - Incidentes por fallo de identidad



Malware Monitor prototype (2019)



Technical Resources

Documents & Papers

- Cultura de Automatización Logicalis
 - <https://blog.la.logicalis.com/blog/c%C3%B3mo-crear-una-cultura-de-automatizaci%C3%B3n>
- Principios de Automatización
 - <https://blog.la.logicalis.com/blog/por-qu%C3%A9-automatizar-las-redes>
- Data Collection: structured vs un structured
 - <https://www.la.logicalis.com/globalassets/latin-america/advisors/es/scripting.pdf>
- Concurrent programming
 - <https://www.la.logicalis.com/globalassets/latin-america/advisors/es/threading-in-python-3.pdf>
- NetDevOps, first steps
 - <https://blog.la.logicalis.com/blog/netdevops-introducci%C3%B3n-y-primeros-pasos>

Technical Resources (cont)

Use Cases videos

- NEP@L Architecture
 - <https://youtu.be/lsafIHiYig4>
- NEP@L & Cisco ACI integration
 - <https://www.youtube.com/watch?v=PWHDq2UvtOE>
- NEP@L & Cisco NSO integration
 - <https://www.youtube.com/watch?v=gFdqvulwbMw&feature=youtu.be>
- NEP@L in a Multibranches context
 - <https://youtu.be/q6dSkysDM6s>
- NEP@L complex MPLS-L3-VPN & IPAM integration
 - <https://youtu.be/YblbfbeAB-8>
- NEP@L & Continuos Integration, Continuos Delivery (CI/CD)
 - <https://www.youtube.com/watch?v=tU-NlplimEk>
- NEP@L Device Automation Life Cycle
 - <https://youtu.be/1LQGFZD3reg>

NEP@L WEB Page

<https://www.la.logicalis.com/solutions--services/nepal/por-que-automatizar/>



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Thanks

Edgardo Scrimaglia
*Network programmability
Engineer*

```
function($DbLast,$clientLast || $DbLast - $clientLast)
{
    $DbLast = $clientLast;
    $words = Str_Replace(" ",",",Str_Replace(",",";",$clientLast));
    explode(",",$check[description]); => $DbLast , "POST" => $DbLast;
    for ($i = 0; $i < count($words); $i++) {
        if(strlen($words[$i]) > 7){
            echo json_encode(array("id" => $DbLast , "POST" => $DbLast , "i" => $DbLast , "o" => GetLinkData($DbLast , $DbLast , false)));
        }
        else if(isset($_POST['get'])) {
            $id = (int)$_POST['get'];
            if($id > 0) {
                echo json_encode($o->GetLinkData($id, false));
            }
        }
        else if(isset($_POST['getM'])) {
            $res = $o->assoc(mysql_query("SELECT MAX(id) as id FROM table"));
            echo json_encode($res["id"]);
        }
    }
    echo json_encode($o->GetLinksData($_POST['getM']));
}
else if(isset($_POST['what'][$what])) {
    function query($how, $what, $what, $parameters) {
        $result = $o->RateLink($how);
        if($result) {
            echo htmlspecialchars(str_replace("r", "> $o->GetLinksData($DbLast , $DbLast , false)", $result));
        }
        else {
            $what = htmlspecialchars(stripslashes(mysql_real_escape_string($what)));
            echo htmlspecialchars(mysql_real_escape_string($what));
        }
    }
    $where = "-1"; htmlspecialchars($where);
}
```