Navigating Process Improvement: IDEF0 Maps with DEA Compasses

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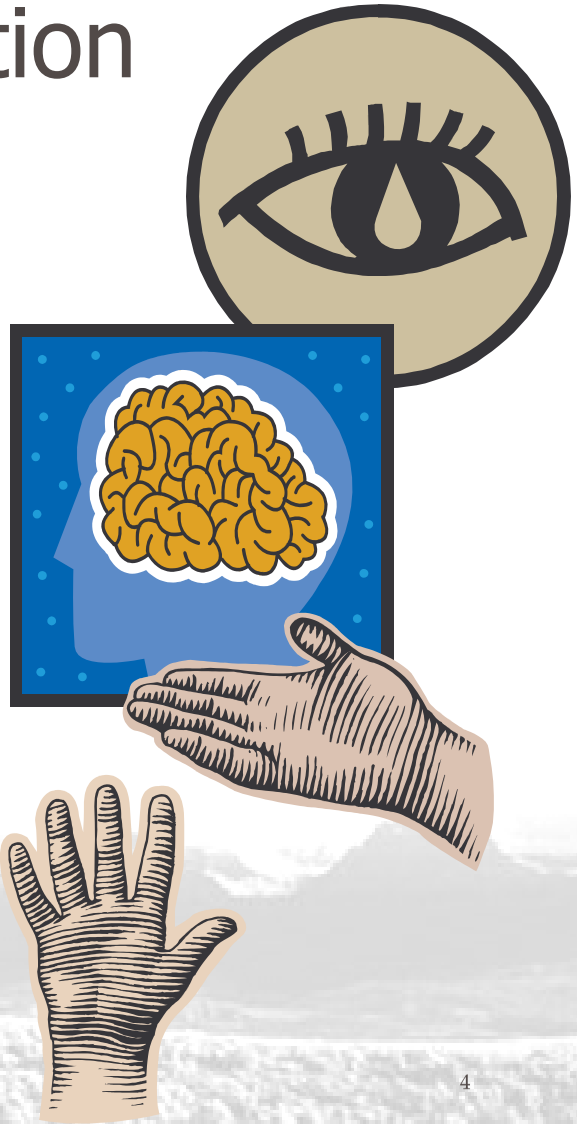
Overview

- Introduction
  - Business Process Improvement
  - Data Envelope Analysis
- Integrated DEFinition [IDEF0] Process Mapping
- Mapping IDEF0 Described Processes to DEA Models
- Implementing the EFFORT System
  - EFficiency Frontier Orientated Review Technique
- Conclusions

Introduction

- Business Process Improvement
  - Two ways to increase productivity
    - Improvement of Production
    - Improvement of Process
- Most efforts concentrate on improvement of production, without reflection on the process being used to produce
  - "You will never win the Daytona 500 with a Ford Pinto, regardless of the quality of your driver or pit crew"
- Identification of Improved Processes has been difficult

- Management Levels of Action
  - Eye
    - Visionary Management
  - Head
    - Intelligent Analytics
  - Hands
    - Guiding Supervision
  - Fingers
    - Nimble Production



Introduction

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- Data Envelope Analysis
  - Provides the Intelligent Analytics
  - Allows comparison of "technology" (i.e. Process Architectures)
  - Provides a means to ID Improved Processes
    - Also a way to identify improvable process
    - And give guidance on how to improve them!!!
  - Requires a model…

Integrated DEFinition [IDEF0] Process Mapping

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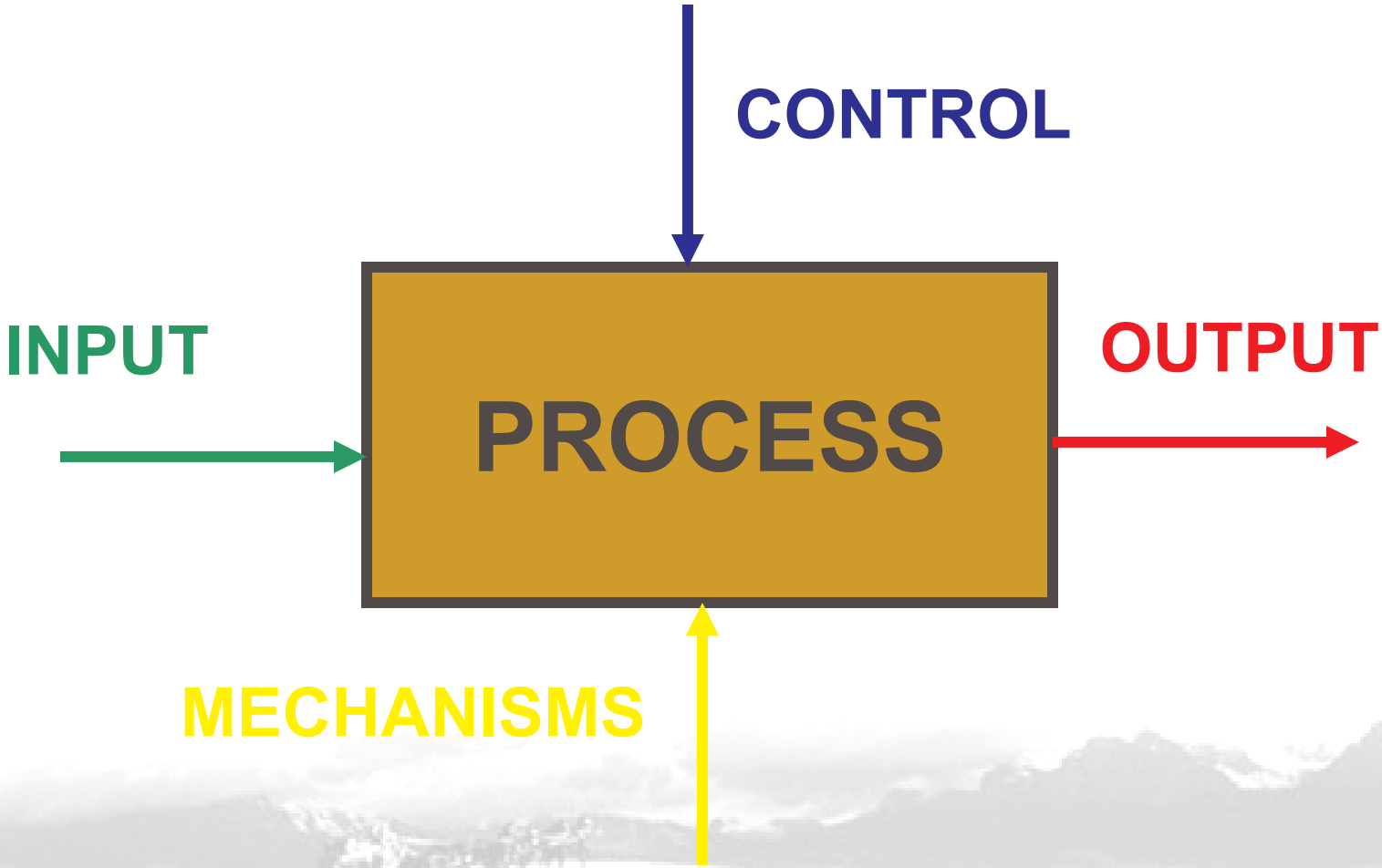
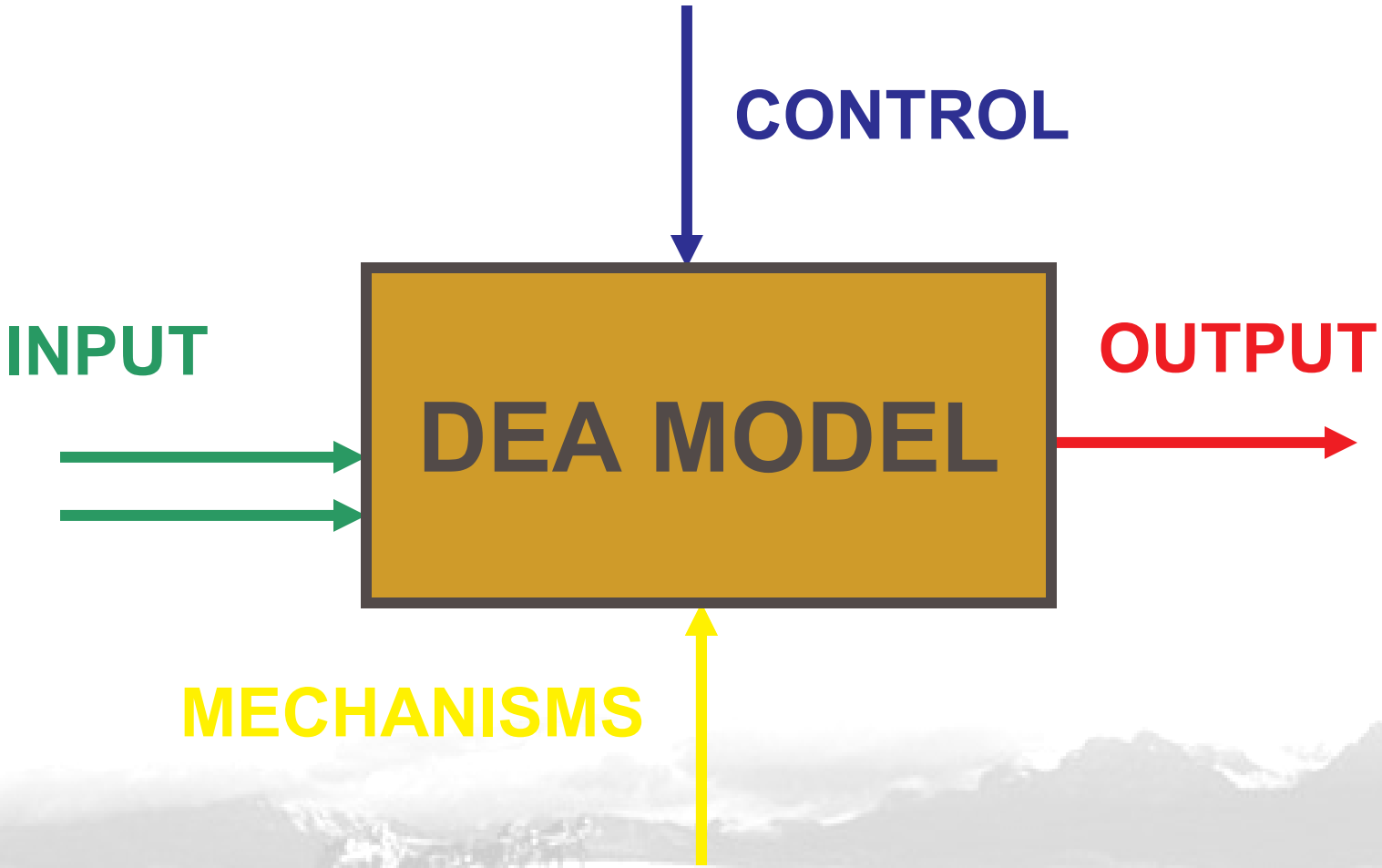
- 1993 NIST Standard
- Designed to model the decisions, actions, and activities of an organization or system
- Derived from a well-established graphical language, the Structured Analysis and Design Technique (SADT)
- Basic Concepts
  - **Cell Modeling Graphic Representation**
    - "Box and arrow" graphics show the function as a box
    - Interfaces to or from as arrows entering or leaving the box
      - "Constraining" when and how operations are triggered and controlled
    - Function Expression is performed by boxes operating simultaneously with other boxes
  - **Communication**
    - English text labels to describe boxes and arrows
    - Gradual exposition of detail featuring a hierarchical structure
  - **Key Elements of Rigor and Precision**
    - Control of the details communicated at each level
    - Bounded Context (no omissions or additional out-of-scope detail)
    - Unique Labels and Titles (no duplicated names)
    - Syntax Rules for Graphics (boxes and arrows)
    - Input versus Control Separation (a rule for determining the role of data)
    - Minimum Control of Function (all functions require at least one control)
    - Purpose and Viewpoint (all models have a purpose and viewpoint statement).
  - **Organization versus Function**
    - Separation of organization from the function is included in the purpose of the model and carried out by the selection of functions and interface names during model development.
  - **Sequence and Timing Independence**
    - Activities can be described by their inputs, outputs, controls, and mechanisms (ICOMs).

Integrated DEFinition [IDEF0] Process Mapping



Mapping IDEF0 Described Processes to DEA Models

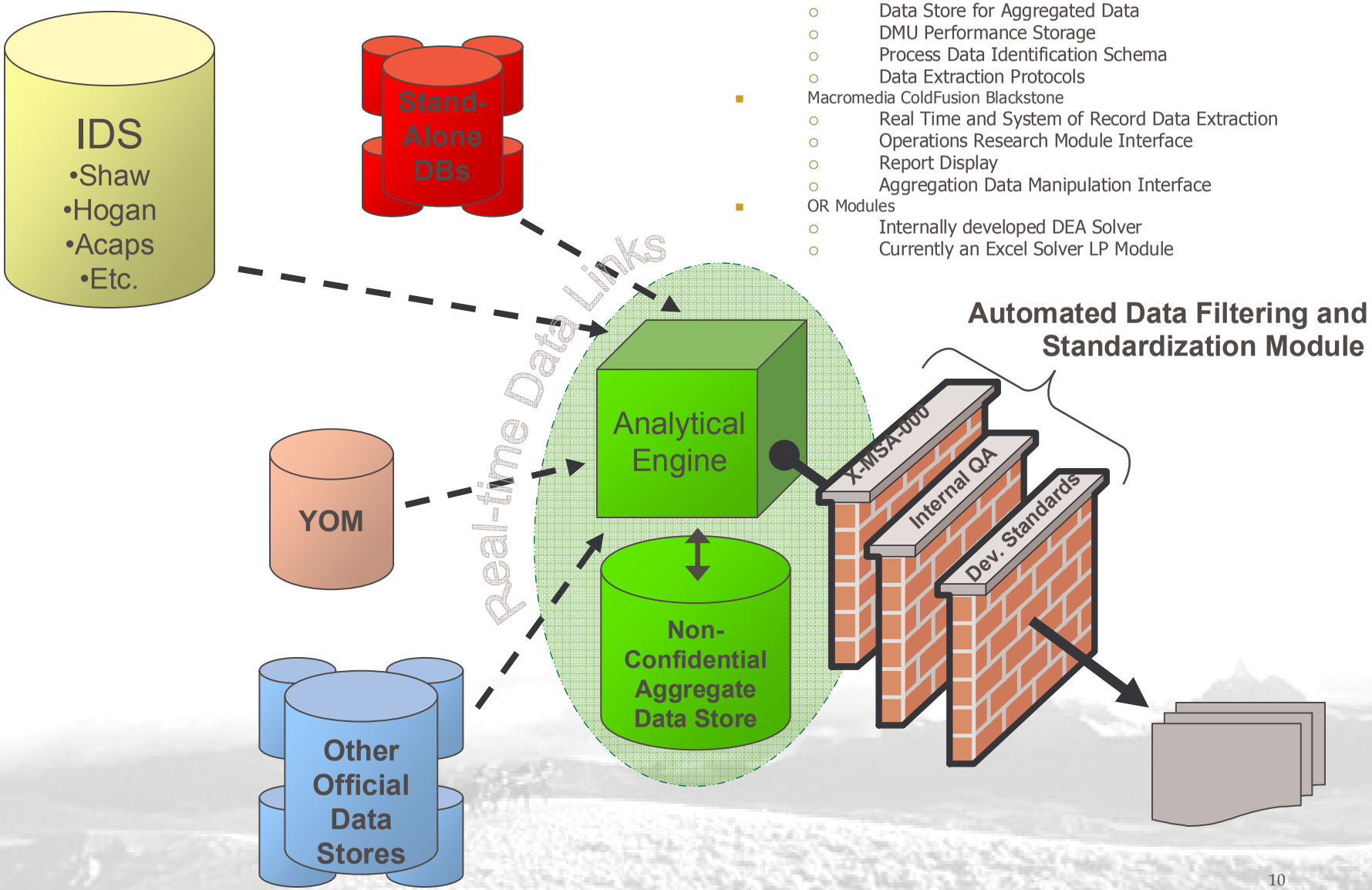


Implementing the EFFORT System

- EFficiency Frontier Orientated Review Technique
  - Implemented system within Collections Servicing at Wells Fargo
- System Architecture
- Management Interface
- DEA Module
- Management Usage

EFFORT System Architecture

- 4TB SQL Server 2003
  - Data Store for Aggregated Data
  - DMU Performance Storage
  - Process Data Identification Schema
  - Data Extraction Protocols
- Macromedia ColdFusion Blackstone
  - Real Time and System of Record Data Extraction
  - Operations Research Module Interface
  - Report Display
  - Aggregation Data Manipulation Interface
- OR Modules
  - Internally developed DEA Solver
  - Currently an Excel Solver LP Module



EFFORT System Architecture

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- Monitors Multiple Critical Processes under Consideration
- Monitors each process on weekly basis
  - Each week is examined as a DMU for that process
  - One year (52 weeks) of history is held
  - Efficiencies depending on the stated form are determined each time period
- Each process has (after 52 week warm up)
  - 1352 (52x52/2) managerial measurement points

EFFORT – Management Interface

- Each process metric is mapped to relevant data fields for ongoing extraction
- Decision is made on Input/Output Orientation
- Default to VRS model unless justifiable to change
- Process data extraction query is coded and attributes of which orientation and RTS model are stored
- Every week data is extracted and DEA model is evaluated for each process and results stored for future reporting and analysis

EFFORT – DEA Module

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- Since at any one evaluation cycle for a process we are only working with 52 DMUs Excel's internal solver is adequate
- Three Sheets
  - Input sheet
  - DEA Analysis Sheet
  - Output sheet
- ColdFusion
  - Feeds extracted data into DMU space
  - Loads Flags for RTS and Orientation Characteristics
  - Sends COM code to initiate Solver
  - Extracts Efficiency Results and stores on SQL Server

EFFORT – Management Usage

- After analysis is complete ColdFusion then provides mechanism to report results for management analysis for a given process or set of processes

EFFORT – Management Usage

- Example output for a process

Process: Foreclosure Preparations

Processing Unit in Effect	Week Ending: 10-Nov	3-Nov	27-Oct	20-Oct	13-Oct	6-Oct	29-Sep	22-Sep	15-Sep	8-Sep	1-Sep	25-Aug	18-Aug	11-Aug	4-Aug	28-Jul	21-Jul	14-Jul	7-Jul	30-Jun	23-Jun	16-Jun	[illegible]	[illegible]	[illegible]
10-Nov	100%																								
3-Nov	39%	97%																							
27-Oct	100%	100%	100%																						
20-Oct	90%	90%	90%	90%																					
13-Oct	40%	48%	48%	54%	54%																				
6-Oct	100%	100%	100%	100%	100%	100%																			
29-Sep	27%	85%	85%	85%	85%	85%	85%																		
22-Sep	100%	100%	100%	100%	100%	100%	100%	100%																	
15-Sep	35%	83%	100%	100%	100%	100%	100%	100%	100%																
8-Sep	71%	71%	71%	71%	71%	92%	92%	92%	92%	97%															
1-Sep	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%														
25-Aug	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%													
18-Aug	40%	80%	96%	96%	96%	96%	96%	100%	100%	100%	100%	100%	100%												
11-Aug	84%	84%	84%	84%	84%	91%	91%	100%	100%	100%	100%	100%	100%	100%											
4-Aug	82%	82%	82%	82%	82%	82%	82%	82%	82%	82%	82%	82%	82%	84%	84%										
28-Jul	39%	39%	39%	47%	78%	86%	86%	86%	90%	90%	90%	100%	100%	100%	100%	100%									
21-Jul	48%	51%	51%	53%	71%	71%	71%	82%	82%	82%	86%	86%	86%	86%	86%	86%	86%								
14-Jul	96%	96%	96%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%							
7-Jul	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%						
30-Jun	70%	86%	86%	93%	93%	93%	93%	93%	93%	93%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%					
23-Jun	83%	83%	83%	83%	83%	83%	84%	84%	84%	84%	84%	84%	84%	84%	84%	84%	84%	84%	84%	84%	84%				
16-Jun	45%	45%	45%	45%	45%	66%	66%	68%	94%	94%	94%	94%	94%	94%	94%	94%	94%	94%	94%	94%	94%	94%			
9-Jun	97%	97%	97%	97%	97%	97%	97%	97%	97%	97%	97%	97%	97%	97%	97%	97%	97%	97%	97%	97%	97%	97%			
2-Jun	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%			
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- **Data is sample, synthesized results for illustrative purposes.**
- **No Wells Fargo performance data is displayed, nor should the above data to be taken as indicative of any process performance within Wells Fargo, N.A.**

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- Current Typical Usages
  - Evaluation of Current Process
  - Evaluation of Trends
  - Identification of Control or IT based Mechanism Changes
  - Identification of Prior Best Practices

Conclusions

- DEA provides a critical framework for identification of both efficient processes, as well as those needing improvement
- DEA also provides guidance in how processes should be changed
- IDEF0 mapped processes provide a rich means for implementation of DEA on other business processes without need for lengthy model development
- DEA results are applicable to real-world problems and can be an integral part of a service operations management intelligence suite

Questions

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Questions