# Chapter XXIII
# A Data-Centric Design Methodology for Business Processes

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## ABSTRACT

*This chapter describes a design methodology for business processes and workflows that focuses first on "business artifacts", which represent key (real or conceptual) business entities, including both the business-relevant data about them and their macro-level lifecycles. Individual workflow services (a.k.a. tasks) are then incorporated, by specifying how they operate on the artifacts and fit into their lifecycles. The resulting workflow is specified in a particular artifact-centric workflow model, which is introduced using an extended example. At the logical level this workflow model is largely declarative, in contrast with most traditional workflow models which are procedural and/or graph-based. The chapter includes a discussion of how the declarative, artifact-centric workflow specification can be mapped into an optimized physical realization.*

# 1.  INTRODUCTION

Most traditional workflow models are based on a procedural and/or graph-based paradigm for specifying how a business process or workflow is supposed to operate, and methodologies to design workflows in those models are typically founded on a process-centric perspective. This chapter describes a fundamentally different approach to workflow design, which is founded on a data-centric perspective, and which is especially useful for designing the detailed operation of business processes for enterprises in the modern era. The first major step in this data-centric approach is to identify the "business artifacts", which correspond to key (real or conceptual) business entities that are to be managed by the workflow. Examples include sales invoices, insurance claims, shipments, financing "deals", and customers. A business artifact includes both business-relevant data about the business entity, along with information about the macro-level lifecycle that the entity moves through, including the key stages of the processing of the entity and how they are or might be sequenced. The second major step is to develop a detailed logical specification of the data needed about each class of artifacts, the services (a.k.a. tasks) that will operate on the artifacts, and the associations between the services and the artifacts. In contrast with most workflow models used in industry today, the services and associations are described in a declarative manner, using pre-conditions and conditional effects for the services and Event-Condition-Action (ECA) rules for the associations. The third and final major step is to map the declarative workflow specification into a more procedural specification, which can be optimized and then mapped into a physical implementation. In addition to describing the data-centric design methodology, this chapter describes an artifact-centric workflow model which can be used as the target for data-centric workflow design activities.   A business process is a set of (typically linked) activities executed by various stakeholders to provide value to a customer without exposing the customer to the costs and risks involved in delivering value. With enterprises of today shifting their business strategies from the more traditional product focus to a customer focus, it is important to be specific about how to organize business operations to deliver business value and enable growth. Business processes are a means to operationalize a business strategy and have become an important aspect of gaining the leading edge in the market place over competitors. Business processes are thereby a key element of an enterprise's "survival kit" and a lever to ensure growth and most importantly, outperform competitors.

Business process modeling is the act of representing a business process in a format (often a graphical representation) that can be used to communicate the intent of a process to different business stakeholders. The level of detail included in a business process model is determined by how the model is being used. For example, providing guidance about process execution may only require a step-by-step description whereas using a business process model as a driver for implementing a complete workflow may require a much greater level of detail.

Using process models as a driver for implementing workflow systems that will support business process execution poses significant design challenges. In most current approaches, activity-flows are designed to specify the how processing is organized. Data is incorporated, but usually at a limited level that focuses on the inputs and outputs of individual services. As a result, it is hard to obtain an understanding of the overall possible effects of the overall sequence of processing steps on key business entities. In contrast, data modeling is a crucial aspect of virtually all software design approaches. The emerging "business artifact" paradigm described in this chapter gives data a foundational role in the context of business process design. In particular, the notion of business artifact introduces data as

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