The Future of Everything: Digital Transformation, Agile Mindset and Preparing for What is Next?

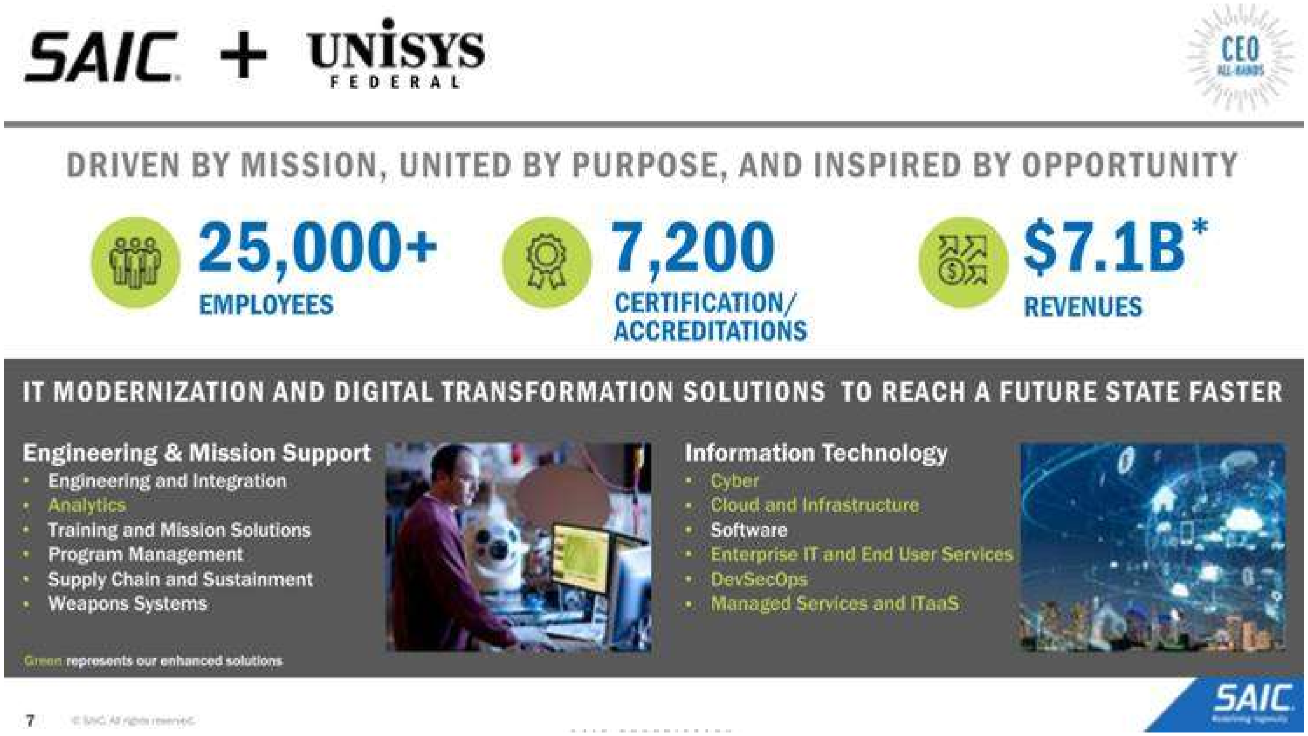
Dr. Kuan H. Collins, DM

Solutions Architecture Practice

November 2020

SAIC®
Redefining Ingenuity

Who is SAIC?



SAIC + UNISYS FEDERAL

CEO ALL-HANDS

DRIVEN BY MISSION, UNITED BY PURPOSE, AND INSPIRED BY OPPORTUNITY

25,000+ EMPLOYEES

7,200 CERTIFICATION/ ACCREDITATIONS

$7.1B* REVENUES

IT MODERNIZATION AND DIGITAL TRANSFORMATION SOLUTIONS TO REACH A FUTURE STATE FASTER

Engineering & Mission Support

- Engineering and Integration
- Analytics
- Training and Mission Solutions
- Program Management
- Supply Chain and Sustainment
- Weapons Systems

Information Technology

- Cyber
- Cloud and Infrastructure
- Software
- Enterprise IT and End User Services
- DevSecOps
- Managed Services and ITaaS

Green represents our enhanced solutions

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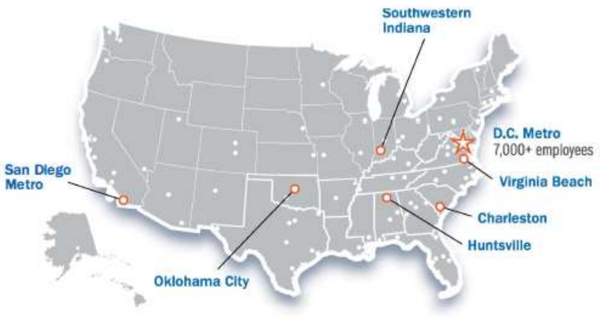
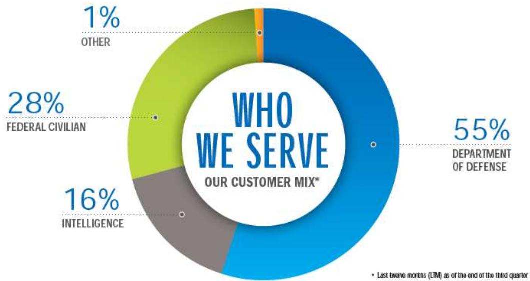

Southwestern Indiana
D.C. Metro
7,000+ employees
Virginia Beach
Charleston
Huntsville
Oklahoma City
San Diego Metro

○ 500+ employees

SAIC also has employees deployed in 40+ international countries in support of our customers' missions.



- Last twelve months (LTM) as of the end of the third quarter of fiscal year 2019 for SAIC (November 2, 2018), including the trailing twelve months of revenue from the acquisition of Engility Holdings, Inc.

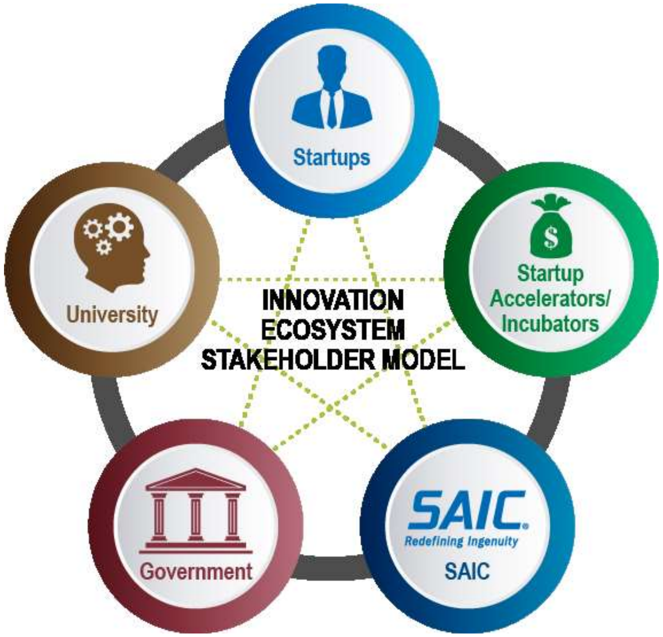
Who is Kuan H. Collins?

- SAIC Fellow
- Work and Mentor at Capital Factory in Austin
- Solutions Architect Master, Technical expert and resource in specialized engineering, intelligent software and analytics areas.
  - Lead senior solutions architect teams
  - Area of Interest: Smart cities, IoT, 5G, blockchain, artificial intelligence, augmented analytics, harnessing innovation, scouting and strategy
- Career – 23 years
  - Government Contracting (Analytic Services, Booz Allen & Hamilton, SPAWAR Systems Command (GS-13), L-3 Communications, SAIC)
- School
  - Undergrad – BSc Electrical Engineering
  - Grad – MSc Computer Information Systems
  - Doctorate – Doctor of Business Administration
- Research/Teaching (Adjunct Faculty UMGC, St Edwards Munday School of Business)
  - Intraorganizational Collaboration, Innovation, Digital Transformation, Systems Thinking, Evidence Based Research Synthesis and Evidence Based Management
  - Big Data, Data Analytics
- Personal
  - Married to husband Chris, live in Austin, Tx
  - Two sons, Zack (16) and Zeke (14), 10th and 9th graders respectively
  - Committee Chair for BSA Troop 30, Camping, hiking, meditation

Innovation Ecosystem Stakeholder Model

Promoting experimentation

- Fail fast
- Close the loop
- Outcome focused


Startups
Startup Accelerators/ Incubators
SAIC Redefining Ingenuity
SAIC
Government
University
INNOVATION ECOSYSTEM STAKEHOLDER MODEL

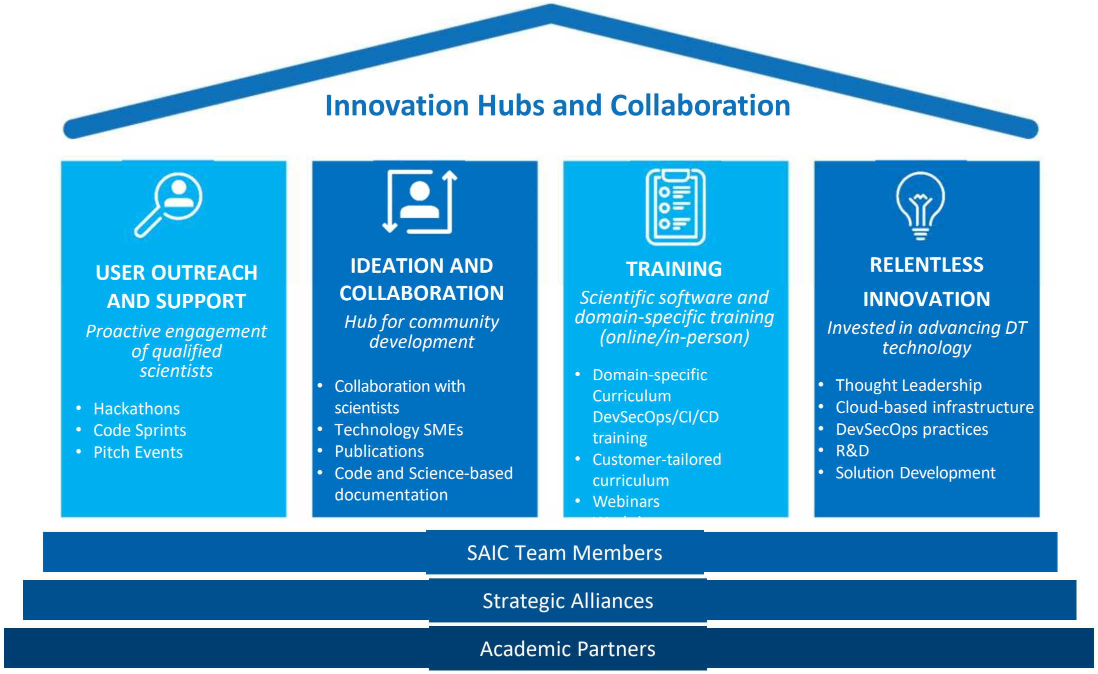
Startups
Startup accelerators (e.g. Techstars, Starburst, Capital Factory

Academic partnerships

System Integrators

http://mitsloan.mit.edu/ideas-made-to-matter/bye-bye-ivory-tower-innovation-needs-ecosystem-to-thrive?utm_source=mitsloanlinkedin&utm_medium=social&utm_campaign=ecosystem

Innovation Hubs and Collaboration



Innovation Hubs and Collaboration

USER OUTREACH AND SUPPORT

Proactive engagement of qualified scientists

- Hackathons
- Code Sprints
- Pitch Events

IDEATION AND COLLABORATION

Hub for community development

- Collaboration with scientists
- Technology SMEs
- Publications
- Code and Science-based documentation

TRAINING

Scientific software and domain-specific training (online/in-person)

- Domain-specific Curriculum DevSecOps/CI/CD training
- Customer-tailored curriculum
- Webinars

RELENTLESS INNOVATION

Invested in advancing DT technology

- Thought Leadership
- Cloud-based infrastructure
- DevSecOps practices
- R&D
- Solution Development

SAIC Team Members

Strategic Alliances

Academic Partners

SAIC MISSION/GOALS

- Provide a collaborative training, education, research and solution development environment for community and partners
- Continuously accelerate and enhance the general and specialized knowledge, skills and capabilities of a world-class Cloud workforce for the nation

FEATURES AND BENEFITS

- Curriculum, training and development initiatives stay in lock step with the ever-changing cloud-based environment
- Critical inputs come from academic and vendor partnerships, and strategic relationships such as those SAIC maintains with CSPs (AWS, Azure, GCP)
- Focused on innovative approaches that will address the industry's challenge of building, engaging and maintaining skilled professional Cloud workforce; and weather scientists

Digital Transformation Service Delivery Framework

CLOUD ADOPTION

Analyzing current systems and applications to provide recommendations for planning cloud migration

CUSTOMER EXPERIENCE

Helping to improve the delivery of services and customer interactions; developing a better understanding of customer needs and translating the findings into action

SECURITY

Developing a roadmap to get to Enterprise security; zero trust; and intent based networking

INTELLIGENT SOFTWARE & ANALYTICS

More efficient and intelligent use of data management, analysis, and reporting capabilities. Application of AI/ML for automation, augmentation, and prediction.

INFRASTRUCTURE OPTIMIZATION

Optimizing data centers, LAN/WAN and reducing infrastructure costs

ITIL v4 / TBM

Model Based Systems Engineering (MBSE)

SAFe/Lean Agile Portfolio Development and Management

DevSecOps

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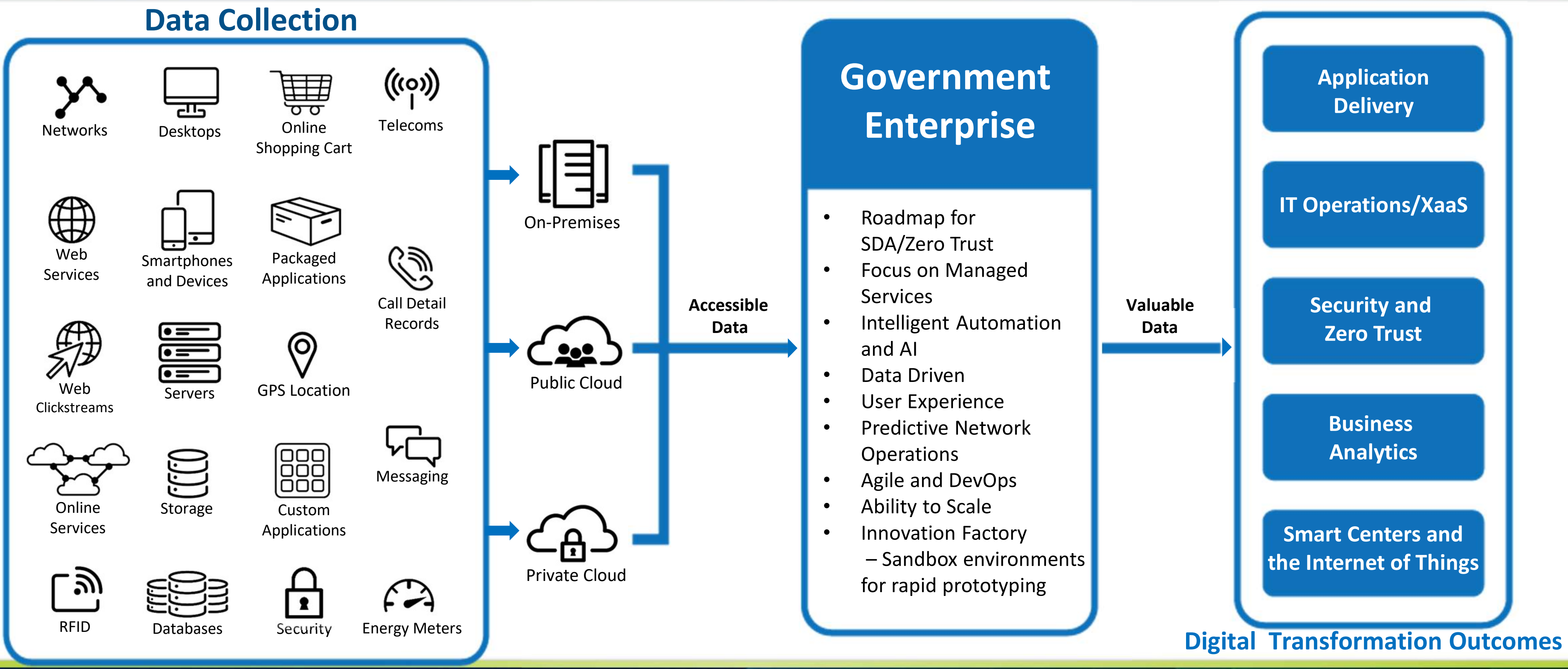
Digital Transformation



Data Collection

- Networks
- Desktops
- Online Shopping Cart
- Telecoms
- Web Services
- Smartphones and Devices
- Packaged Applications
- Call Detail Records
- Web Clickstreams
- Servers
- GPS Location
- Online Services
- Storage
- Custom Applications
- Messaging
- RFID
- Databases
- Security
- Energy Meters

On-Premises

Public Cloud

Private Cloud

Accessible Data

Government Enterprise

- Roadmap for SDA/Zero Trust
- Focus on Managed Services
- Intelligent Automation and AI
- Data Driven
- User Experience
- Predictive Network Operations
- Agile and DevOps
- Ability to Scale
- Innovation Factory – Sandbox environments for rapid prototyping

Valuable Data

- **Application Delivery**
- **IT Operations/XaaS**
- **Security and Zero Trust**
- **Business Analytics**
- **Smart Centers and the Internet of Things**

Digital Transformation Outcomes

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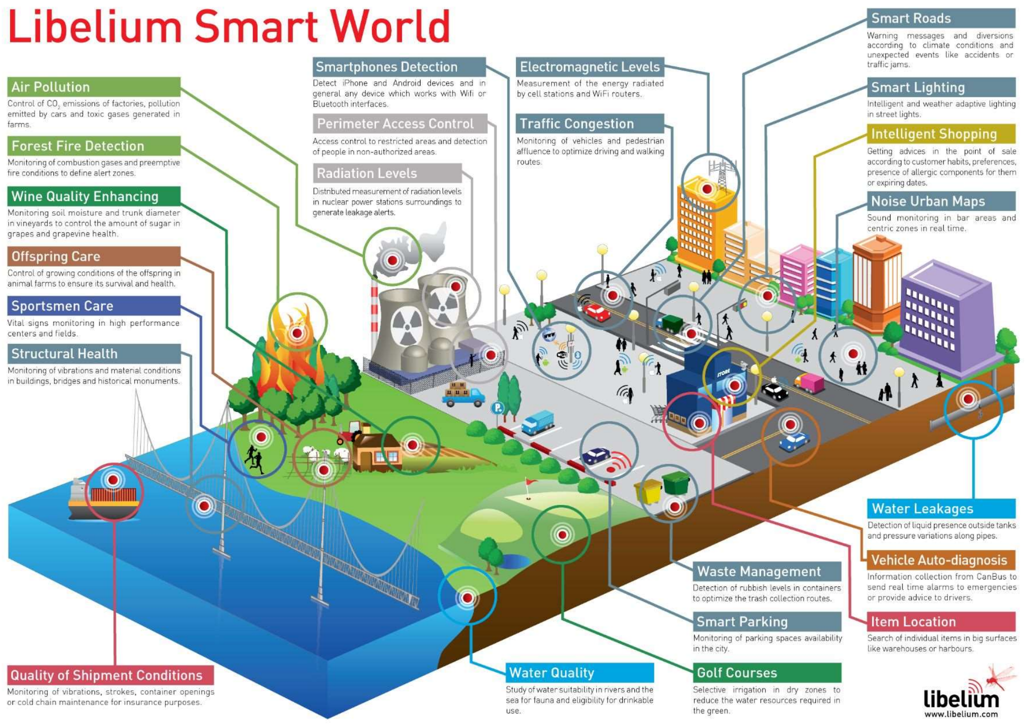
SMART X VISION: X ∈ {Campus, Center, City, Health, Home, Logistics, Workplace, World …}



Libelium Smart World

Air Pollution
Control of CO_2 emissions of factories, pollution emitted by cars and toxic gases generated in farms.

Forest Fire Detection
Monitoring of combustion gases and preemptive fire conditions to define alert zones.

Wine Quality Enhancing
Monitoring soil moisture and trunk diameter in vineyards to control the amount of sugar in grapes and grapevine health.

Offspring Care
Control of growing conditions of the offspring in animal farms to ensure its survival and health.

Sportsmen Care
Vital signs monitoring in high performance centers and fields.

Structural Health
Monitoring of vibrations and material conditions in buildings, bridges and historical monuments.

Smartphones Detection
Detect iPhone and Android devices and in general any device which works with Wifi or Bluetooth interfaces.

Perimeter Access Control
Access control to restricted areas and detection of people in non-authorized areas.

Radiation Levels
Distributed measurement of radiation levels in nuclear power stations surroundings to generate leakage alerts.

Electromagnetic Levels
Measurement of the energy radiated by cell stations and WiFi routers.

Traffic Congestion
Monitoring of vehicles and pedestrian affluence to optimize driving and walking routes.

Smart Roads
Warning messages and diversions according to climate conditions and unexpected events like accidents or traffic jams.

Smart Lighting
Intelligent and weather adaptive lighting in street lights.

Intelligent Shopping
Getting advices in the point of sale according to customer habits, preferences, presence of allergic components for them or expiring dates.

Noise Urban Maps
Sound monitoring in bar areas and centric zones in real time.

Water Leakages
Detection of liquid presence outside tanks and pressure variations along pipes.

Vehicle Auto-diagnosis
Information collection from CanBus to send real time alarms to emergencies or provide advice to drivers.

Waste Management
Detection of rubbish levels in containers to optimize the trash collection routes.

Smart Parking
Monitoring of parking spaces availability in the city.

Item Location
Search of individual items in big surfaces like warehouses or harbours.

Quality of Shipment Conditions
Monitoring of vibrations, strokes, container openings or cold chain maintenance for insurance purposes.

Water Quality
Study of water suitability in rivers and the sea for fauna and eligibility for drinkable use.

Golf Courses
Selective irrigation in dry zones to reduce the water resources required in the green.

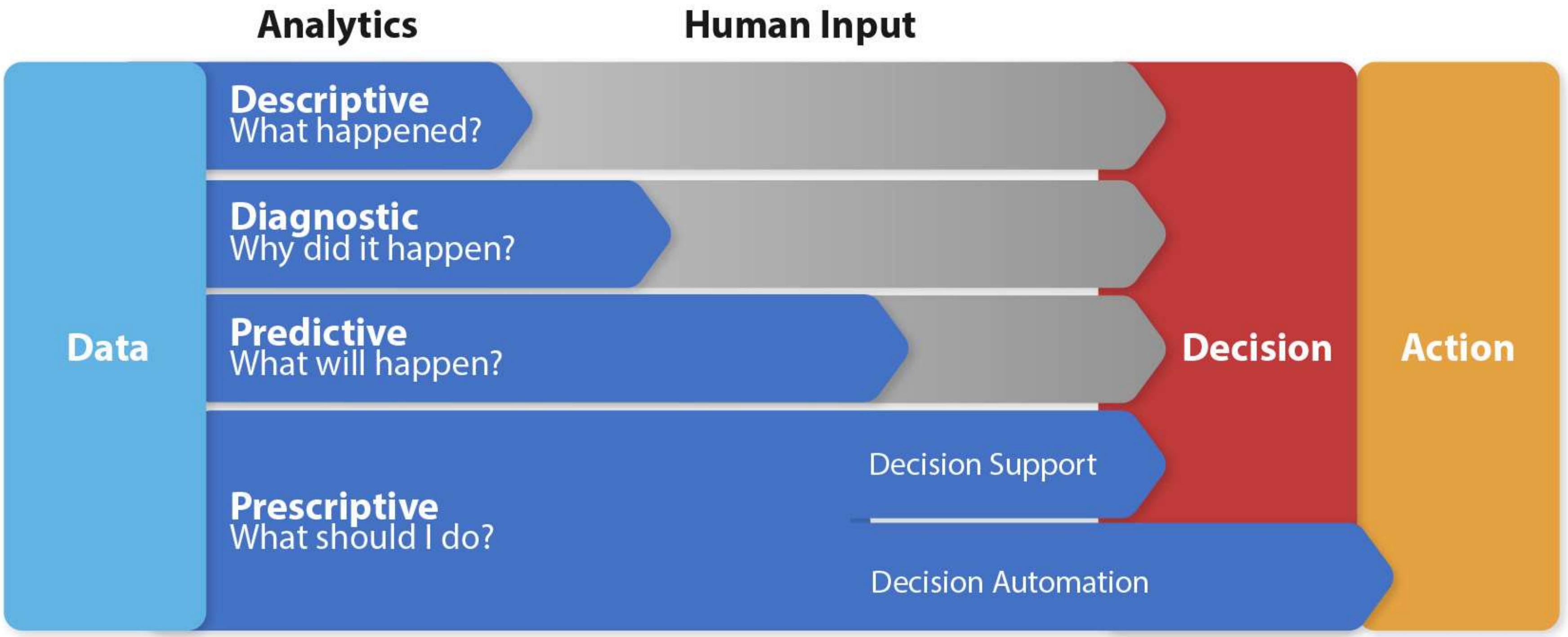
libelium
www.libelium.com

Smart System Stack

- Policy
- Application
- Business Process
- Database
- Message Broker
- Edge Computing
- Device Management
- Communications
- IoT Sensor/Actuator

Much of the implementation is common across various types of Smart Apps -> Good opportunity for collaboration

Analytics Framework



Analytics

Human Input

Data

Descriptive
What happened?

Diagnostic
Why did it happen?

Predictive
What will happen?

Prescriptive
What should I do?

Decision Support

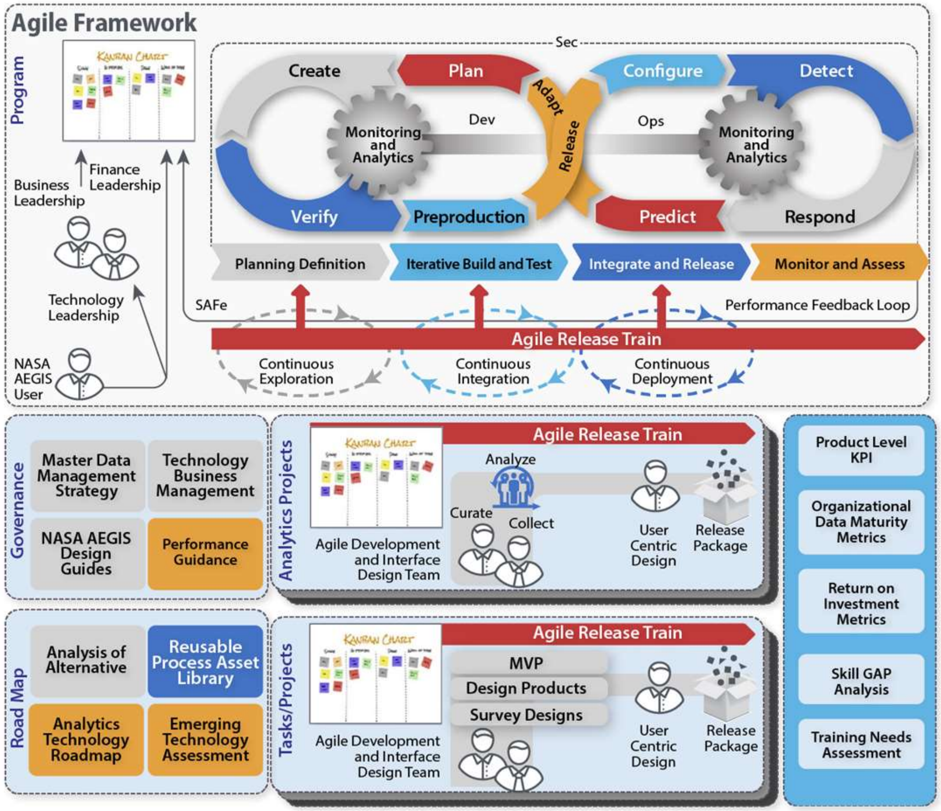
Decision Automation

Decision

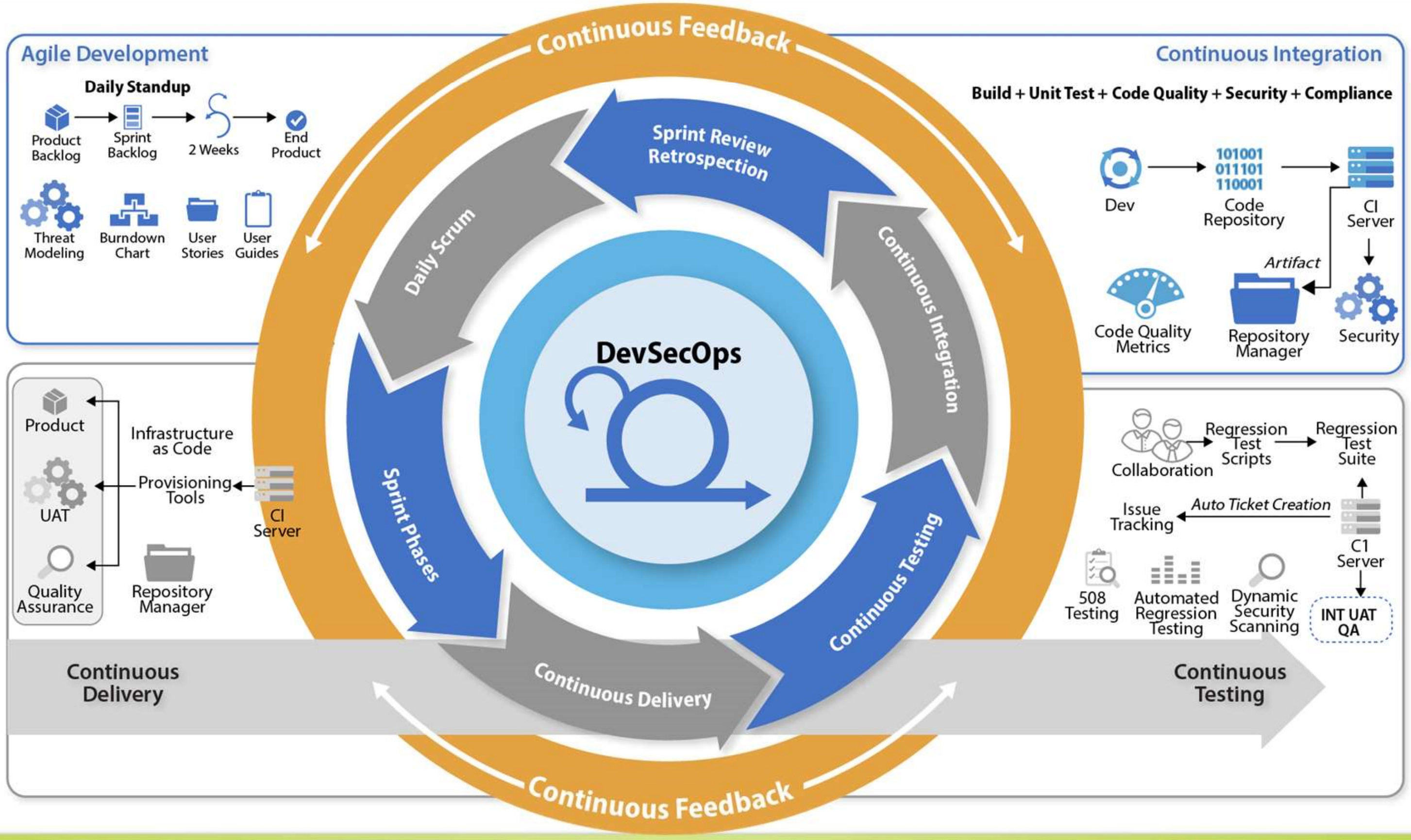
Action

Scaled Agile (SAFe) and Lean Portfolio Management

- Agile Manifesto
  - **Individuals and interactions** over processes and tools
  - **Working software** over comprehensive documentation
  - **Customer collaboration** over contract negotiation
  - **Responding to change** over following a plan


Agile Framework
Program
Kanban Chart
Business Leadership
Finance Leadership
Technology Leadership
NASA AEGIS User
Sec
Create
Plan
Configure
Detect
Monitoring and Analytics
Dev
Adapt
Release
Ops
Monitoring and Analytics
Verify
Preproduction
Predict
Respond
Planning Definition
Iterative Build and Test
Integrate and Release
Monitor and Assess
SAFe
Performance Feedback Loop
Agile Release Train
Continuous Exploration
Continuous Integration
Continuous Deployment
Governance
Master Data Management Strategy
Technology Business Management
NASA AEGIS Design Guides
Performance Guidance
Analytics Projects
Agile Release Train
Kanban Chart
Analyze
Curate
Collect
User Centric Design
Release Package
Agile Development and Interface Design Team
Road Map
Analysis of Alternative
Reusable Process Asset Library
Analytics Technology Roadmap
Emerging Technology Assessment
Tasks/Projects
Agile Release Train
Kanban Chart
MVP
Design Products
Survey Designs
User Centric Design
Release Package
Agile Development and Interface Design Team
Product Level KPI
Organizational Data Maturity Metrics
Return on Investment Metrics
Skill GAP Analysis
Training Needs Assessment

DevSecOps and Infrastructure as Code



Continuous Feedback

Agile Development

Daily Standup

Product Backlog → Sprint Backlog → 2 Weeks → End Product

Threat Modeling

Burndown Chart

User Stories

User Guides

Continuous Integration

Build + Unit Test + Code Quality + Security + Compliance

Dev → 101001 011101 110001 Code Repository → CI Server

Artifact

Code Quality Metrics

Repository Manager

Security

Sprint Review Retrospection

Daily Scrum

Continuous Integration

Sprint Phases

Continuous Testing

Continuous Delivery

DevSecOps

Product

UAT

Quality Assurance

Infrastructure as Code

Provisioning Tools

CI Server

Repository Manager

Collaboration

Regression Test Scripts → Regression Test Suite

Issue Tracking

Auto Ticket Creation

C1 Server

508 Testing

Automated Regression Testing

Dynamic Security Scanning

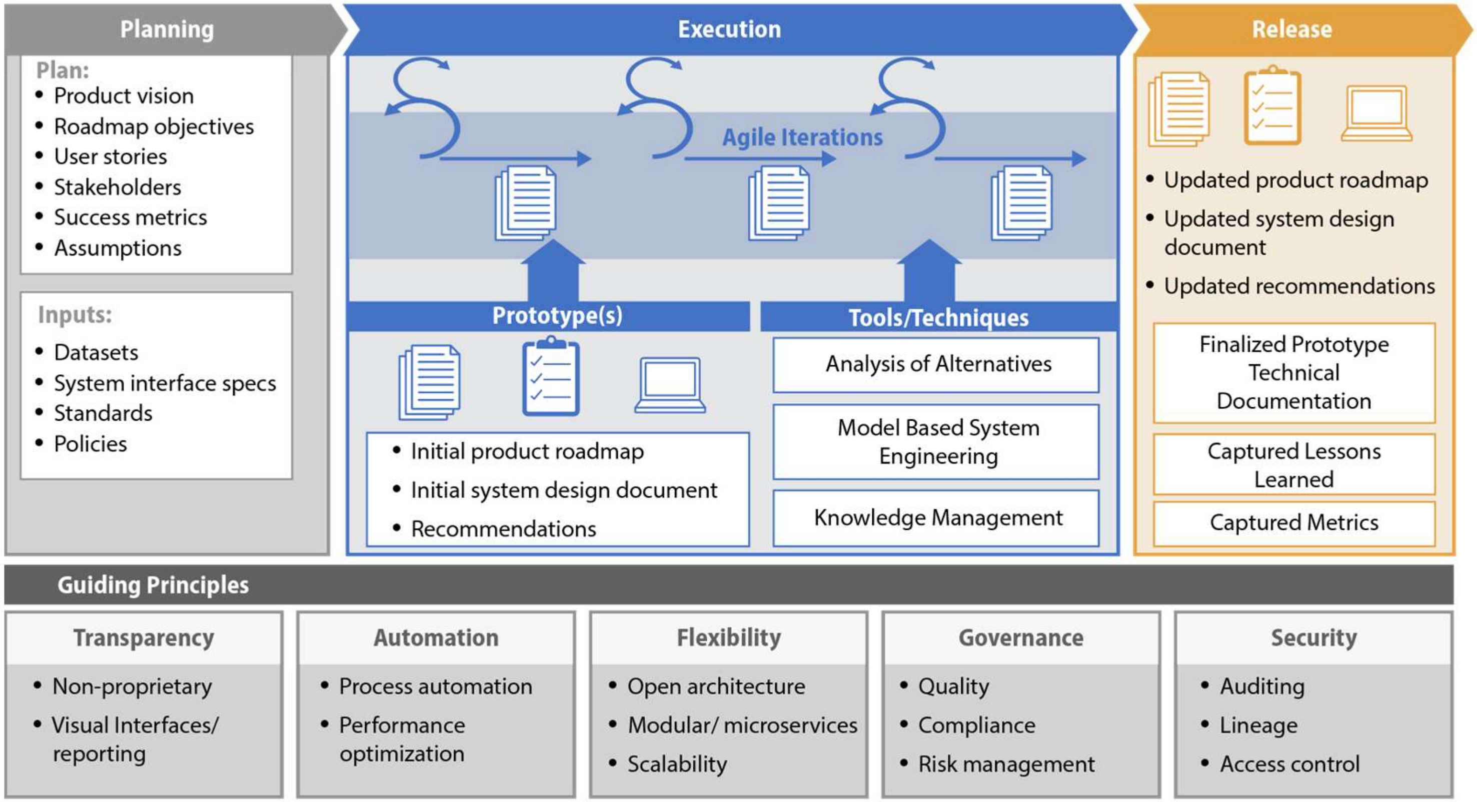
INT UAT QA

Continuous Delivery

Continuous Testing

Continuous Feedback

Accelerated Innovation, Rapid Prototyping and Pivoting Early



Planning

Plan:
- Product vision
- Roadmap objectives
- User stories
- Stakeholders
- Success metrics
- Assumptions

Inputs:
- Datasets
- System interface specs
- Standards
- Policies

Execution

Agile Iterations

Prototype(s)
- Initial product roadmap
- Initial system design document
- Recommendations

Tools/Techniques
- Analysis of Alternatives
- Model Based System Engineering
- Knowledge Management

Release
- Updated product roadmap
- Updated system design document
- Updated recommendations

Finalized Prototype Technical Documentation

Captured Lessons Learned

Captured Metrics

Guiding Principles

Transparency
- Non-proprietary
- Visual Interfaces/ reporting

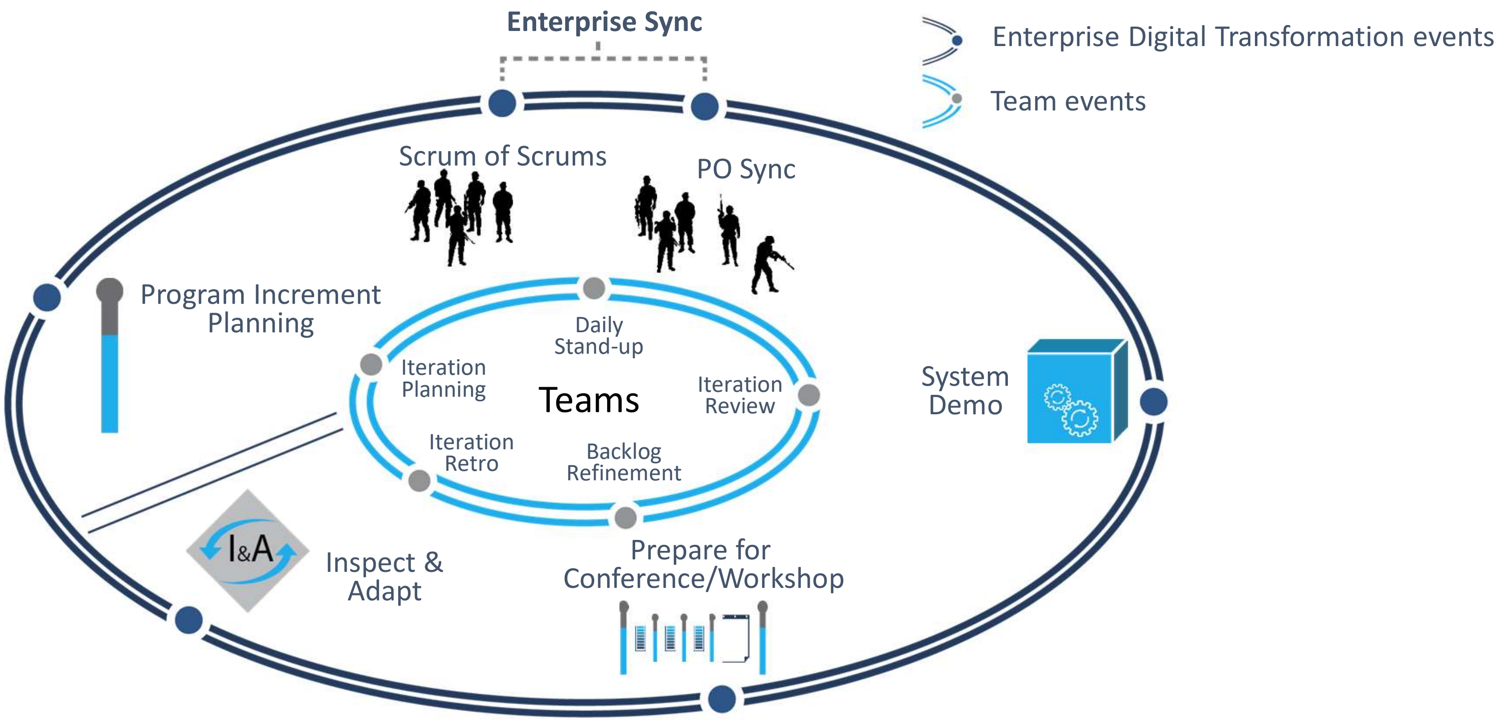
Automation
- Process automation
- Performance optimization

Flexibility
- Open architecture
- Modular/ microservices
- Scalability

Governance
- Quality
- Compliance
- Risk management

Security
- Auditing
- Lineage
- Access control

Process Modernization – Keeping the train on the tracks


Enterprise Sync
Enterprise Digital Transformation events
Team events
Scrum of Scrums
PO Sync
Program Increment Planning
Daily Stand-up
Iteration Planning
Teams
Iteration Review
Iteration Retro
Backlog Refinement
System Demo
I&A
Inspect & Adapt
Prepare for Conference/Workshop

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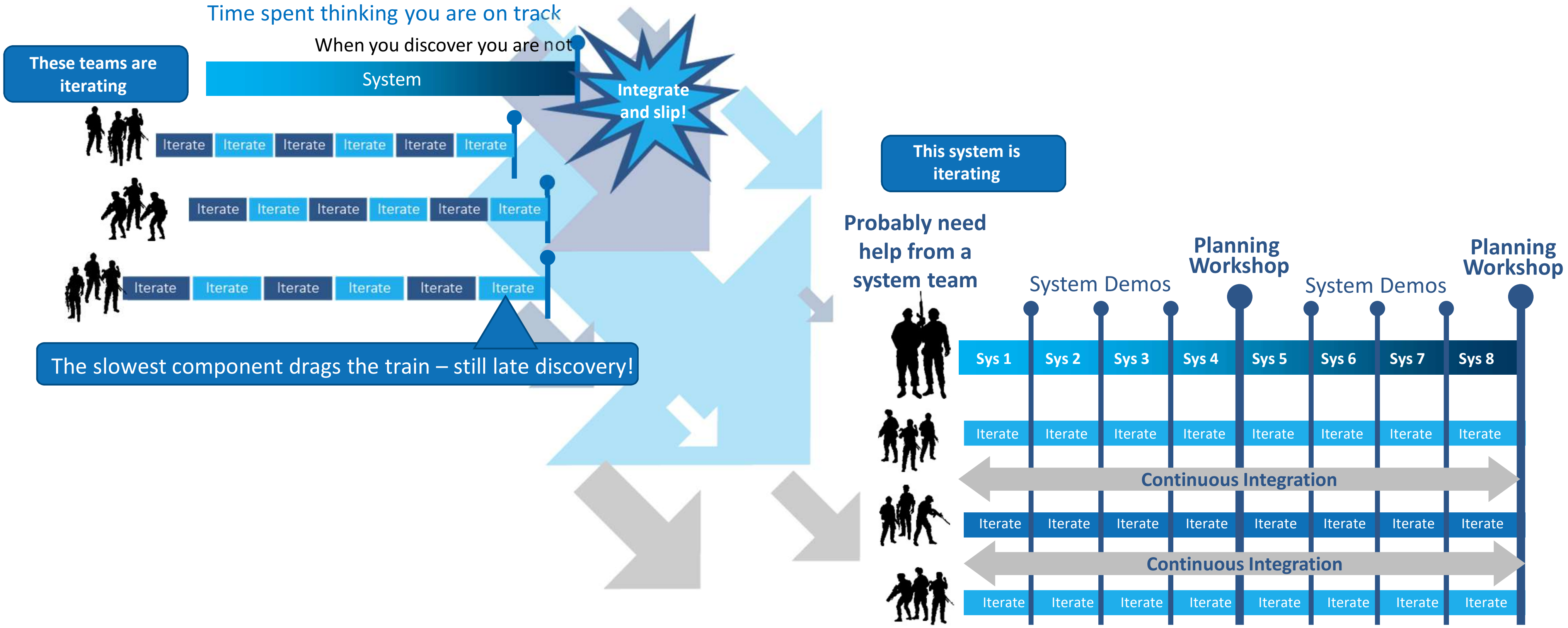
Process Cadence and Synchronization



Time spent thinking you are on track

When you discover you are not

These teams are iterating

System

Integrate and slip!

Iterate Iterate Iterate Iterate Iterate Iterate

Iterate Iterate Iterate Iterate Iterate Iterate

Iterate Iterate Iterate Iterate Iterate Iterate

The slowest component drags the train – still late discovery!

This system is iterating

Probably need help from a system team

System Demos

Planning Workshop

System Demos

Planning Workshop

Sys 1 Sys 2 Sys 3 Sys 4 Sys 5 Sys 6 Sys 7 Sys 8

Iterate Iterate Iterate Iterate Iterate Iterate Iterate Iterate

Continuous Integration

Iterate Iterate Iterate Iterate Iterate Iterate Iterate Iterate

Continuous Integration

Iterate Iterate Iterate Iterate Iterate Iterate Iterate Iterate

Redefining Ingenuity

Process Planning Workshop Agenda

Planning Agenda

DAY 1

8:00 – 9:00	Business Content	• State of the business and upcoming objectives
9:00 – 10:30	Product/Solution Vision	• Vision and prioritized features
10:30 – 11:30	Architecture Vision and development practices	• Architecture, common frameworks, etc. •
11:30 – 1:00	Planning context and lunch	• Facilitator explains planning process
1:00 – 4:00	Team breakouts	• Teams develop draft plans and identify risks and impediments
4:00 – 5:00	Draft plan review	• Teams present draft plans, risks, and impediments
5:00 – 6:00	Management review and problem solving	• Adjustments made based on challenges, risks, and impediments

Planning Agenda

DAY 2

8:00 – 9:00	Planning adjustments	• Planning adjustments made based on previous day's management meeting
9:00 – 11:00	Team breakouts	• Teams develop final plans and refine risks and impediments • Business owners circulate and assign business value to team objectives
11:00 – 1:00	Final plan and lunch	• Teams present final plans, risks, and impediments
1:00 – 2:00	Program risks	• Remaining program-level risks are discussed and ROAMed
2:00 – 2:15	Confidence vote	• Team and program confidence vote
2:15 – ???	Plan rework if necessary	• Retrospective, moving forward, Final Instructions

Capturing the Workflow; Prioritizing Capabilities (Features for Optimal ROI)

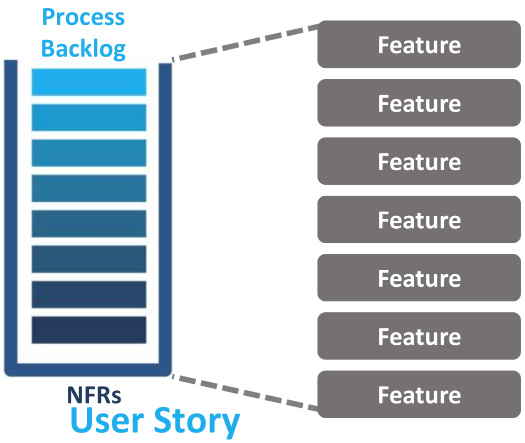
Enabler Story

Document As-Is processes and the systems that deliver results for IPTs

Business Feature

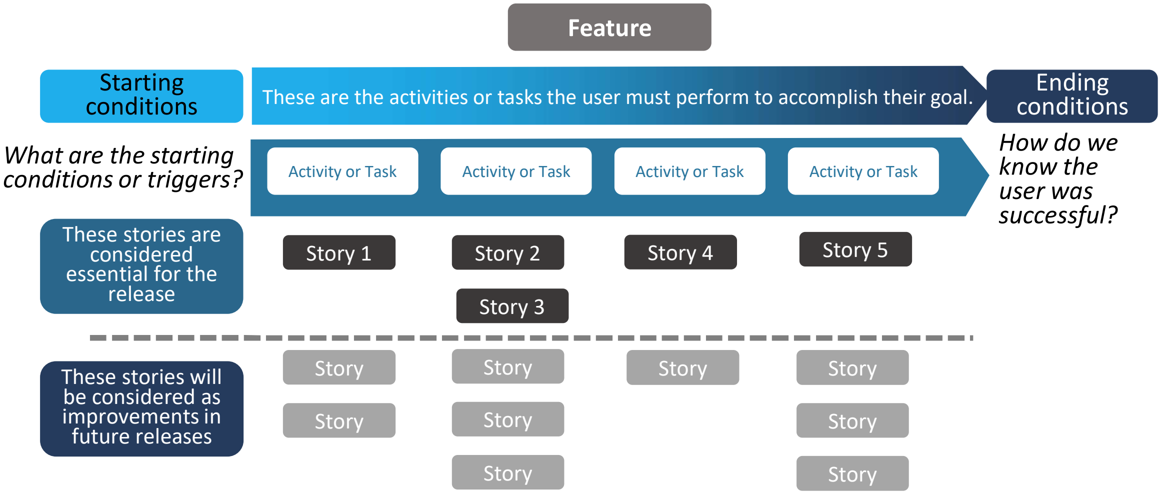
Feature: Synchronize activities across IPTs to accelerate completion of objectives

Benefit hypothesis: Prioritize problems and define Sprints; inform POM and funding decisions


Process Backlog
Feature
Feature
Feature
Feature
Feature
Feature
Feature
NFRs

User Story

As an IPT lead, **I can** track Requirements; Concept, O&O, and wargaming evaluations; Capability prioritization; Technical resolution of SoS challenges and opportunities; and Advanced Research Projects; **so that** I can accelerate adapting to changes in threats and policy, etc.


Feature
Starting conditions
These are the activities or tasks the user must perform to accomplish their goal.
Ending conditions
What are the starting conditions or triggers?
Activity or Task
Activity or Task
Activity or Task
Activity or Task
How do we know the user was successful?
These stories are considered essential for the release
Story 1
Story 2
Story 3
Story 4
Story 5
These stories will be considered as improvements in future releases
Story
Story
Story
Story
Story
Story
Story
Story
Story

$$\text{WSJF} = \frac{\text{User-Business Value} + \text{Time Criticality} + \text{Risk Reduction and/or Opportunity Enablement}}{\text{Job Size}}$$

Weighted Shortest Job First (WSJF)

Redefining Ingenuity

Process Kanban

Funnel

All big ideas are captured, such as:

- New or changing threat(s)
- Potential Gamechangers
- Cost savings
- Policy changes
- Problems with existing solutions

Reviewing

- Refine understanding of the epic
- Create the Epic Hypothesis Statement
- Calculate WSJF
- WIP limited

Analyzing

- Solution alternatives
- Refine WSJF
- Cost estimates
- Define MVP
- Create Lean Business Case
- Go/no-go decision
- WIP limited

Backlog

- Epics approved by LPM
- Periodically reprioritized using WSJF
- Pulled by teams when available ART capacity exists

Implementing

MVP

- Build and evaluate MVP
- Pivot or persevere decision made

Persevere

- Affected ARTs or Solution Trains reserve capacity for the epic
- Continue feature implementation until WSJF determines otherwise

Done

- Done when LPM governance is no longer required

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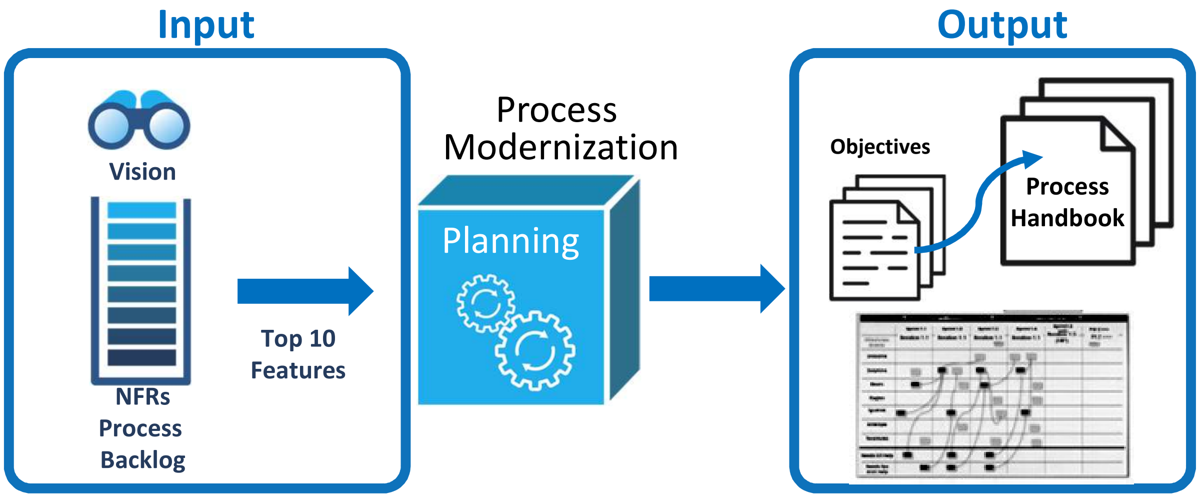
Process Planning Conference Outcomes



Input

Vision

NFRs
Process
Backlog

Top 10
Features

Process
Modernization

Planning

Output

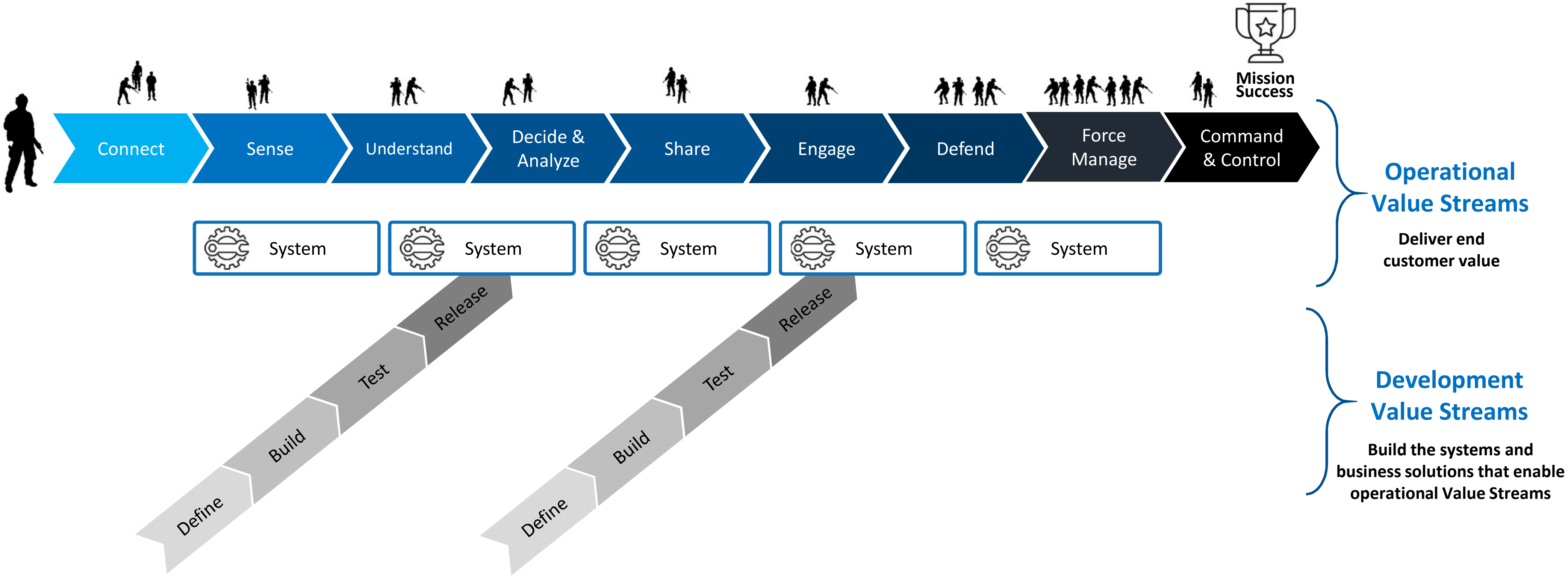
Objectives

Process
Handbook

Vision and top 10 Features

Process Modernization Objectives
and Program Board

Operational vs Development Value Streams



Mission Success

Connect

Sense

Understand

Decide & Analyze

Share

Engage

Defend

Force Manage

Command & Control

System

System

System

System

System

Define

Build

Test

Release

Define

Build

Test

Release

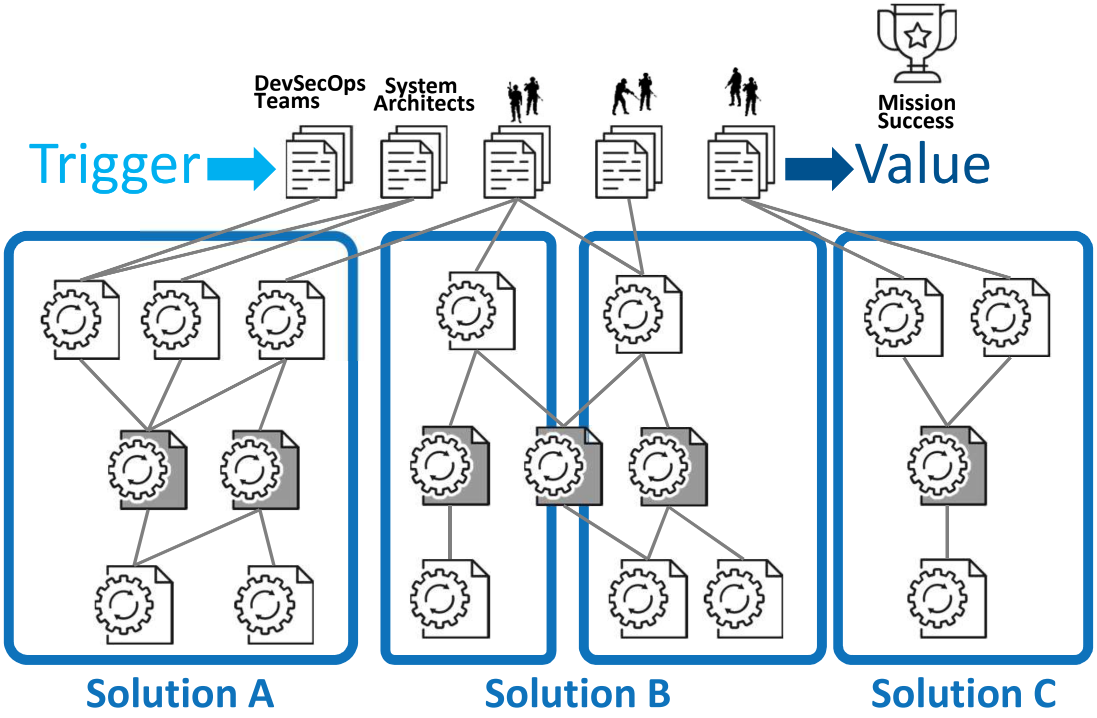
Operational Value Streams

Deliver end customer value

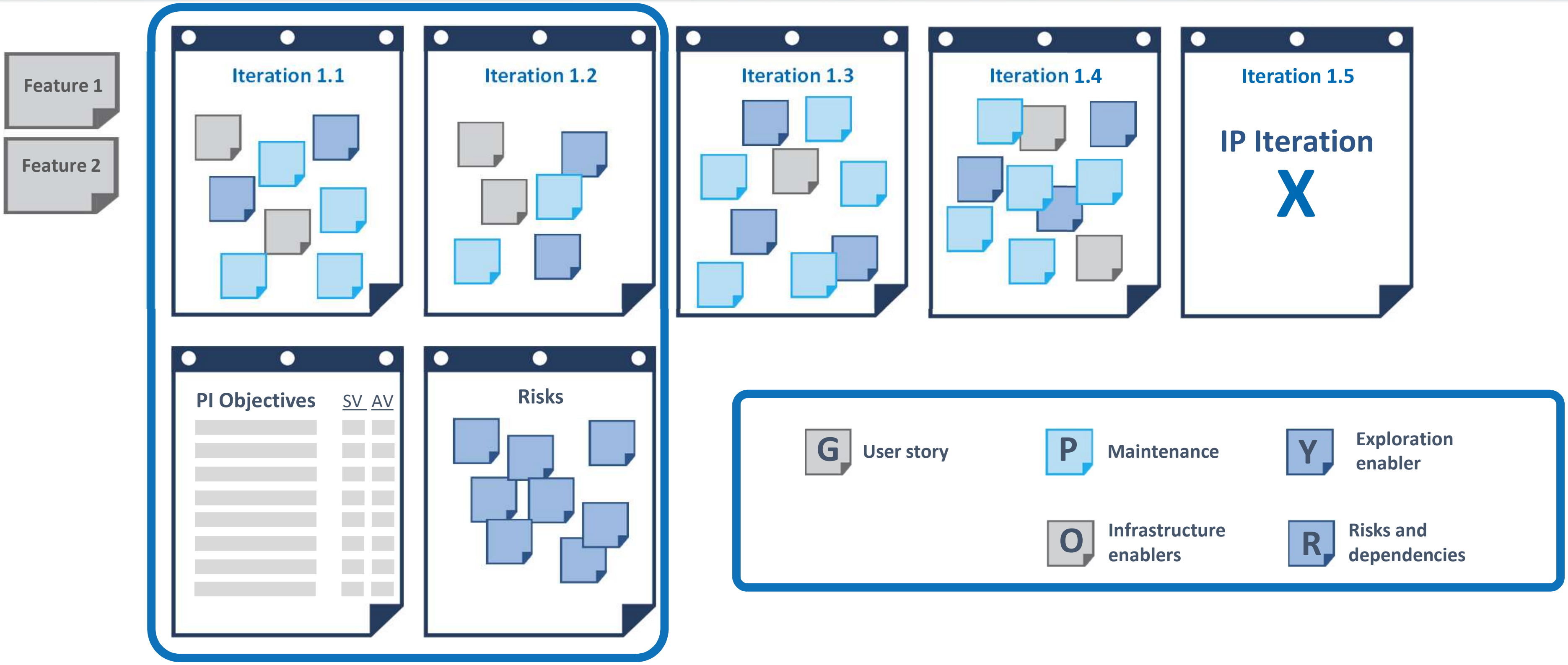
Development Value Streams

Build the systems and business solutions that enable operational Value Streams

Identifying the Agile Release Trains


DevSecOps Teams
System Architects
Mission Success
Trigger
Value
Solution A
Solution B
Solution C

Planning Requirements


Feature 1
Feature 2
Iteration 1.1
Iteration 1.2
Iteration 1.3
Iteration 1.4
Iteration 1.5
IP Iteration
X
PI Objectives
SV
AV
Risks

G User story

P Maintenance

Y Exploration enabler

O Infrastructure enablers

R Risks and dependencies

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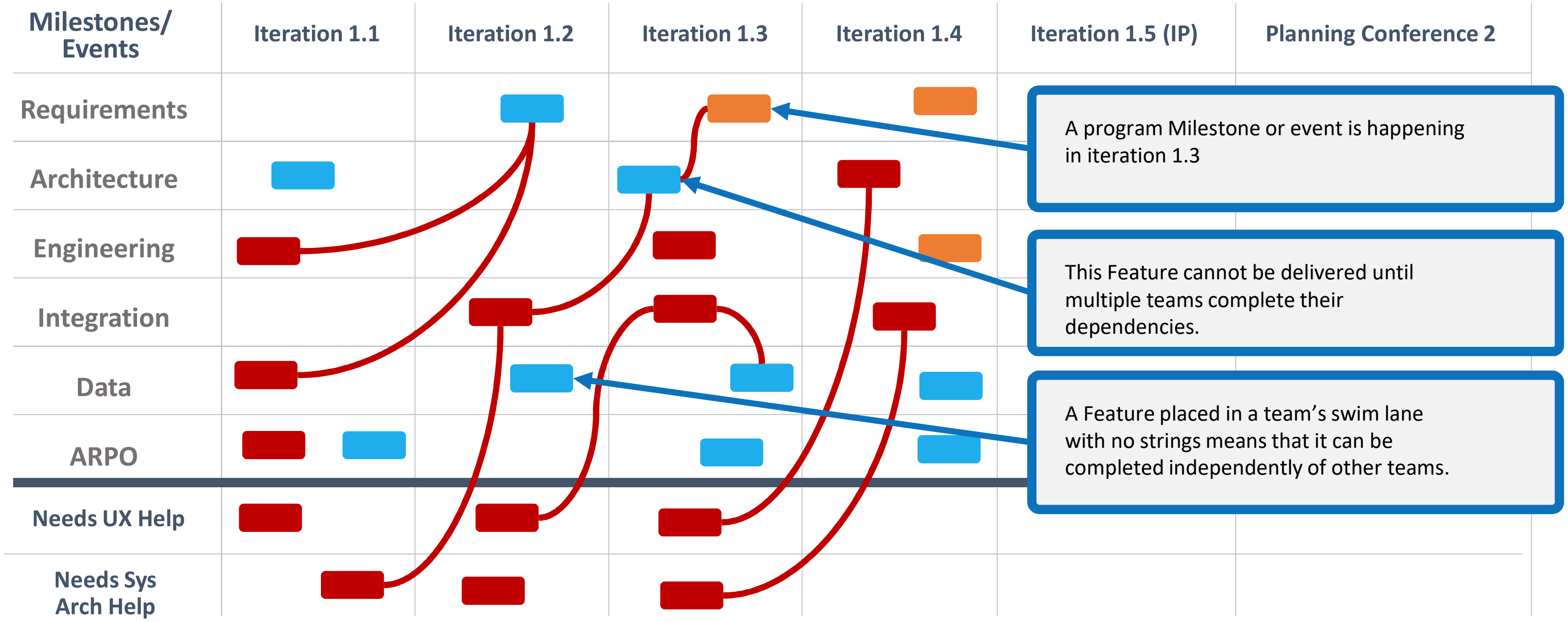
Setting Business Value

Team A

Objectives	**BV**
Proof of concept with Representative data	10
Decide to create or buy tools	3
Uncommitted	
Proof of concept with customer data	7

Process Handbook Board – Feature delivery, Dependencies, and Milestones



Milestones/ Events | Iteration 1.1 | Iteration 1.2 | Iteration 1.3 | Iteration 1.4 | Iteration 1.5 (IP) | Planning Conference 2

Requirements

Architecture

Engineering

Integration

Data

ARPO

Needs UX Help

Needs Sys Arch Help

A program Milestone or event is happening in iteration 1.3

This Feature cannot be delivered until multiple teams complete their dependencies.

A Feature placed in a team’s swim lane with no strings means that it can be completed independently of other teams.

Blue = Features

Red = Significant Dependency

Orange = Milestone/Event

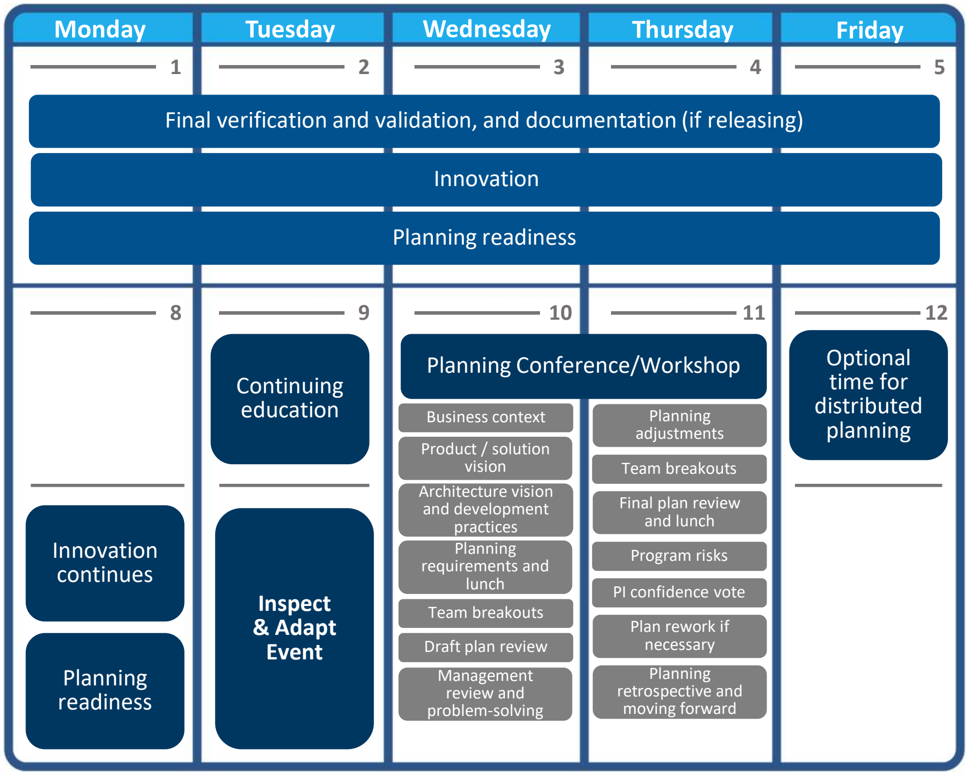
A dependency requiring Stories or other dependencies to be completed before the Feature can be completed

Planning Retrospective

The Planning Meeting retrospective

1. What went well
2. What didn't
3. What we can do better next time

Innovation Planning



Monday	Tuesday	Wednesday	Thursday	Friday
1	2	3	4	5
Final verification and validation, and documentation (if releasing)				
Innovation				
Planning readiness				
8	9	10	11	12
	Continuing education	Planning Conference/Workshop		Optional time for distributed planning
Innovation continues Planning readiness	**Inspect & Adapt Event**	Business context Product / solution vision Architecture vision and development practices Planning requirements and lunch Team breakouts Draft plan review Management review and problem-solving	Planning adjustments Team breakouts Final plan review and lunch Program risks PI confidence vote Plan rework if necessary Planning retrospective and moving forward	

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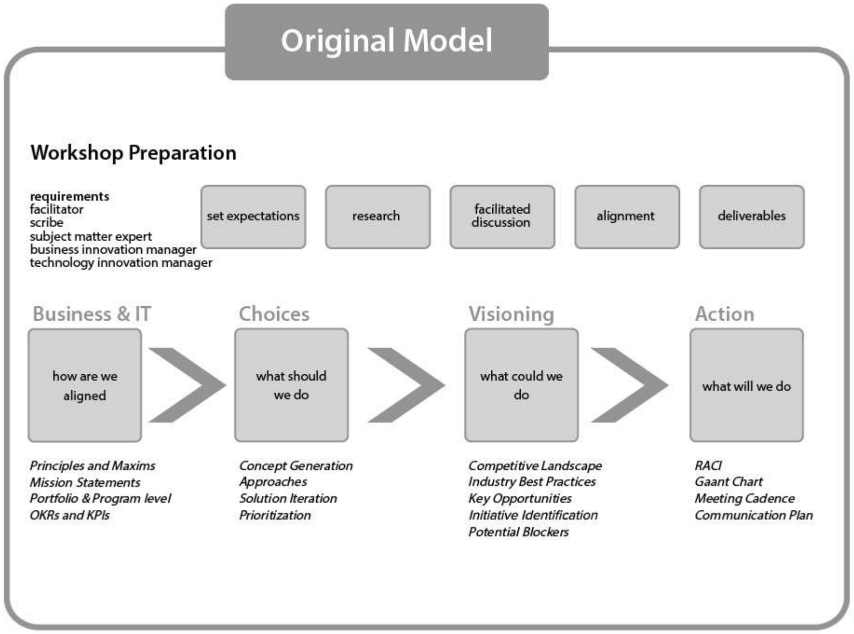
Innovation Workshops



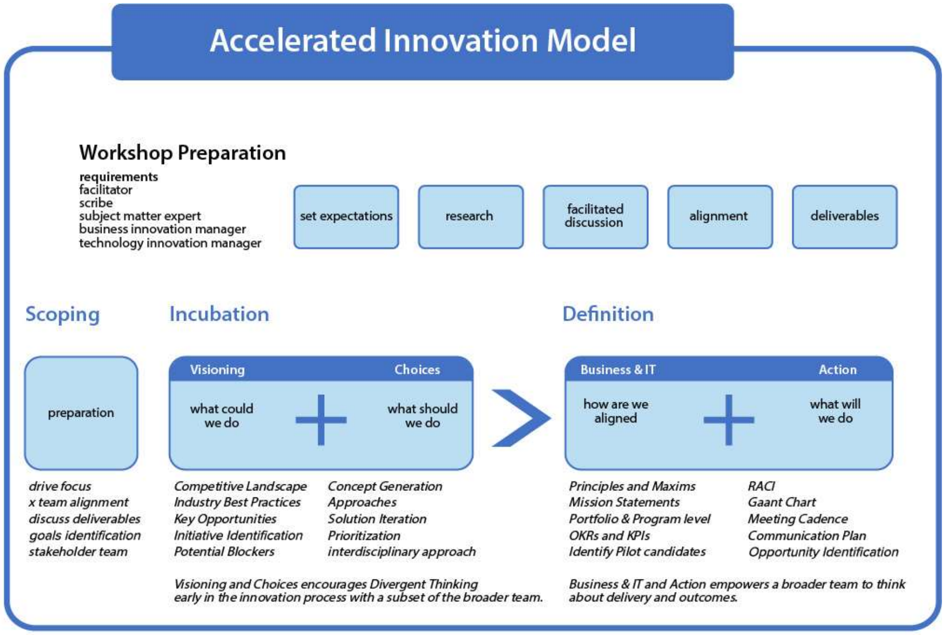
Original Model

Workshop Preparation

requirements
facilitator
scribe
subject matter expert
business innovation manager
technology innovation manager

set expectations
research
facilitated discussion
alignment
deliverables

Business & IT	Choices	Visioning	Action
how are we aligned	what should we do	what could we do	what will we do
Principles and Maxims *Mission Statements* *Portfolio & Program level* *OKRs and KPIs*	*Concept Generation* *Approaches* *Solution Iteration* *Prioritization*	*Competitive Landscape* *Industry Best Practices* *Key Opportunities* *Initiative Identification* *Potential Blockers*	*RACI* *Gaant Chart* *Meeting Cadence* *Communication Plan*



Accelerated Innovation Model

Workshop Preparation

requirements
facilitator
scribe
subject matter expert
business innovation manager
technology innovation manager

set expectations
research
facilitated discussion
alignment
deliverables

Scoping

preparation

drive focus
x team alignment
discuss deliverables
goals identification
stakeholder team

Incubation

Visioning
Choices
what could we do
+
what should we do

Visioning	Choices
Competitive Landscape *Industry Best Practices* *Key Opportunities* *Initiative Identification* *Potential Blockers*	*Concept Generation* *Approaches* *Solution Iteration* *Prioritization* *interdisciplinary approach*

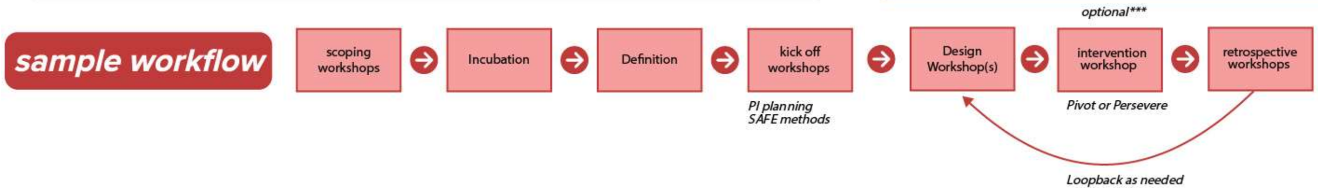
Visioning and Choices encourages Divergent Thinking early in the innovation process with a subset of the broader team.

Definition

Business & IT
Action
how are we aligned
+
what will we do

Business & IT	Action
Principles and Maxims *Mission Statements* *Portfolio & Program level* *OKRs and KPIs* *Identify Pilot candidates*	*RACI* *Gaant Chart* *Meeting Cadence* *Communication Plan* *Opportunity Identification*

Business & IT and Action empowers a broader team to think about delivery and outcomes.



sample workflow
scoping workshops
Incubation
Definition
kick off workshops
Design Workshop(s)
intervention workshop
retrospective workshops

*optional****

PI planning
SAFE methods

Pivot or Persevere

Loopback as needed

Benefits

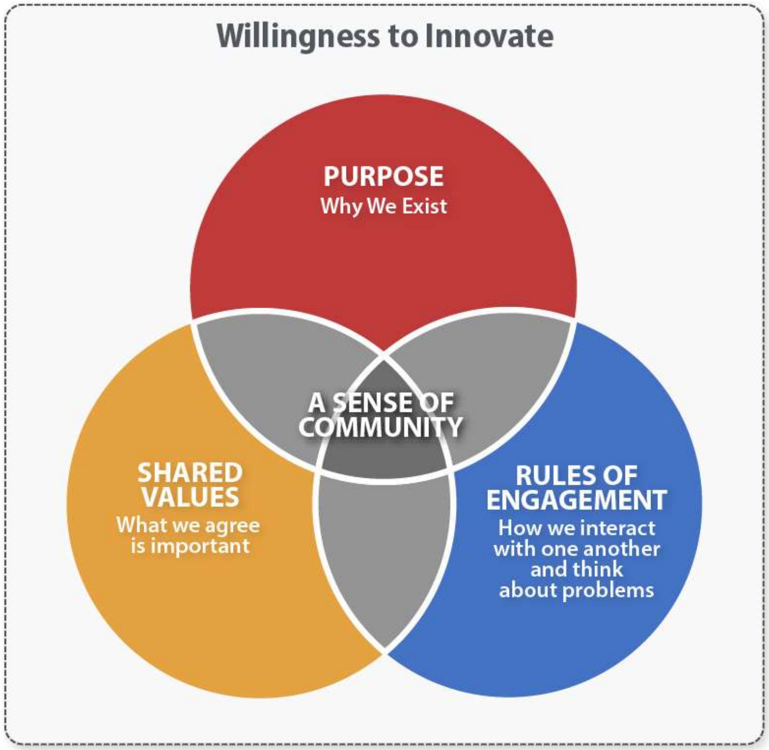
CULTURE OF TRANSFORMATION

Integrated approach - total involvement - give everyone a voice

COST REDUCTION

Identify and address issues early in the process

Willingness to Innovate vs Ability to Innovate



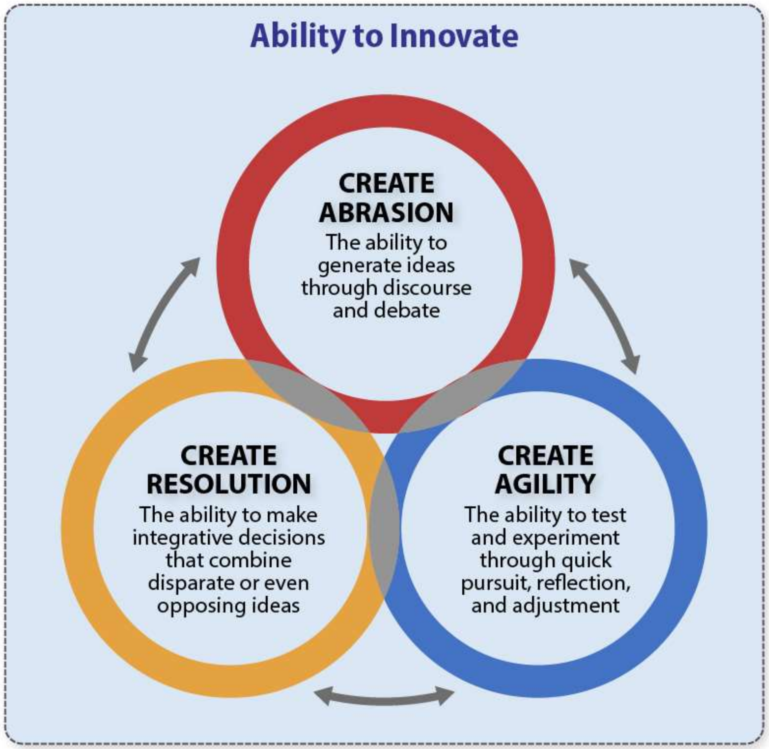
Willingness to Innovate

PURPOSE
Why We Exist

SHARED VALUES
What we agree is important

RULES OF ENGAGEMENT
How we interact with one another and think about problems

A SENSE OF COMMUNITY



Ability to Innovate

CREATE ABRASION
The ability to generate ideas through discourse and debate

CREATE RESOLUTION
The ability to make integrative decisions that combine disparate or even opposing ideas

CREATE AGILITY
The ability to test and experiment through quick pursuit, reflection, and adjustment

Willingness to Innovate
Ability to Innovate
Adapted from, Collective Genius: The Art and Practice of Leading Innovation (Harvard Business Review Press, 2014)

Tactics to Encourage Disruptive Thinking

- Assume you are incorrect
- Be more open to new ideas
- Reward and encourage dissent
- Designate a Devil’s Advocate
- Discuss the competing alternative to your decisions
- Perform case studies about emerging trends
- Embrace diversity
- Actively hunt trends
- Study other Markets
- Push to see the potential in awkward ideas
- Learn about similar companies that missed key opportunities
- Get outsiders to suggest ideas you might be missing
- Hire leaders from different markets
- Host idea competitions
- Invite junior hires, outsiders, and customers to a workshop

Future of Work

- For future of work, how do we improve employee’s collaboration and productivity while people can work from anywhere?
- Take advantage of this pandemic and make teams even better and stronger with work from anywhere post pandemic.
- With the right virtual tools, we can keep teams innovative and when it is safe again we can create opportunities for teams to be in person as well.
- It will no longer be a requirement that to be creative and innovative requires people physically in the same room.
- Technology today and what is coming in the future is changing that paradigm.
- Throughout all this we need to make sure we wrap it tightly with the right cybersecurity.

Summary

- Innovative ideas do not magically happen, they require action and effort
- Future Framework - **Ability to Change** – most important trait for our fast-moving future
- We are more dependent on our past decisions than we like to admit
- New ideas are awkward and different – practice spotting the subtle clues that hint toward great ideas
- Pathway to Greatness can be fraught with doubt
- Being outside of an industry makes it easier to see the potential in new ideas
- Even your biggest future fans might need time to understand your new way of doing things

Backup