Net-Enabled Traffic Flow Management (TFM)

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FAA MOIE

MITRE Technology Program

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Problem

- An aging TFM platform cannot support the research and operational needs of the Next Generation Air Traffic System (NextGen)
- Applying a service oriented architecture (SOA) to National Airspace System (NAS) assets will be challenging for the FAA's System Wide Information Management (SWIM) program
- Advanced visualization techniques and integration of disparate TFM systems are needed to improve decision making and enhance situation awareness

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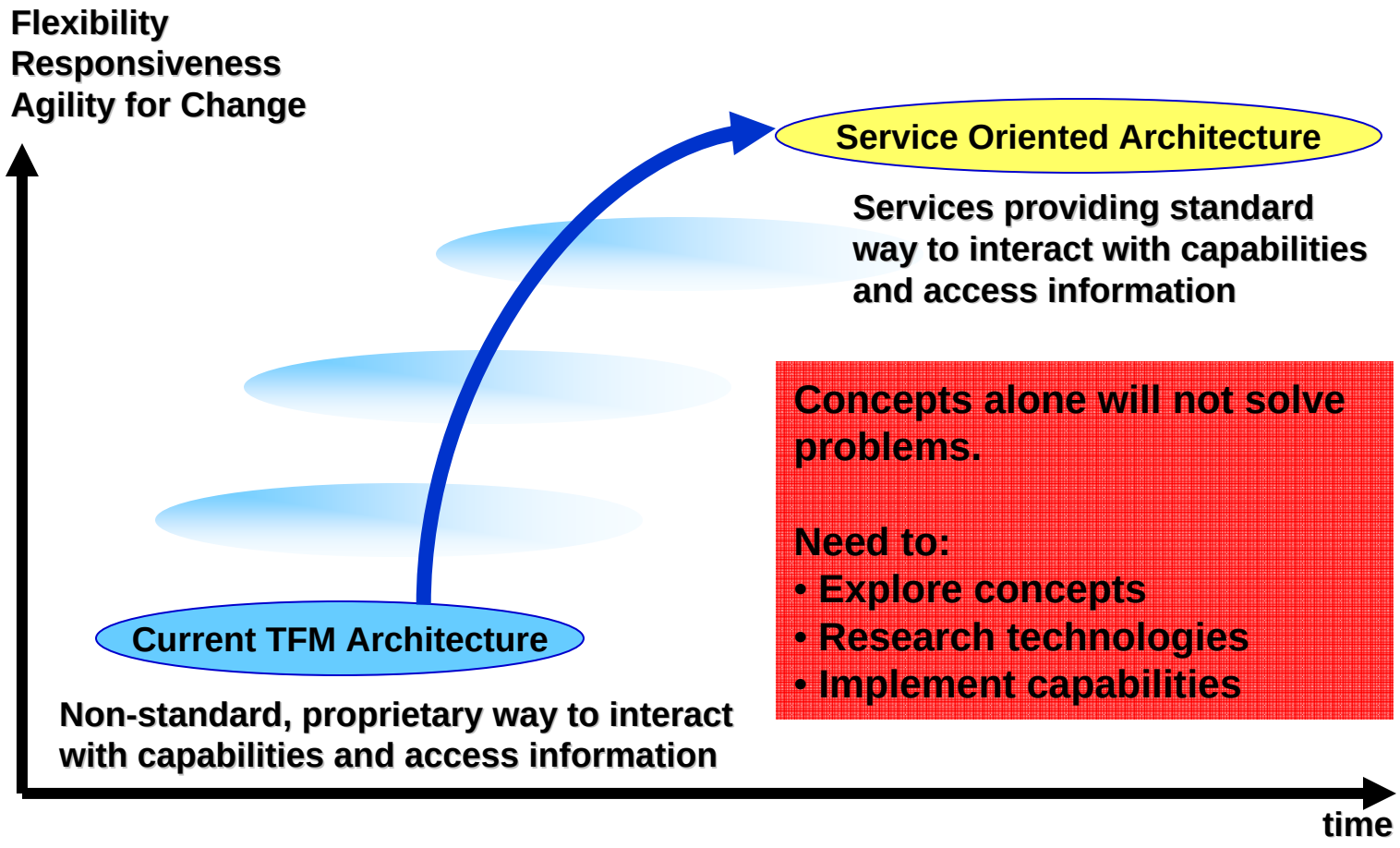
Background



Source: M. Halley, MITRE 2005 with Modifications for TFM MOIE

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Objectives

- A new, evolutionary TFM R&D infrastructure using SOA design principles and proposed SWIM technologies
- An understanding of SOA/SWIM technologies and how they can improve CAASD and FAA processes
- Insight into how advanced visualization techniques and SOA capabilities can enable better decision making

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Activities

- Determining requirements for CAASD's next-generation TFM research platform employing SOA principles and methodologies
- Surveying SOA technologies proposed for SWIM and providing a technology framework for the new TFM platform
- Prototyping SOA Web services including request/response and publish/subscribe to bring TFM and CAASD capabilities to bear
- Exploring advanced TFM visualization concepts and using SOA technologies and standards to access data and information

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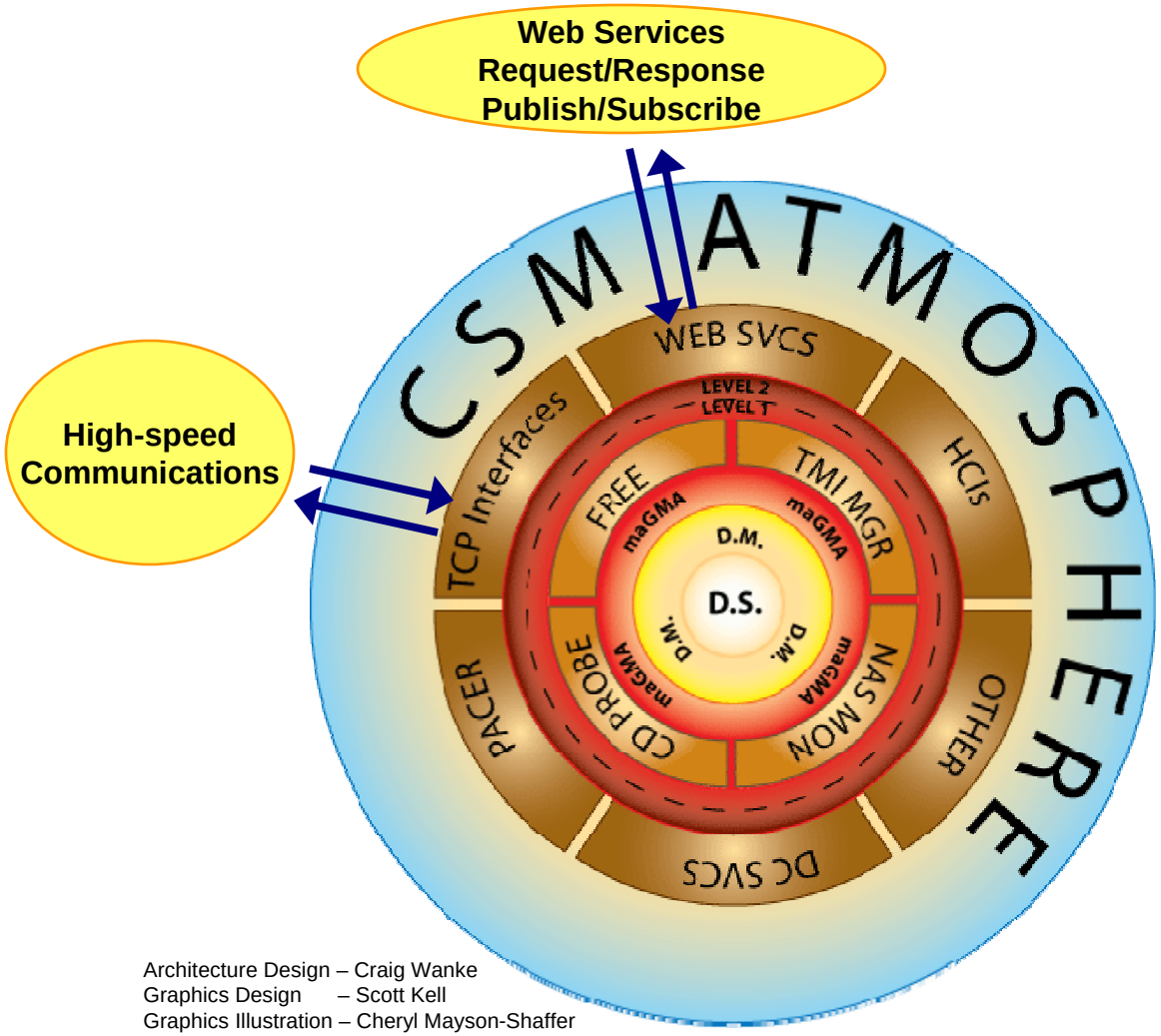
Highlight: TFM Core Design



Architecture Design – Craig Wanke
Graphics Design – Scott Kell
Graphics Illustration – Cheryl Mayson-Shaffer

LEGEND

- **CSM – Central Simulation Manager**
- **D.S. – Data Store**
- **D.M. – Data Manager**
- **DC SVCS – Data Collection Services**
- **HCI – Human-Computer Interface**
- **maGMA – (most awesome) Generic Message Adapter**
- **FREE – Track & Trajectory Modeler**
- **TMI MGR – Traffic Management Initiative Manager**
- **CD – Conflict Detection**
- **NAS MON – NAS Monitor**

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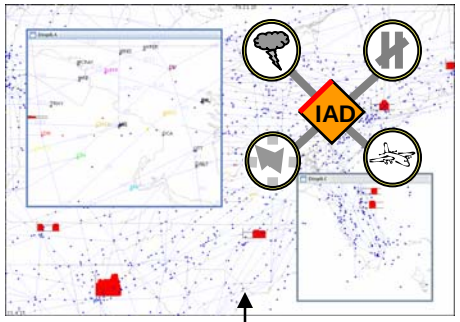
Demonstration

Prototype Environment



Service Execution
XML Conversion
SOAP Header Addition

Legacy TFM Process

Track Data Interface

XML
TCP

Web App. Servers

Writes to Producer

P/S

Publishes to Consumer

SOAP/HTTP

Web App. Server

P/S

Forwards to Subscriber

Advanced TFM Visualization Service Consumer

DATA

Weather Data Interface

Executes

Returns

R/R

DATA

Adaptation Data Interface

Executes

Returns

R/R

SOAP/HTTP

Service Subscription
Service Request
Response Processing

P/S – Publish/Subscribe
R/R – Request/Response

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Impacts

- By exploring and developing a net-enabled framework of simulation and visualization capabilities for TFM using SOA technologies, we will:
  - Lay the foundation for a more agile, efficient architecture framework for meeting the needs of NextGen-era TFM research
  - Strengthen the ability to conduct research through rapid integration of information and capabilities exposed by means of SOA technologies and Web service standards
  - Build experience and knowledge base of how SOA/SWIM technologies may be applied to FAA processes

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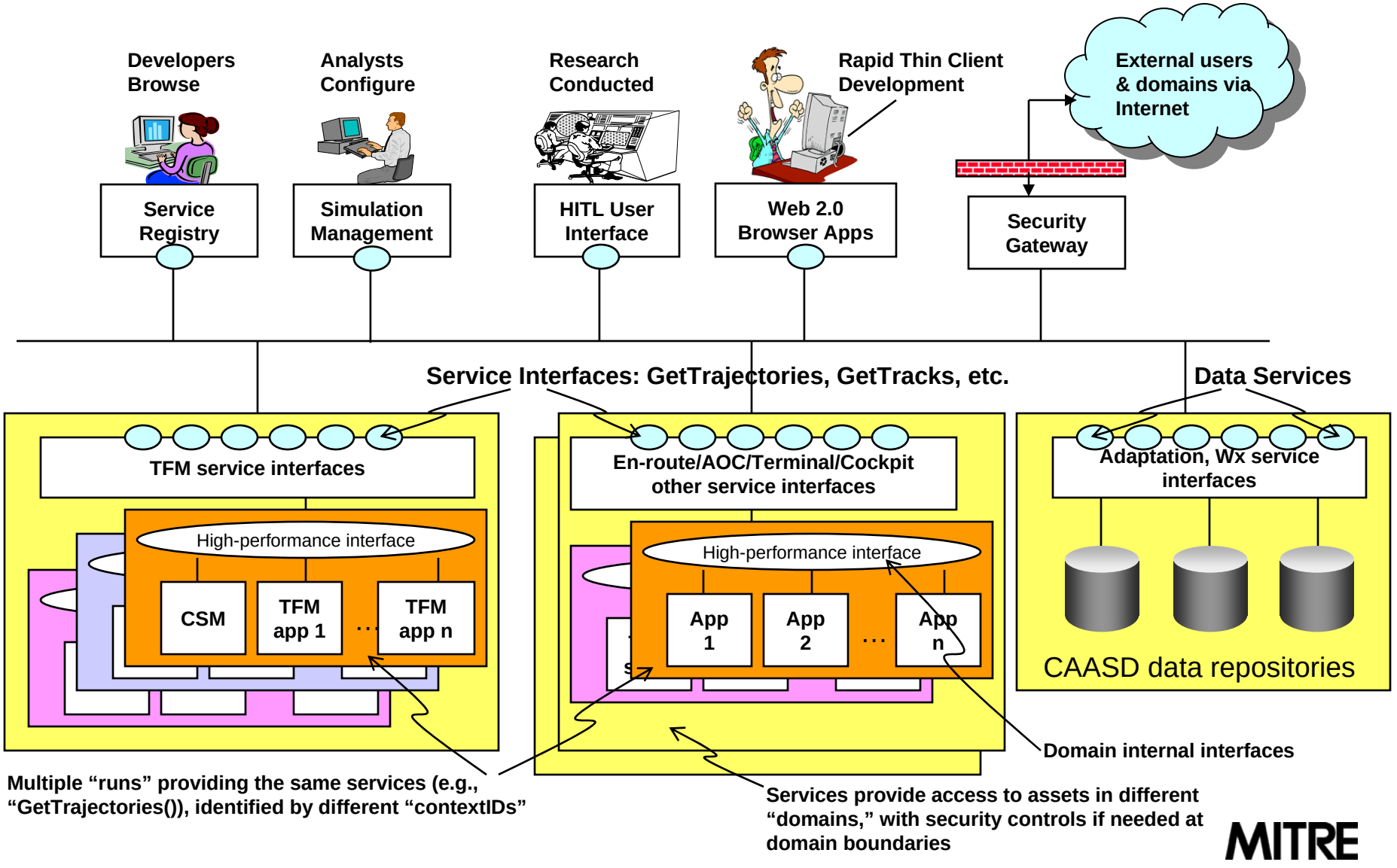
Future Plans: Beyond TFM



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