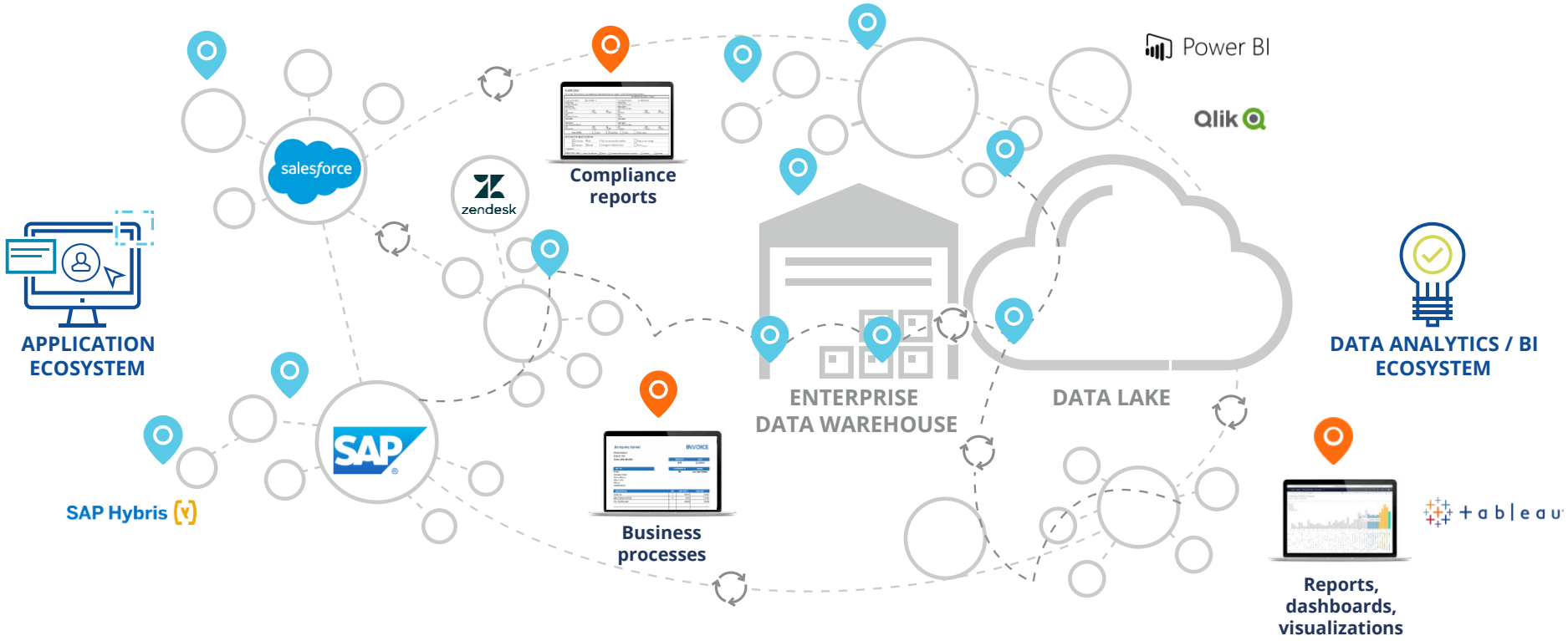
Tricentis Data Integrity

Trust your Data

Your data is always on the move

through increasingly complex landscapes

Migrations,
Regulatory Compliance,
AI/ML-driven initiatives



...to many different destinations

Critical Business Decisions Rely on Data

But there's always the potential for risk

Migrate, Merge, Consolidate

Complex projects introduce risk as the data touches heterogeneous landscapes

Compliance

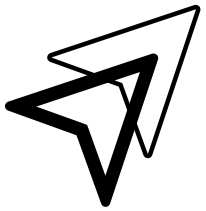
Lack of regulatory compliance leads to the potential for huge fines

AI/ML

Data drives AI, and without trustworthy data your AI cannot be trusted

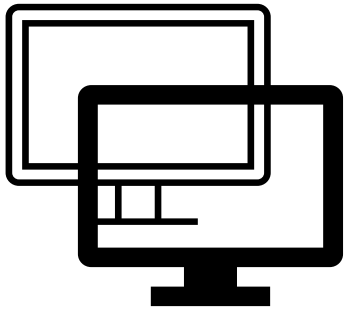
And risk is introduced with every movement or change

But your current solutions don't mitigate risk



Point Solutions

- Siloed
- Lack of Coverage
- Tool Fatigue
- *Not end-to-end*



Manual

- Expensive
- Time-consuming
- Human Error Prone
- *Not automated*

Bad Data

Bad Data

Bad Data is Costly

Bad Data costs US companies $12.5M per company a year

Data migration

Poor testing during data migrations is a leading cause of transformation failures

Compliance

Lack of visibility can result in costly fines

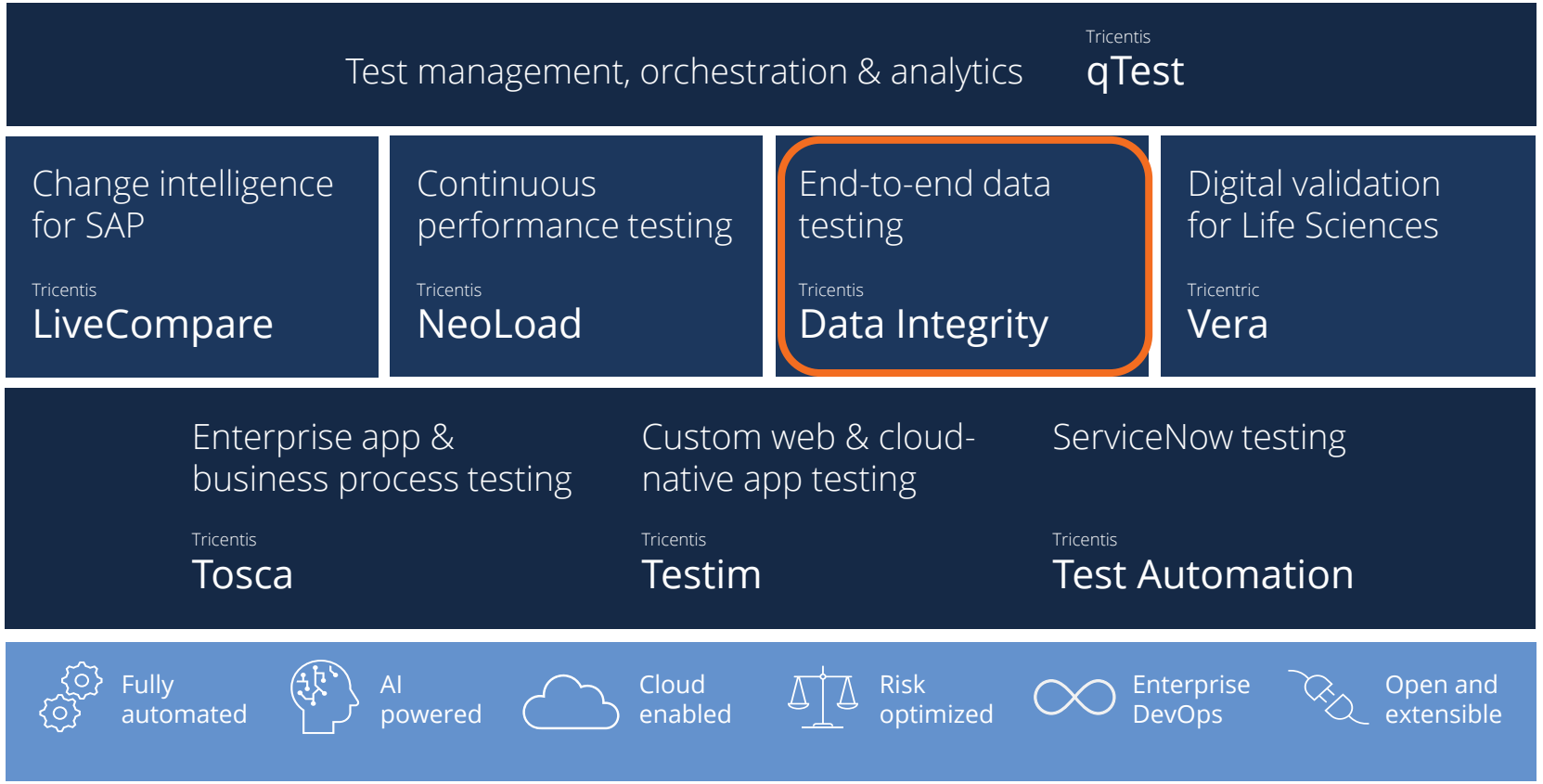
AI / ML

AI/ML projects without a data strategy introduces bias

You need a data integrity tool that is automated, end-to-end, and integrated across your entire ecosystem

What we **provide**

Deliver higher quality faster with the Tricentis Quality Engineering Platform



Product **Roadmap**

Single SaaS Solution for all Tricentis Core Quality Engineering Capabilities

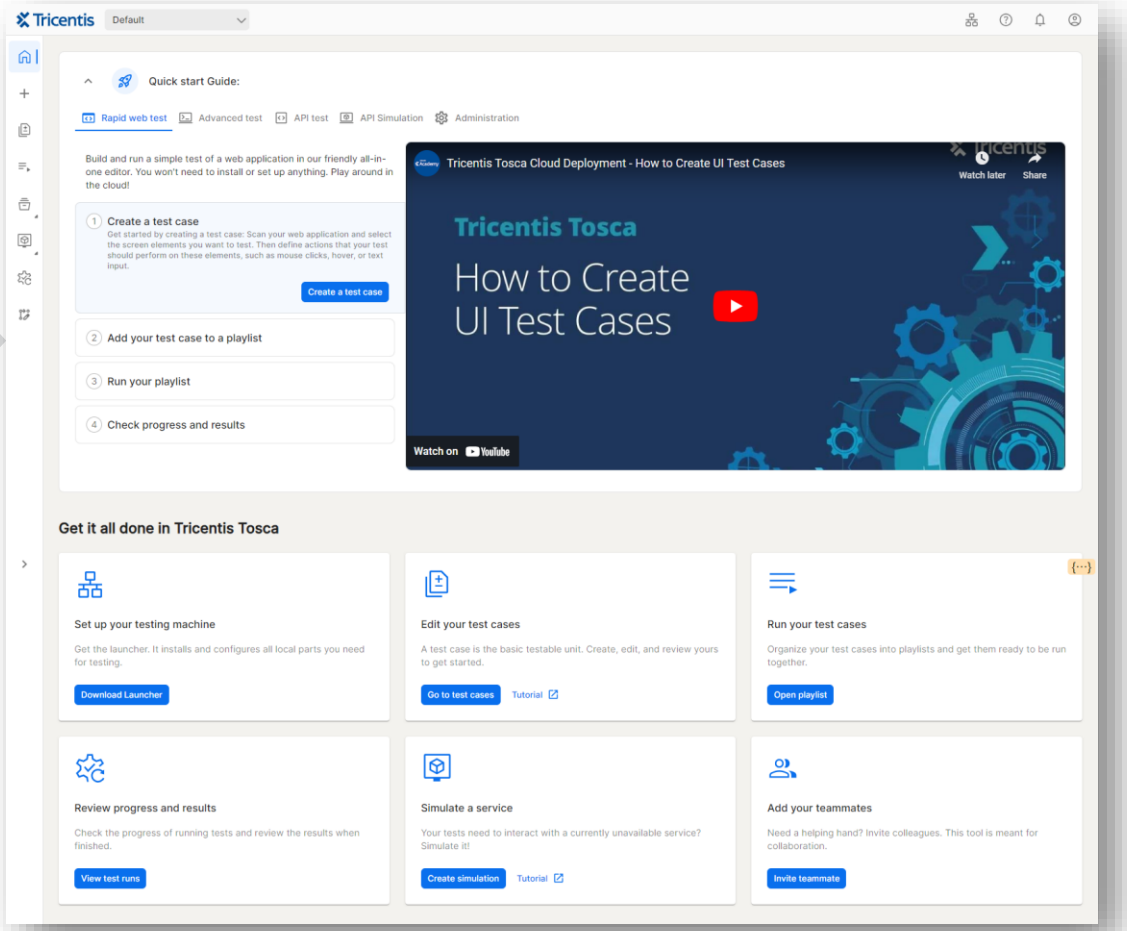
Test Automation
(Tosca Cloud, Mobile)

Data Testing
(Data Integrity, TDM)

Test Management
(qTest, Vera)

Impact Analysis
(LiveCompare)

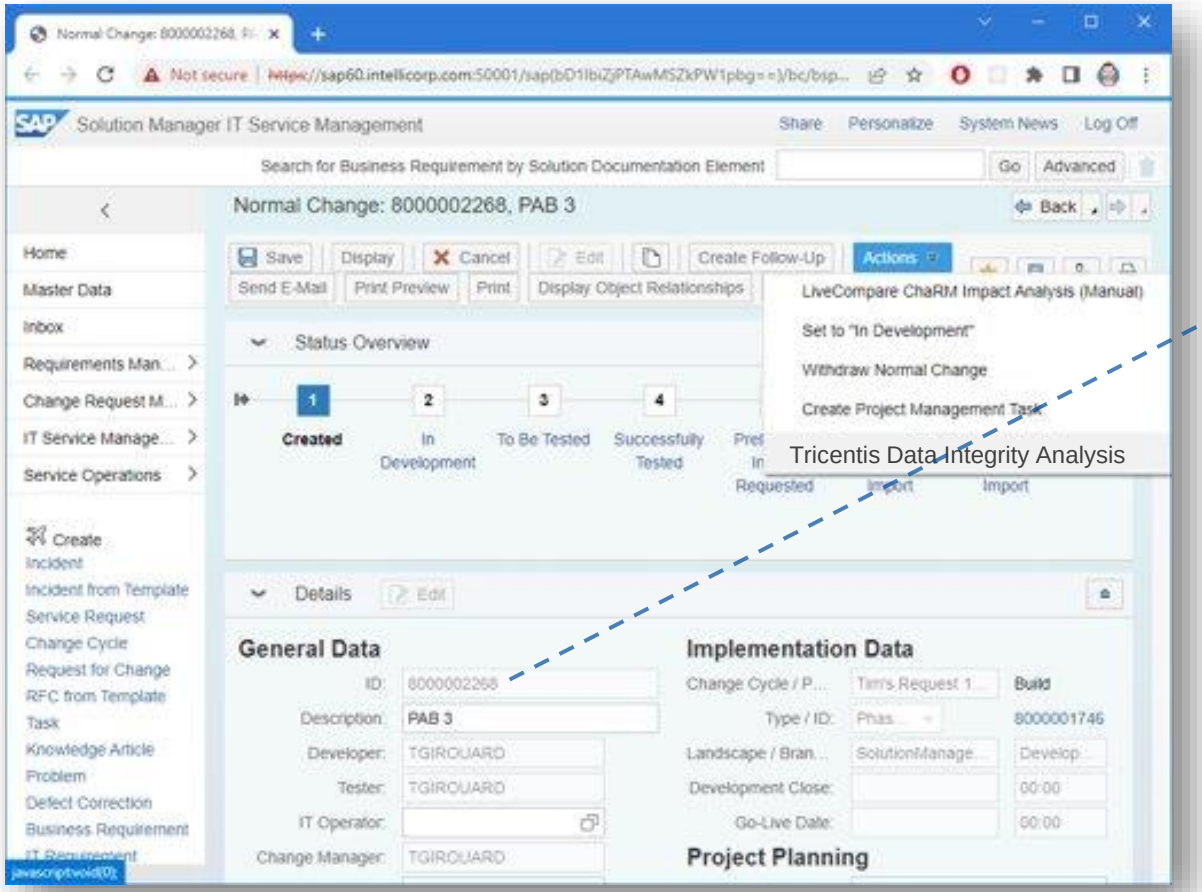
Performance Testing
(NeoLoad)



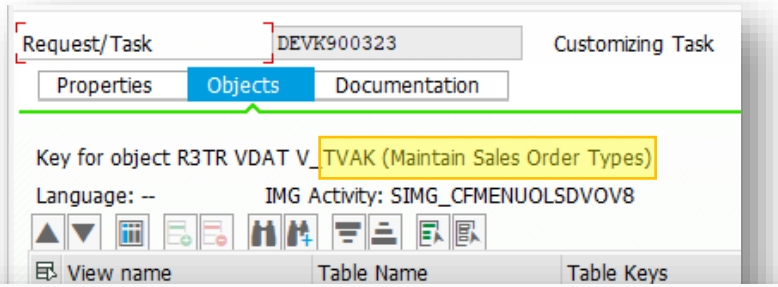
- Integrate the Tricentis portfolio with shared services and universal user experience
- Leverage AI to solve customer problems and improve usability
- Cloud, on-prem, & hybrid support

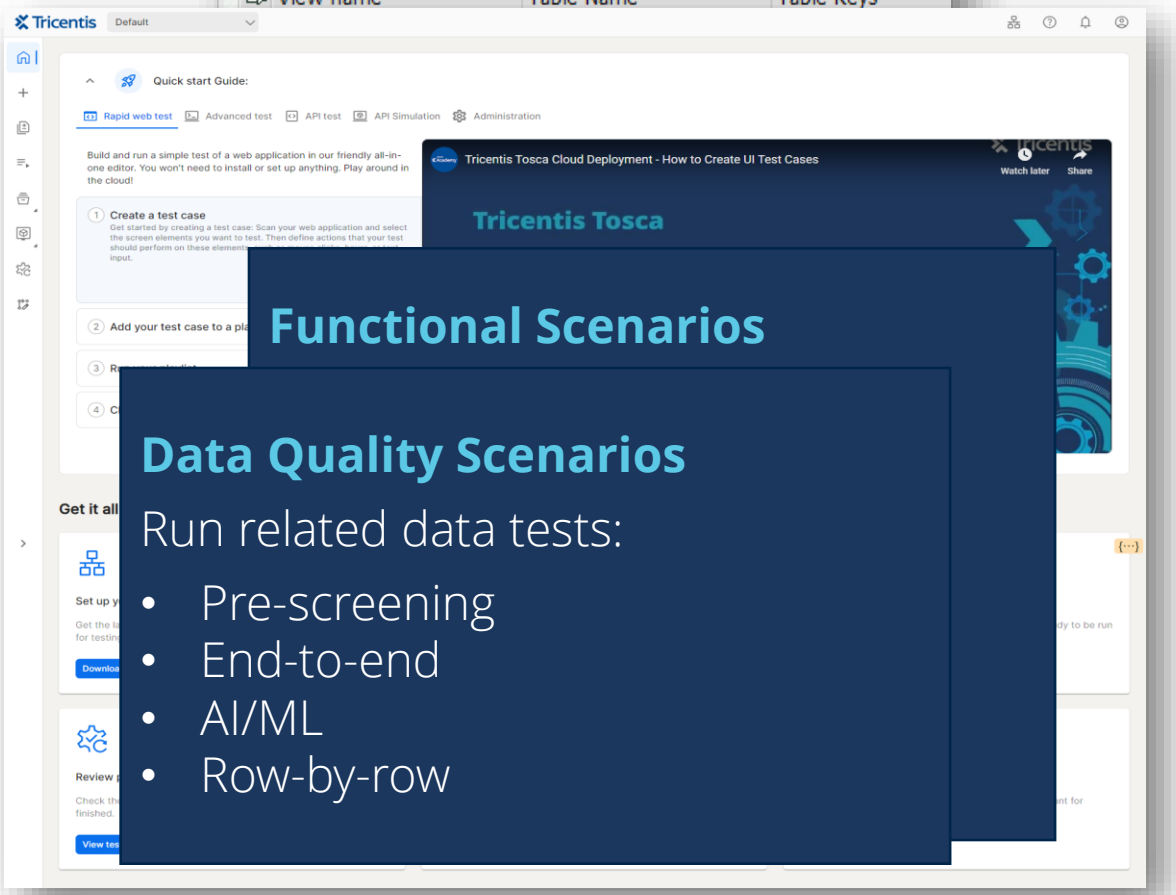
SAP Integration

Data Change Impact Analysis

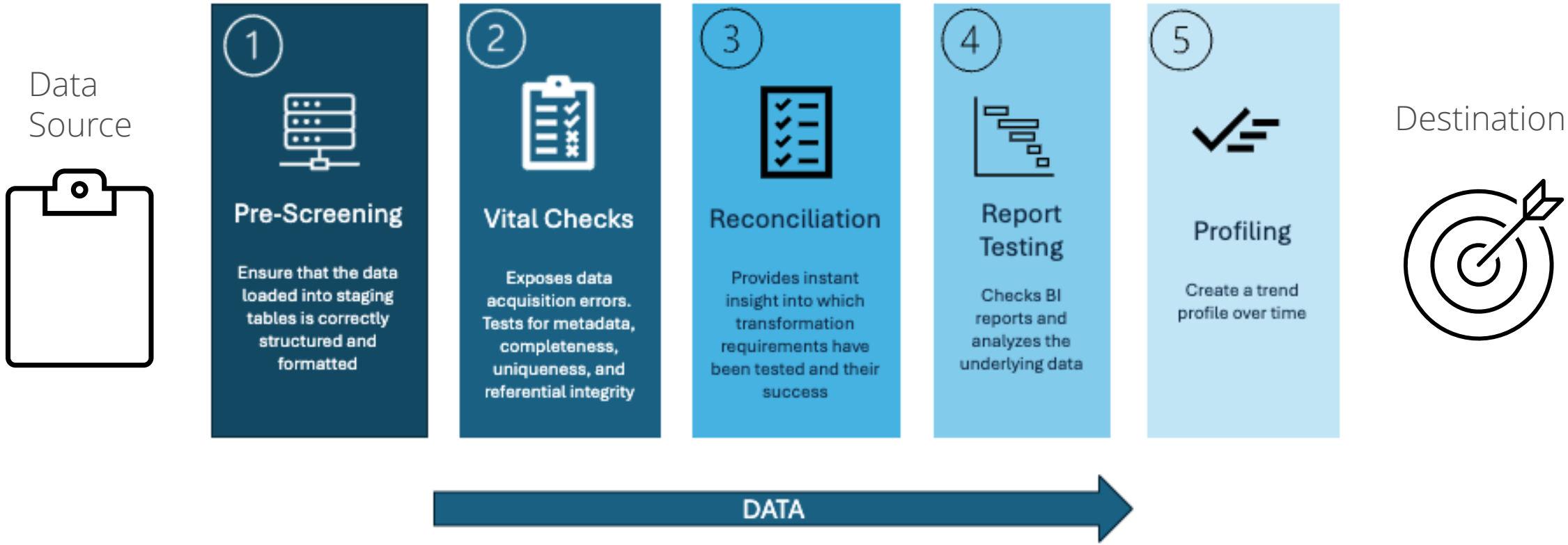


Tricentis Data Integrity Analysis





Tricentis Data Integrity eliminates risk as it appears in your data testing cycle



Deliver trustworthy data through a Complex Process

Tricentis Data Integrity

Automated, end-to-end, and integrated into your ecosystem

ORACLE ERP

infor

SAP ERP

START

salesforce

workday.

servicenow

Data ingestion

SAP Data warehouse 3rd Party data lake

Data marts & methods

Analytics/BI & application ecosystems

tableau

Power BI

SAP Analytics Cloud

PRE-SCREENING
Metadata checks
Format checks

VITAL CHECKS
Completeness
Uniqueness
Referential integrity

FIELD TESTS
Aggregation
Value range
Transformation

CONTINUOUS MONITORING
Row counts
Job run times
Data distribution

RECONCILIATION TESTS
Detailed source to target comparison tests ETL validation

REPORT & APP TESTING
UI automation
Visual checks
Content checks
Security checks

SAP ORACLE Microsoft Azure aws servicenow salesforce

Deliver trustworthy data through a Complex Process

Integrate with the tools you already use

Orchestration Engines

Apache Airflow · AWS Step Functions · Flyte · bmc Control-M Enterprise Manager

ORACLE ERP · infor · SAP ERP · Source Extract · salesforce · workday. · servicenow

Raw Data — talend · Informatica

Staging — Microsoft SQL Server · talend · Informatica

Silver / Hub — Microsoft SQL Server · talend · Informatica · databricks

Gold / Marts — snowflake · databricks

tableau · Power BI · SAP Analytics Cloud

PRE-SCREENING
Metadata
Format
Nullness
Range

VITAL CHECKS
Completeness
Uniqueness
Referential integrity

FIELD TESTS
Aggregation
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CONTINUOUS MONITORING
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RECONCILIATION TESTS
Detailed source to target comparison tests & ETL validation

REPORT & APP TESTING
UI automation
Visual checks
Content checks
Security checks

Business Value

- Migrate, Merge, Consolidate
- Compliance
- AI/ML

Business Value

Mergers and Acquisitions require solid reconciliation/validation strategies

TD Bank

- Risk: Without properly migrated customer data, marketing of acquiring bank's services would not be correct or compliant
- **Data Integrity** ensures consistency, trust, and validation throughout the project lifecycle
- **ROI: $10's million in projected sales to properly migrated customers**

Data Migrations during and AFTER new cloud environments

TJX

- Risk: Production errors in the Snowflake environment (new Netezza data conflicts with migrated data)
- On-prem to Snowflake supported by **Data Integrity/Reconciliation Tests**
- **ROI: Netezza to Snowflake migration saved $1M**

Data Reconciliation/Validations for Accurate business decisions

worldpay from FIS

- Risk: Data chaos wreaking havoc on analytics supporting Payroll, Payments, ERP, Logistics, etc…
- **Data Integrity/Reconciliation** in the Cloud
  - *Action item: check out our DataBricks/Azure 10-minute Demo Video*
- **ROI? More like Return to trust! Addressing:**
  - *$24 million lost in Oil trading decisions due to data chaos (off by 1,000th of a percent)*
  - *$10's millions spent on data warehousing and analytics NOT BEING USE*

SAP Change Events – Data Driven

Mergers & Acquisitions

Table key: BUKRS

"AR01"

Table key: BUKRS

"ARG1"

Merge

SAP Change Events – Data Driven

Mergers & Acquisitions

Transparent Tables with Selected Key	Remaining Tables after Filter I	Remaining Tables after Filter II	Relevant Tables	Final Table Set
3179	3177	218	19	18
BUKRS	Remove Unsupported Table Types	Remove Large Tables	Tables with Entries	Tables with Data Discrepancies

LiveCompare Report - T001
Created by: timg on: 2023-06-08 05:24:02
Compared table contents (2 of 2)

Status	System	MANDT	BUKRS	BUTXT	ORT01	LAND1	WAERS	SPRAS	KTOPL	WAABW	PERIV	KOKFI	RCOMP	STCEG	FIKRS
	SAP43_SNC_PJ	001	AR01	Country Template AR	Argentinien	AR	ARS	S	INT	00					
	SAP43_SNC_PJ		ARG1							10					

Maximum exchange rate deviation in percent

WorldPay – 90% Savings with BI/DWH Test Automation

SITUATION

- Millions of dollars invested in applications designed to help business leaders understand and leverage data
- Reporting errors lead to low to zero adoption
- QA leaders were challenged of “fixing this problem” by transforming the end-to-end data testing process

THE NEED

- Automation for end-to-end data testing
- Support for Complex technology stacks—from 40-year-old mainframes to cloud
- Handle massive amounts of data from many different sources and many transformations between source and report

WHY TRICENTIS

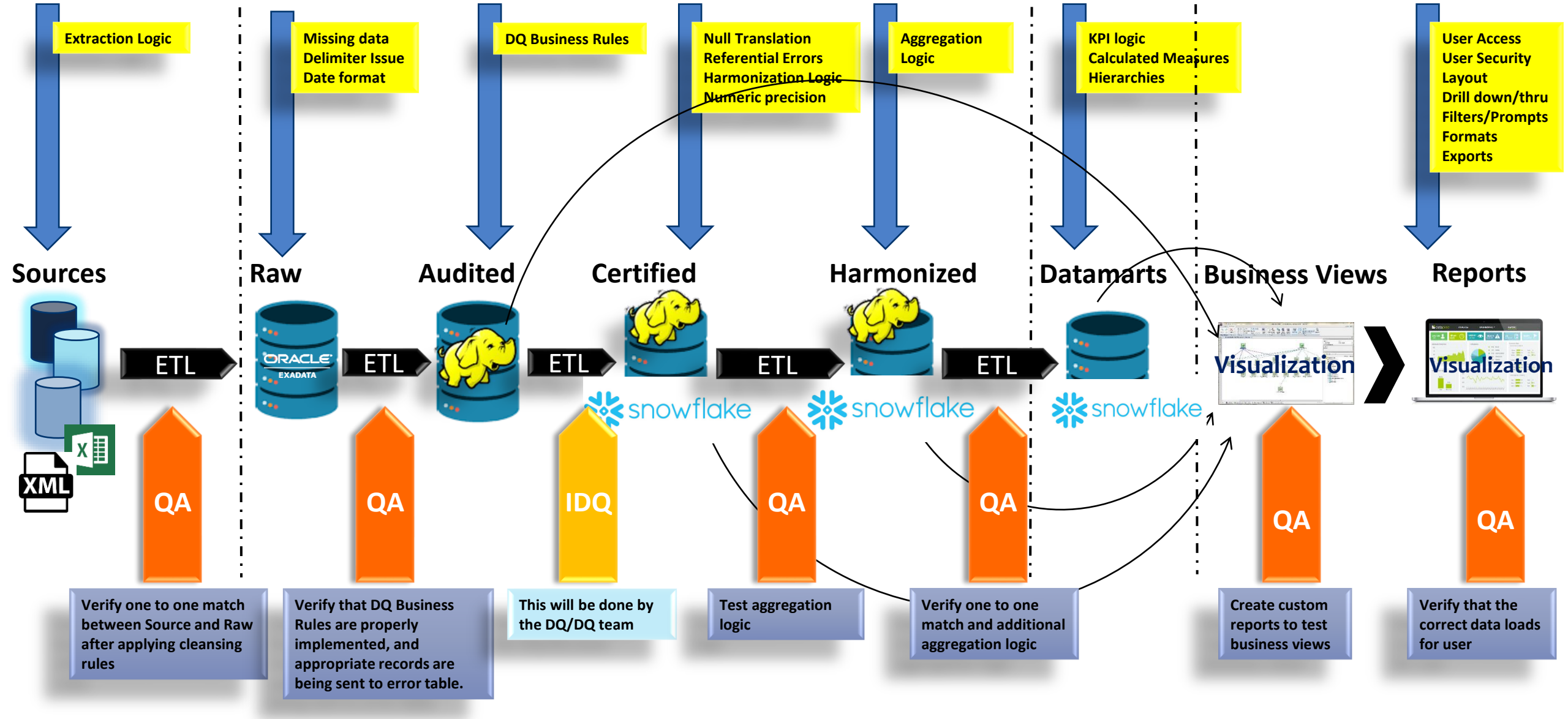
- Reusable, scalable tests without wrestling with scripting
- Thousands of hours of manual effort saved per month
- Improved user adoption and productivity because of improved data quality

worldpay from FIS

Business Case Summary	Using Tricentis in the BI/DWH
Time to Market Increase	90%+ Increase
Cost of Testing	90% Reduction
Records Compared in 20 min	200 Million

Data Testing Approach

worldpay from FIS



Worldpay customer quote

"

A few months after our new BI / data warehouse testing approach launched, people finally started **trusting** the applications.

They're highly used now, and they have become a vital tool in making critical business decisions.

worldpay

- Head of Enterprise Quality Assurance Team, Worldpay

TJX reduces Snowflake migration timeline & costs by 50%

And eliminates data testing headaches with Tricentis Data Integrity

SITUATION

- Netezza to Snowflake required verification for each migration stage (sources to target)
- Scripted automation produced errors, requiring stop and restarts and delaying the 1-year project plan
- Data leaders required to implement a rigorous, repeatable regression process as data moved

NEED

- More resilient, faster test automation for end-to-end data testing
- Support for complex technology stack
- Ability to handle massive amounts of data, including 5 years of sales data from many different sources, requiring many transformations from source to report

RESULT

- Reusable, scalable tests without scripting
- Thousands of hours of manual effort and test maintenance saved
- Improved user adoption and productivity because of improved data quality

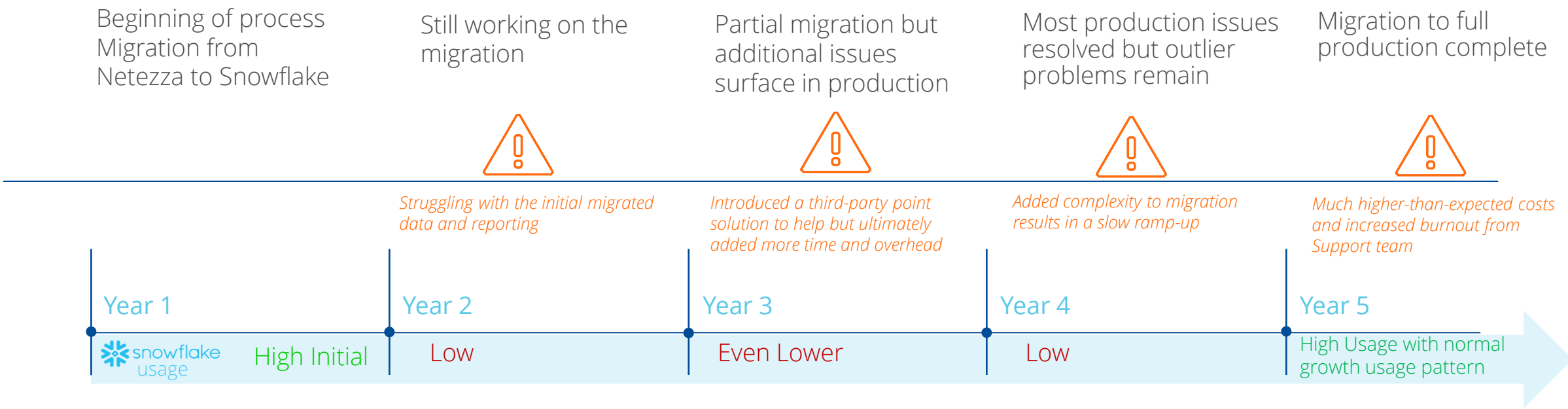
50%
Time to market increase

50%
Reduction in testing costs

38#
Minute runtime for entire regression suite

Snowflake Migration Timeline (Manual Testing)

Don't wait 3+ years for a complete migration to Snowflake



Snowflake Migration Timeline (Data Integrity)

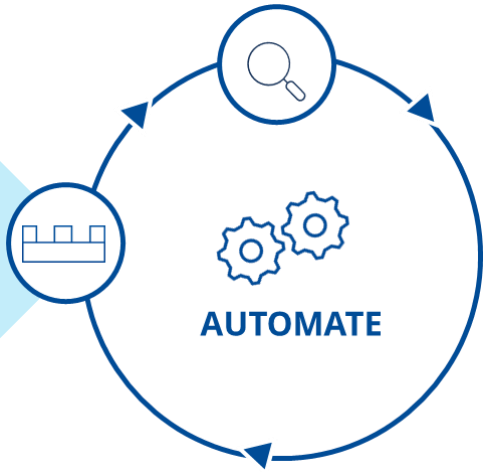
Migrate to Snowflake in 180 days!

Beginning of process Migration to Snowflake

Implemented Snowflake data testing with Tricentis

Migration completed – 40 million records tests being able to execute in minutes across the migration

Ongoing Tricentis Data Integrity accelerates Snowflake adoption of change



snowflake usage

High Usage with normal growth usage pattern

TD Bank Streamlines E2E Regulatory Compliance

SITUATION

- Banks conducting business in the United States are required to identify, monitor, and report “suspicious activity” in a timely manner
- Existing procedures could not handle the scope needed for compliance

THE NEED

- Complex validations across different data sources
  - Focus: Automation
- Increased coverage to automate 70k suspicious transactions scenarios
  - Focus: Accuracy

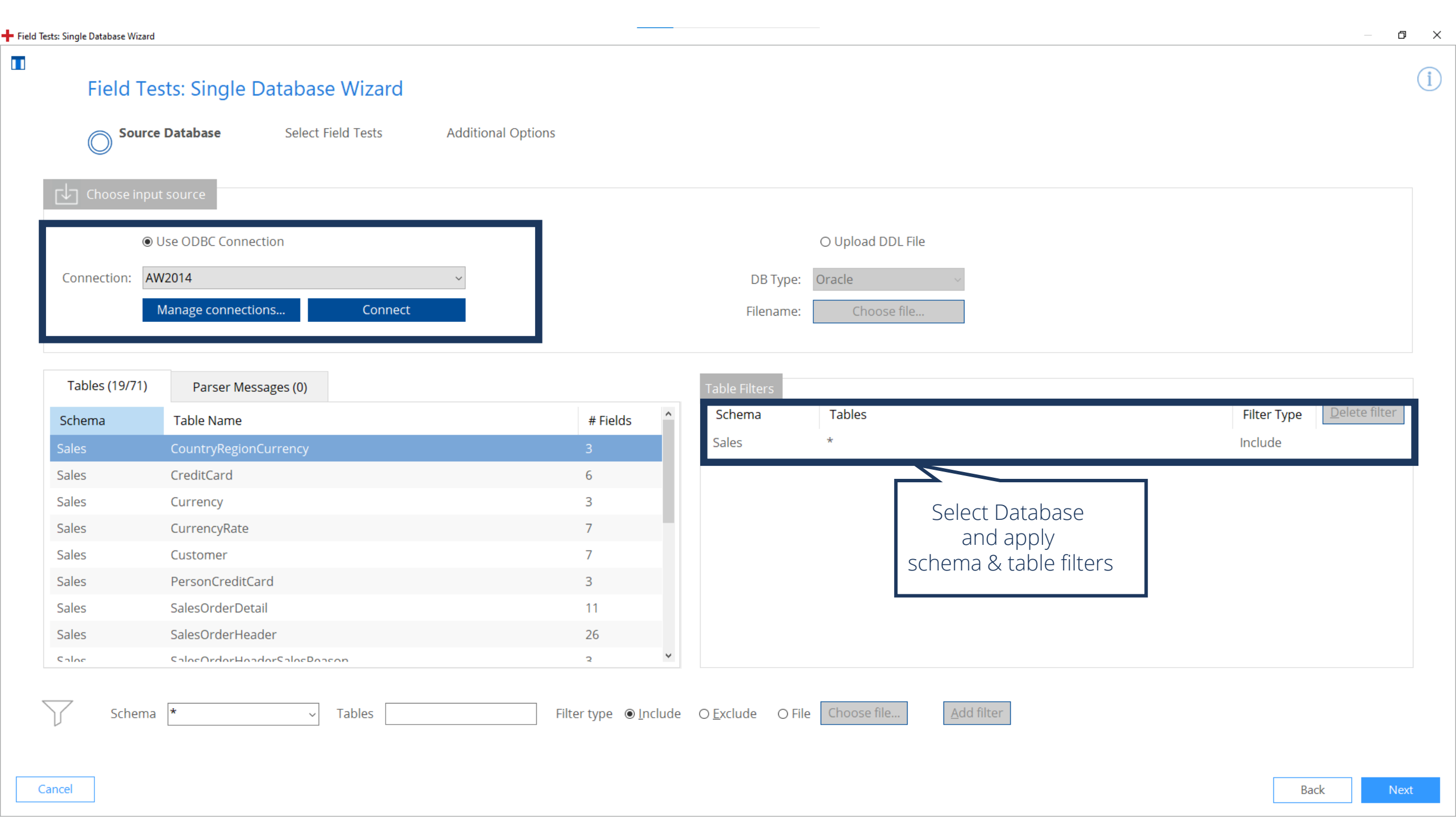
WHY TRICENTIS

- Improved scenario coverage to all identified use cases
- Automated validation to decrease manual overhead
- Increased identification of suspicious transactions across technical landscape and business verticals

Business Case Summary	Tricentis in the BI/DWH
Critical Checks Execution	70k validations in 15 min.
Potential Fines Avoided in 90 Days	$2,600,000
Identified Suspicions Transactions	1600% Increase

“We knew that automation was key for proactively ramping up our compliance … we just didn’t believe it was possible to automate something so complex. Now, we’re much more confident that threats are being identified and reported almost as soon as the transactions occur. “

- Director of Compliance


Field Tests: Single Database Wizard
Field Tests: Single Database Wizard
Source Database
Select Field Tests
Additional Options
Choose input source
Use ODBC Connection
Connection:
AW2014
Manage connections...
Connect
Upload DDL File
DB Type:
Oracle
Filename:
Choose file...
Tables (19/71)
Parser Messages (0)
Schema
Table Name
Fields
Sales CountryRegionCurrency 3
Sales CreditCard 6
Sales Currency 3
Sales CurrencyRate 7
Sales Customer 7
Sales PersonCreditCard 3
Sales SalesOrderDetail 11
Sales SalesOrderHeader 26
Table Filters
Schema
Tables
Filter Type
Delete filter
Sales
*
Include
Select Database
and apply
schema & table filters
Schema
*
Tables
Filter type
Include
Exclude
File
Choose file...
Add filter
Cancel
Back
Next

Field Tests: Single Database Wizard

Field Tests: Single Database Wizard

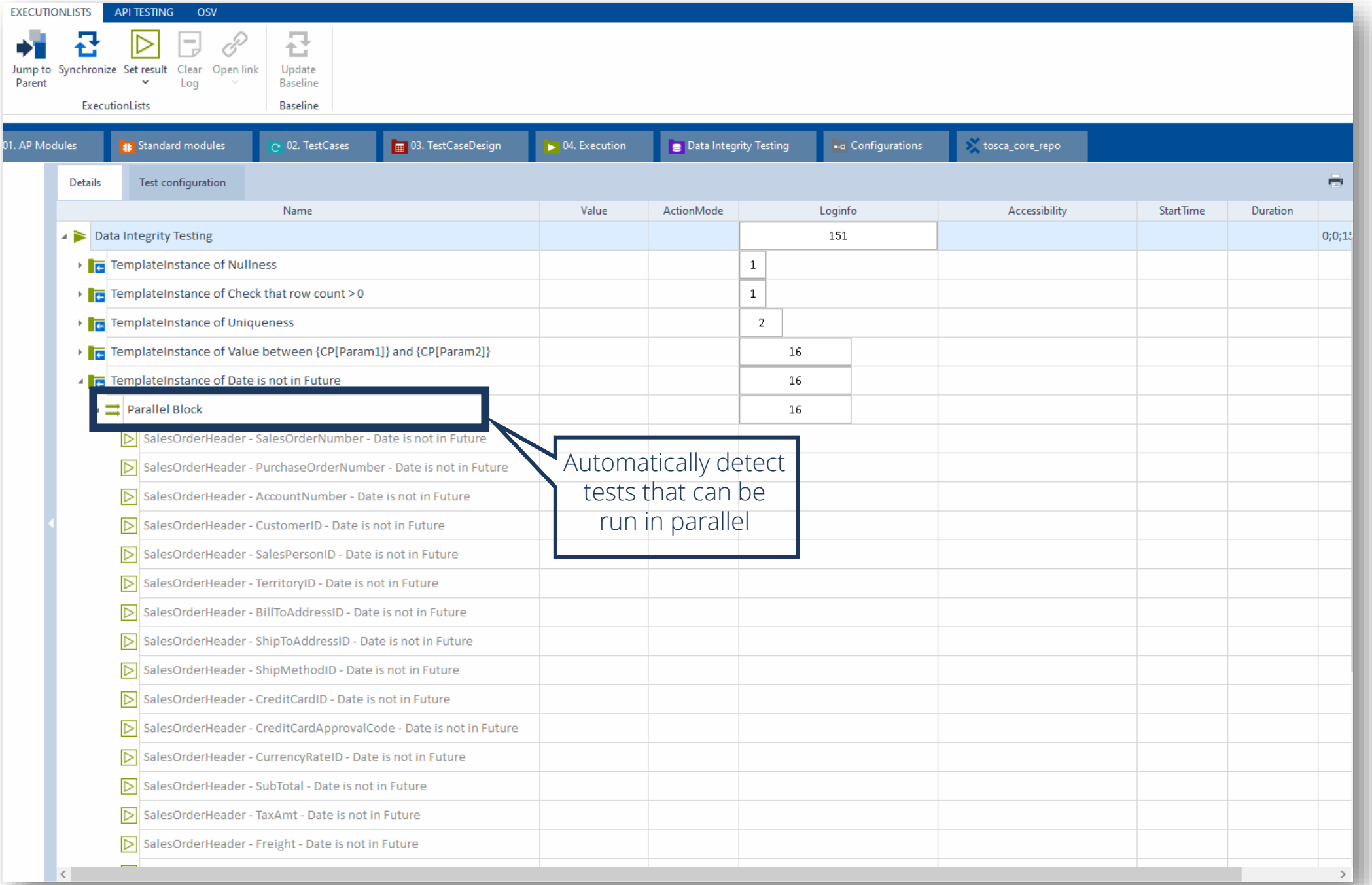
Source Database | **Select Field Tests** | Additional Options

Apply data templates across 100s of tables & columns in a few mouse clicks.

Column Chooser | Search Panel

Field	Type	Nullness	Uniqueness	Check that row count > 0	Date Valid	Value between 0 and 100	Value between {CP[Param1]} and {CP[Param2]}	Date is not in Future	Date greater than {CP[Param1]}	Sensor is Active	Sample: Valid CountryRegio... from hard coded list	Sample: Valid Currency Code dynamically sourced	Sample: Valid ProductID format	Sample: ProductID exists in master product table	SAP: Sales Order Header Currency vs Line Cuurency
▸ SalesOrderDetail															
◢ SalesOrderHeader															
SalesOrderID	int(10,0)	☑	☑	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
RevisionNumber	tinyint(3,0)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
OrderDate	datetime	☐	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
DueDate	datetime	☐	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
ShipDate	datetime	☐	☐	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Status	tinyint(3,0)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
OnlineOrderFlag	bit	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
SalesOrderNumber	nvarchar(25)	☐	☐	☐	☐	☐	☑	☑	☑	☑	☑	☑	☑	☑	☑
PurchaseOrderNumber	nvarchar(25)	☐	☐	☐	☐	☐	☑	☑	☑	☑	☑	☑	☑	☑	☑
AccountNumber	nvarchar(15)	☐	☐	☐	☐	☐	☑	☑	☑	☑	☑	☑	☑	☑	☑
CustomerID	int(10,0)	☐	☐	☐	☐	☐	☑	☑	☑	☑	☑	☑	☑	☑	☑
SalesPersonID	int(10,0)	☐	☐	☐	☐	☐	☑	☑	☑	☑	☑	☑	☑	☑	☑
TerritoryID	int(10,0)	☐	☐	☐	☐	☐	☑	☑	☑	☑	☑	☑	☑	☑	☑
BillToAddressID	int(10,0)	☐	☐	☐	☐	☐	☑	☑	☑	☑	☑	☑	☑	☑	☑
ShipToAddressID	int(10,0)	☐	☐	☐	☐	☐	☑	☑	☑	☑	☑	☑	☑	☑	☑
ShipMethodID	int(10,0)	☐	☐	☐	☐	☐	☑	☑	☑	☑	☑	☑	☑	☑	☑
CreditCardID	int(10,0)	☐	☐	☐	☐	☐	☑	☑	☑	☑	☑	☑	☑	☑	☑
CreditCardApprovalCode	varchar(15)	☐	☐	☐	☐	☐	☑	☑	☑	☑	☑	☑	☑	☑	☑
CurrencyRateID	int(10,0)	☐	☐	☐	☐	☐	☑	☑	☑	☑	☑	☑	☑	☑	☑
SubTotal	money(19,4)	☐	☐	☐	☐	☐	☑	☑	☑	☑	☑	☑	☑	☑	☑
TaxAmt	money(19,4)	☐	☐	☐	☐	☐	☑	☑	☑	☑	☑	☑	☑	☑	☑
Freight	money(19,4)	☐	☐	☐	☐	☐	☑	☑	☑	☑	☑	☑	☑	☑	☑
TotalDue	money(19,4)	☐	☐	☐	☐	☐	☑	☑	☑	☑	☑	☑	☑	☑	☑
Comment	nvarchar(128)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
rowguid	uniqueidentifier	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
ModifiedDate	datetime	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

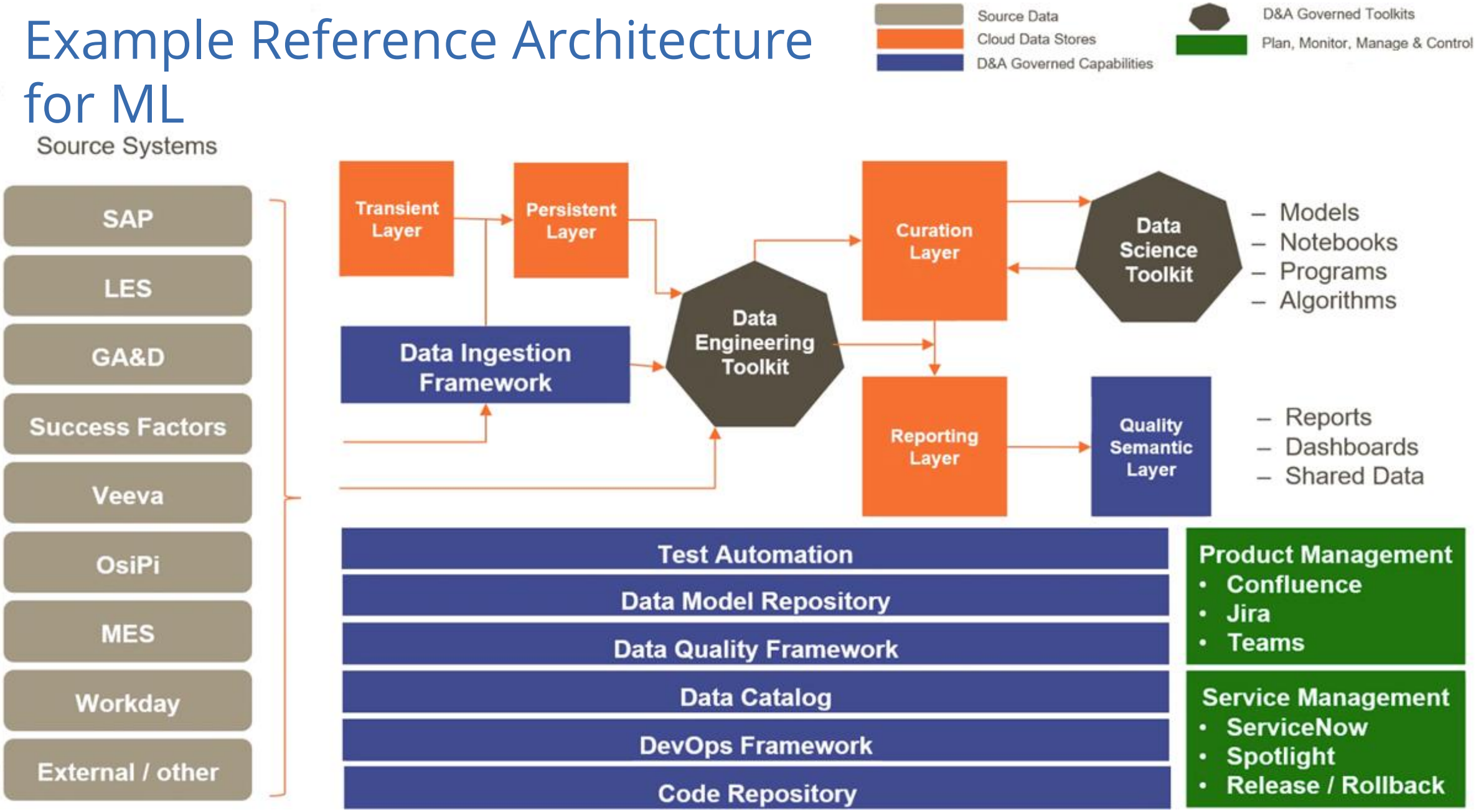
Cancel | Back | Next


EXECUTIONLISTS
API TESTING
OSV
Jump to Parent
Synchronize
Set result
Clear Log
Open link
Update Baseline
ExecutionLists
Baseline
01. AP Modules
Standard modules
02. TestCases
03. TestCaseDesign
04. Execution
Data Integrity Testing
Configurations
tosca_core_repo
Details
Test configuration
Name
Value
ActionMode
Loginfo
Accessibility
StartTime
Duration
Data Integrity Testing
151
TemplateInstance of Nullness
1
TemplateInstance of Check that row count > 0
1
TemplateInstance of Uniqueness
2
TemplateInstance of Value between {CP[Param1]} and {CP[Param2]}
16
TemplateInstance of Date is not in Future
16
Parallel Block
16
SalesOrderHeader - SalesOrderNumber - Date is not in Future
SalesOrderHeader - PurchaseOrderNumber - Date is not in Future
SalesOrderHeader - AccountNumber - Date is not in Future
SalesOrderHeader - CustomerID - Date is not in Future
SalesOrderHeader - SalesPersonID - Date is not in Future
SalesOrderHeader - TerritoryID - Date is not in Future
SalesOrderHeader - BillToAddressID - Date is not in Future
SalesOrderHeader - ShipToAddressID - Date is not in Future
SalesOrderHeader - ShipMethodID - Date is not in Future
SalesOrderHeader - CreditCardID - Date is not in Future
SalesOrderHeader - CreditCardApprovalCode - Date is not in Future
SalesOrderHeader - CurrencyRateID - Date is not in Future
SalesOrderHeader - SubTotal - Date is not in Future
SalesOrderHeader - TaxAmt - Date is not in Future
SalesOrderHeader - Freight - Date is not in Future
Automatically detect tests that can be run in parallel

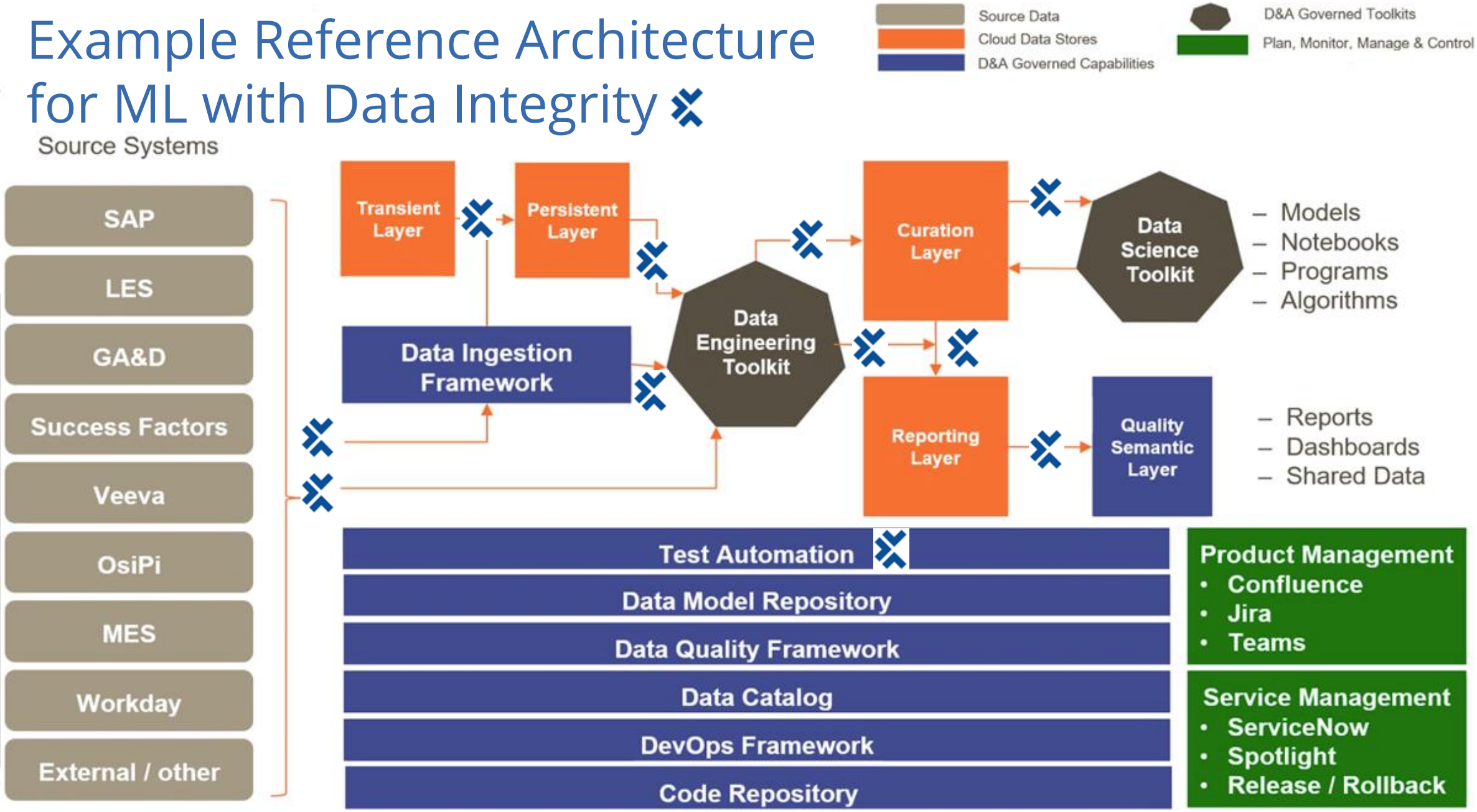
AI/ML Use Case

- Why Data Integrity?
  - AI/ML is driven by data. Curation of data for models and deployments is critical for success.
  - In an AI/ML process, the data passes through models that create code to support solutions. Trustworthy data is essential for AI/ML innovation.
- What is the business value?
  - Complex ecosystems must have end to end, automated and continuous observability into deployments and pipelines, promoting trust while enabling delivery with low risk.
  - AI/ML must learn from trusted and correct data. Effective use of machine learning depends on accuracy and completeness to support predictive AI tasks.

Example Reference Architecture for ML



Example Reference Architecture for ML with Data Integrity



AI Benefits

Achieve a trustworthy foundation with clean, fit-for-purpose data

Simple | Efficient | Cost-effective

Major areas for AI impacts on a business

1. Improving the customer experience
2. Employee productivity gains
3. **Optimized Business Operations**
   - **Data Migrations (required for new AI architectures)**
   - **Innovation**
   - **Compliance**

Optimized Business Operations Compliance

- AI Compliance Reporting
  - AML[2] & KYC
    - Anti-money laundering & Adversarial machine learning
    - Know your customer

Integrity of the Data in the Models

Includes:
1. Schema & Metadata checks
2. Parsing checks
3. Clean-label & backdoor poisoning

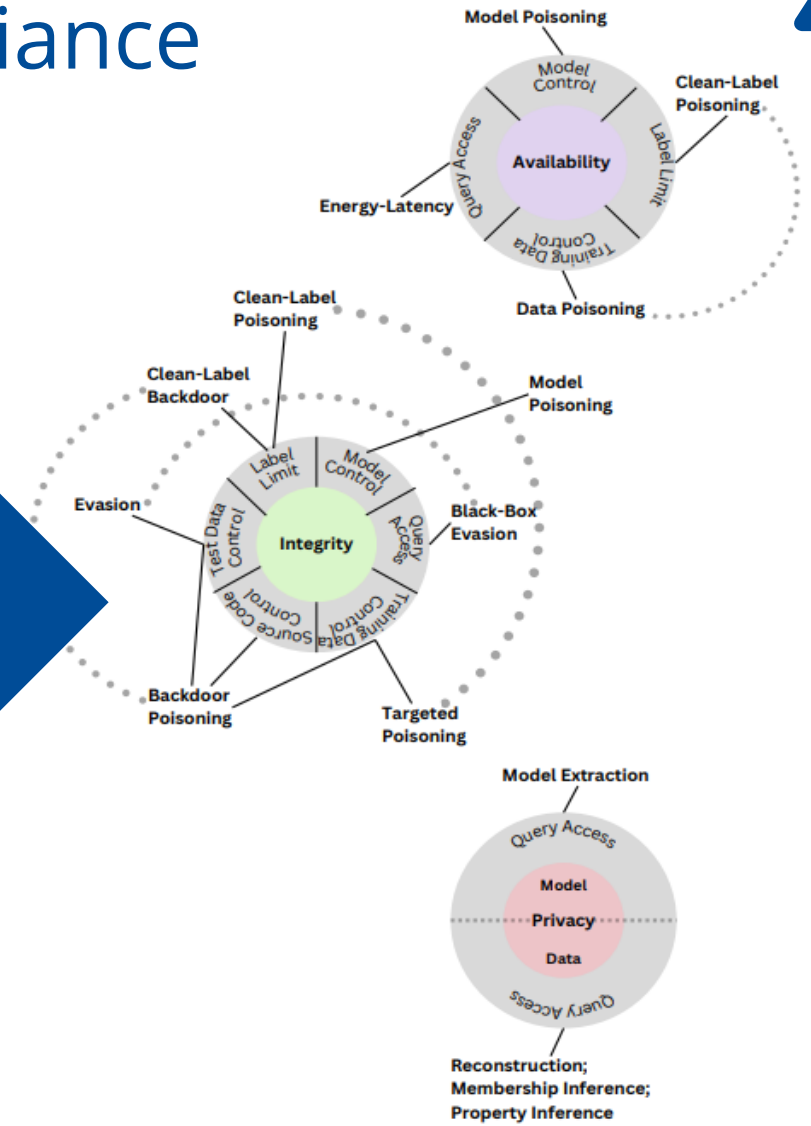


Figure 1. Taxonomy of attacks on Predictive AI systems.

NIST Trustworthy and Responsible AI NIST AI 100-2e2023 Diagram

Tricentis Data Integrity for AI/ML

Major Pharma (Vaccines Group)

- The Issue
  - ML models not leading innovation decisions correctly
    - Non-curated data used for model training & deployment
    - Bias was way off expectations
- Why
  - Small team checking the quality of supermassive datasets
  - Manually spot-checking data at each stage of process
- Solution
  - E2E Validation datasets along the entire were process expected, conforming and regression-checked
  - Automation achieved 90% data validation coverage
  - Continuous data test execution now embedded in AI/ML quality assurance
    - Azure | Databricks | PowerBI
- Results
  - Supporting market success for $1B Vaccine

Thank you

Please visit our booth for all the details and a Demo!