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DevOps Challenges in a Highly Regulated Environment

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Introduction

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Speaker Bio – Tom Halpin



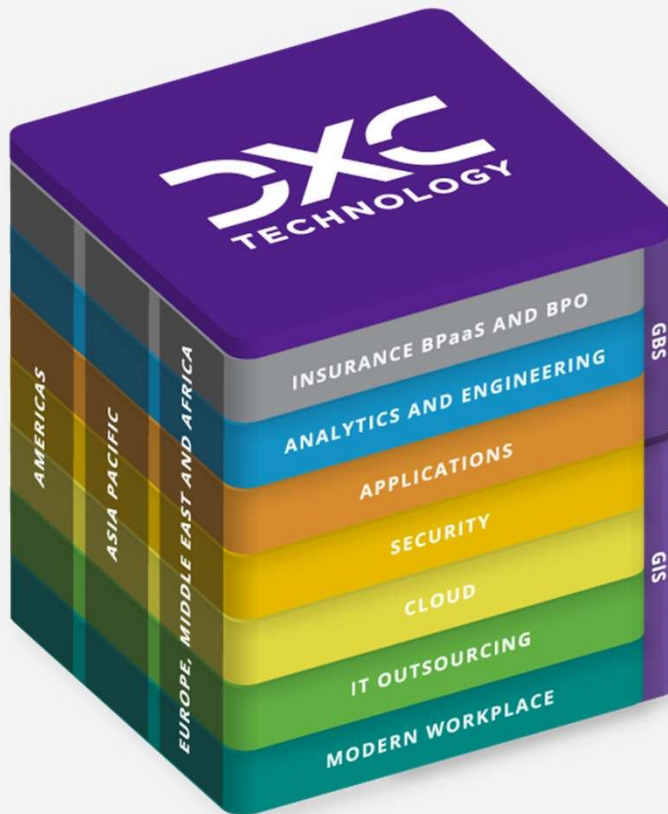
- Distinguished Engineer with DXC Technology working in an Agile/DevOps enablement role in the Innovation & Automation
- Works with teams in DXC to transform to a DevOps model in support of product aligned value streams thus facilitating the scaled adaption of DevOps culture, practices and tools across DXC

Speaker Bio – Laurent Douillet



- Senior Software Architect with DXC Technology, consultant and hands-on practitioner on all things related to software factory
- Specializes in continuous delivery through identifying value streams, creating build pipelines, and implementing effective change management strategies. His technical expertise is in DevOps tooling, cloud/container platforms, and microservice architecture

DXC Technology – Enterprise Technology Stack



DXC delivers the IT services our customers need to modernize operations and drive innovation across their entire IT estate.

- We help customers create a rich workplace experience, simplify and optimize on-premises IT, and achieve a secure, high-performance cloud environment to realize positive business outcomes
- Our services weave cyber resilience throughout the enterprise, help customers reimagine business with transformative applications, and enable data-driven decisions, automation and state-of-the-art engineering
- DXC business process outsourcing helps customers transform operations to a digital business model

DXC Platform X

- DXC Platform X is our **data-driven intelligent automation** platform that enables customers to accelerate their journey to resilient, self-healing IT across their entire IT estate. The platform empowers IT teams to detect and resolve issues quickly, and automatically predict and prevent future problems before they happen
- Systems achieve a state of “**silent operations**,” putting IT operations from top of mind to out of mind, saving time and money and enabling IT to focus on what’s most important: the business



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DevOps

An Imperfect Search for Perfection

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DevOps – Underlying Principles

- Three Ways – A Principle-based DevOps Framework
 - First Way
 - Principles of flow - work always flows in one direction – downstream
 - Second Way
 - Principles of feedback - create, shorten and amplify feedback loops
 - Third Way
 - Principles of continuous learning - continued experimentation, learn from mistakes, and achieve mastery
- *The Phoenix Project - Gene Kim, Kevin Behr, George Spafford*

DevOps – Definition of Awesome

- You build it, you run it

"Giving developers operational responsibilities has greatly enhanced the quality of the services, both from a customer and a technology point of view.

The traditional model is that you take your software to the wall that separates development and operations and throw it over and then forget about it.

*Not at Amazon. **You build it, you run it.** This brings developers into contact with the day-to-day operation of their software. It also brings them into day-to-day contact with the customer.*

This customer feedback loop is essential for improving the quality of the service."

– Amazon CTO Werner Vogels - 2006 Interview



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Dev-HRE-Ops

Dev – Highly Regulated Environment - Ops

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HRE – Highly Regulated Environment - Definition

- *“Highly Regulated / Restricted Environment (HRE) - a physical or digital environment characterized by: air-gapped physical spaces, air-gapped computer systems, heightened access controls, segregation of duties, inability to discuss certain topics outside of specific physical spaces, and an inability to transport certain artifacts off premise.”*
 - DEVOPS BLOG - Jose Morales

Dev-HRE-Ops – Implications – Last Mile Challenge

- Implications

- You build it, you run it remains the objective but not always possible
- Processes tightly controlled
- Regulatory environment drives both business investment and technical choices
- Security controls and governance processes mandated by regulatory environment.
- Segregation of duties often a requirement.
- Deploying changes more frequently often viewed as a risk to security and governance controls

- Last mile challenges

- Product development squads not allowed access to production systems
- Air-gapped server rooms & computer systems.
- Restrictions can include
 - In region or in country personnel required
 - Security clearance required
 - Screen sharing prohibited
 - Log sharing prohibited
 - Access via secure devices
 - Limited access to network services and associated resources

Dev-HRE-Ops - Approach

- Common misconception arises that HRE means you cannot “do” DevOps
- Dev-"HRE"-Ops is possible and desirable in support of HRE mandated processes
- Enablement of operation & support teams key to success in the last mile
- Cultural challenge as much as a technical challenge
- Important to include all stake-holders: squad members, operators, auditors, regulators & change control in Dev-HRE-Ops enablement efforts

Dev-HRE-Ops - Approach

- Automate end to end value stream – using integration & delivery pipelines
- Have an everything as code mindset
 - PRs, CI/CD, Test Automation, Security Controls, Issues, Documentation, Infrastructure & Change Controls
 - Codify compliance, access and regulatory requirements
- Make use of the available tools
 - GitHub, Jira, Jenkins & Artifactory in our case

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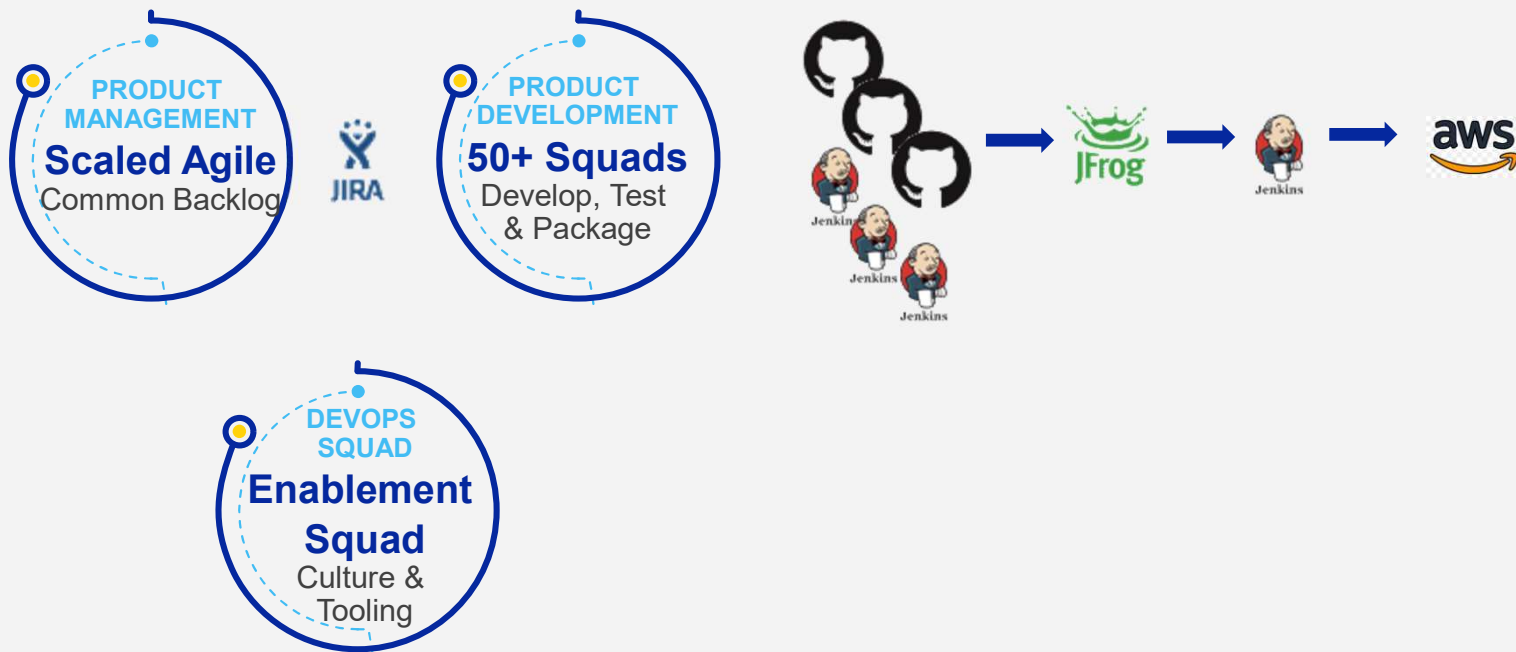
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DXC Platform X Pipelines

Operations Team Enablement

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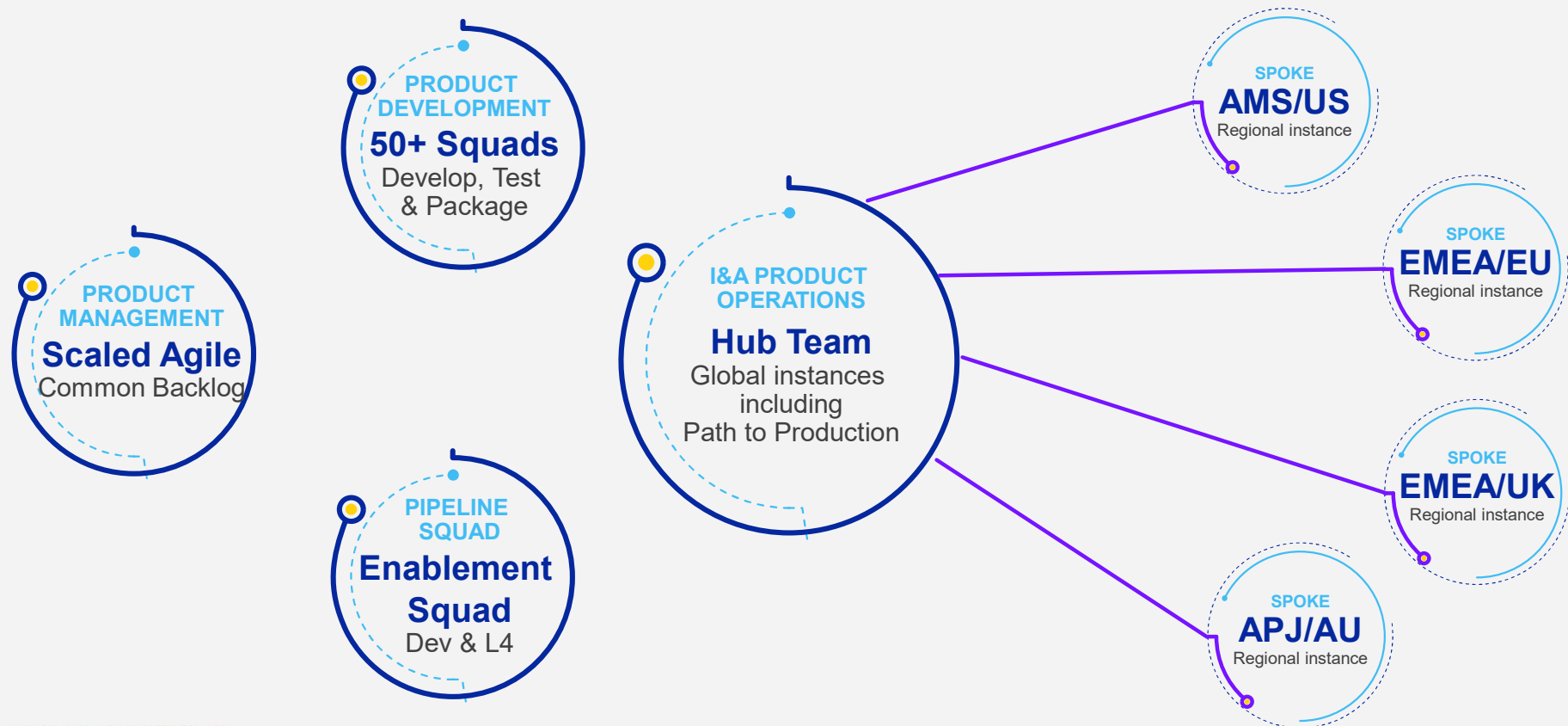
DXC Platform X - Ideal World - DevOps



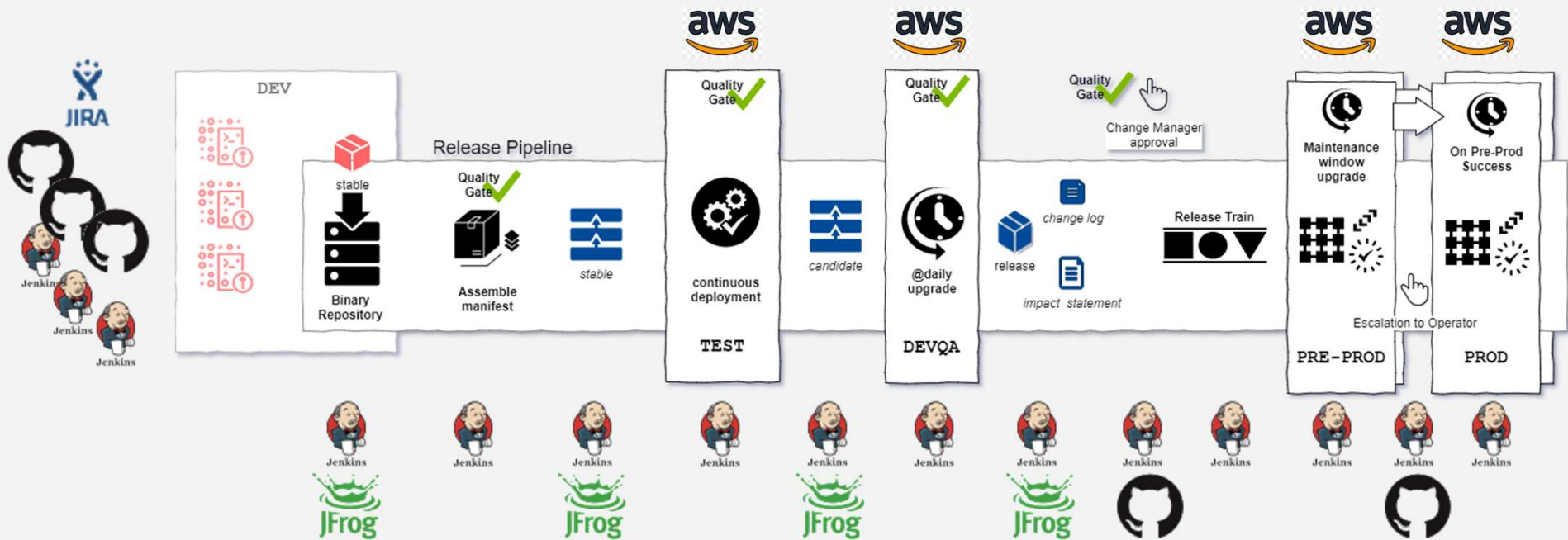
DXC Platform X - Dev-HRE-Ops – Challenges

- Only in country / in region access allowed
- Security clearance required for operators
- Access via secure laptops
- Limited access to network and associated resources
- No screen sharing
- No log sharing
- Product Squads new to HRE environments
- Operations team new to DevOps

DXC Platform X - Actual World - Dev-HRE-Ops



DXC Platform X - Path to Production – CI/CD Pipelines



Physical manifestation of an Agile Release Train

- designed to enforce a repeatable, high quality, consistent move to production of DXC Platform X components

DXC Platform X - Release Pipeline – Route Map

Test	Dev QA	Global Commercial Pre-Prod	Global Commercial Prod
<div>version 1.635.6</div> <div>pass/fail/skip (core) 938/ 0/ 12</div> <div>pass/fail/skip (ebd,cif) 337/ 0/ 0</div> <div>failed component -</div> <div>last run 2021-02-05 15:22 UTC</div> <div>View reported issues ➔</div>	<div>version 1.635.5</div> <div>pass/fail/skip (core) 938/ 0/ 12</div> <div>pass/fail/skip (ebd,cif) 305/ 0/ 0</div> <div>failed component -</div> <div>last run 2021-02-05 14:13 UTC</div> <div>View reported issues ➔</div>	<div>version 1.635.2</div> <div>pass/fail/skip (core) 969/ 0/ 12</div> <div>pass/fail/skip (ebd,cif) 317/ 0/ 0</div> <div>failed component -</div> <div>last run 2021-02-05 13:04 UTC</div> <div>View reported issues ➔</div>	<div>version 1.633.4</div> <div>pass/fail/skip (core) -/-/-</div> <div>pass/fail/skip (ebd,cif) 241/ 76/ 0</div> <div>failed component not run</div> <div>last run 2021-02-05 13:05 UTC</div> <div>View reported issues ➔</div>
		US Regional Pre-Prod	US Regional Prod
		<div>version 1.633.4</div> <div>pass/fail/skip (core) -/-/-</div> <div>pass/fail/skip (ebd,cif) 305/ 0/ 0</div> <div>failed component not run</div> <div>last run 2021-02-05 04:06 UTC</div> <div>View reported issues ➔</div>	<div>version 1.633.4</div> <div>pass/fail/skip (core) 925/ 0/ 53</div> <div>pass/fail/skip (ebd,cif) 305/ 0/ 0</div> <div>failed component -</div> <div>last run 2021-02-04 23:52 UTC</div> <div>View reported issues ➔</div>
		European Regional Pre-Prod	European Regional Prod
		<div>version 1.633.4</div> <div>pass/fail/skip (core) -/-/-</div> <div>pass/fail/skip (ebd,cif) 305/ 0/ 0</div> <div>failed component not run</div> <div>last run 2021-02-05 16:05 UTC</div> <div>View reported issues ➔</div>	<div>version 1.633.4</div> <div>pass/fail/skip (core) 924/ 0/ 53</div> <div>pass/fail/skip (ebd,cif) 305/ 0/ 0</div> <div>failed component -</div> <div>last run 2021-02-05 01:14 UTC</div> <div>View reported issues ➔</div>

Release Pipeline - Route Map

- Components Path to Production
- Service operates 365 days a year
- Global
 - Test -> DevQA -> GC Pre-Prod -> GC Prod
- Regional Instances
 - Pre-Prod -> Prod



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Operational Team Enablement

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DXC Platform X - HRE - Operational Requirements

- To address the last mile challenge posed by HRE operational requirements needed to:
 - Enable and onboard hub & spoke operational teams
 - Design for Less Ops
 - Automate the value stream in so far as possible
- Provide Robust Operational Processes
 - Adhere to the principle of "Everything as Code"
 - Create a reusable rather than a bespoke solution
 - Allow SME's to quickly collate and/or create and share complex content
 - Provide a convenient mechanism for users to consume the operational content
 - Ensure content remains in the source repositories maintained by content owners
 - Reduce the possibility of the creation of duplicated content
 - Provide a means of versioning content


DXC Platform X - Operations Hub & Spoke Enablement

- Operation Squad Enablement included:
 - DevOps Training Plan augmented with Training Validation Exercises
 - Open Sourced - [Online DevOps Dojo](#)
 - Open Sourced - [Online Product Engineering Dojo](#)
 - Pipeline Operation - Training Needs Assessment
 - Functional Areas
 - Topics
 - Processes
 - Existing collateral reviewed, updated and augmented
 - Delivery mechanism

DXC Platform X - Operations Hub & Spoke Enablement – cont.

- Operation Squad Enablement included:
 - Operation Support Sequences - GitHub Pages
 - Sequences as Code
 - Guided process paths
 - On-boarding of HRE operations team
 - Working sessions to help HRE operations team ramp up
 - KT sessions
 - Guild – Weekly - Q&A / Brownbags
 - Off-boarding of product squad

DXC Platform X – Operational Sequences as Code

 Create a Sequence

Training

Overview

Sequences ^

README.md

Operator Onboarding

Create a Sequence

release, pipeline, operations, create, add, sequence, playbook, repository

Sequence

Contributor

Install [Git Bash](#) to work with GitHub locally. The url provided is for a

Review the recommended Contributor [Onboarding Guide](#). Take any tr

Fork and Clone an instance of this repository.

Open a GitBash or a terminal session.

Go to the cloned copy of your forked instance of this repository.

Open your editor of choice.

Sequence

```
@startuml
    participant "Contributor" as Contrib #white

    == How to create a sequence ==

    Contrib -> Contrib: Install [[https://git-scm.com/download/win(Right click to open the Git Bash Installation Instructions in a new wi
    note right
        The url provided is for a Windows machine.
    end note

    Contrib -> Contrib: Review the recommended Contributor [[https://github.dxc.com/pages/Innovation-Automation/platform-dxc-release-pipe

    Contrib -> Contrib: Fork and Clone an instance of this repository.

    Contrib -> Contrib: Open a GitBash or a terminal session.

    Contrib -> Contrib: Go to the cloned copy of your forked instance of this repository.

    Contrib -> Contrib: Open your editor of choice.

    Contrib -> Contrib: Create the new sequence in the relevant folder.

    note right
        Sequences are defined as code in the form of UML files added to the sequence's sub-directory.
        There are loads of examples of good sequences in this, the [[https://github.dxc.com/pages/Innovation-Automation/platform-dxc-releas
    end note

    Contrib -> Contrib: Commit changes and verify pipeline is green.

    note right
        The continuous integration pipeline will run and validate your commit.
    end note
```

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Conclusions

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DXC Platform X - Dev-HRE-Ops Conclusion

- Dev-"HRE"-Ops is both possible and desirable
- Last mile poses challenges to traditional DevOps definition of awesome
- Operation & support team enablement essential to success
- Cultural challenge as much as a technical challenge
- Everything as code mindset important
 - Codify compliance and regulatory requirements
 - Automate delivery pipeline end to end
 - Make use of the available tools
- Key takeaway - it's a journey - an imperfect search for perfection



Thank you!

Tom Halpin & Laurent Douillet

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Q&A

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