Achieving application coordination with business transaction management software

A Choreology white paper

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Evolving beyond 'build, inspect and fix'

New technology has always been a key enabler for reducing inefficiencies in the way organizations do business. In recent years technology that addresses the management of business processes has been a popular target for investment, but because these processes are too often managed in isolation, organizations have not achieved the projected benefits. One way to address this problem is to consider technology that coordinates processes and the systems they involve, thus ensuring consistent business results.

In many industries, the elements of a business process, or a party and its counterpart, use systems that are designed around the 'hope for the best' principle. Similar to a 1970s auto plant, the approach is 'build, inspect and fix'.

The main flow of work or interaction is followed by a process or procedure that catches inconsistencies after the event. For example, in the context of securities trade processing it is very common to carry out end-of-day batch reconciliation runs to ensure that trade or trade-reference data has reached the designated set of systems. This ensures that the flow towards ultimate clearing and settlement can proceed. When failures or breaks in consistency are discovered, these are recorded (in a fail queue, for example), and then presented by a secondary repair system on a work-list to a person in the department responsible for fixing the problem.

> *"Choreology's Cohesions 1.0 is the first product to make application coordination a reality in today's heterogeneous enterprise."*
>
> *Alastair Green*
> *CEO, Choreology*

Many organizations are aware that the 'inspect and fix' approach can be very expensive, particularly when processes and interactions involve complex, high-value transactions. Inconsistent business results create massive costs and inconveniences, and can damage customer relations and business reputation. Examples include:

- Cost of identifying and repairing failures in securities trade processing resulting from inconsistent reference data or partial propagation of trade data;
- Failure to accurately provision multi-element services in a communications or network grid;
- Failure to correctly allocate or settle revenues and payments between multiple back-end providers;
- Inability to create reliable, easily-controlled multi-level supply chain orders, leading to manufacturing or delivery delays.

What is needed is an intra-day, reliable and coordinated approach to integration that delivers and ensures consistent results across all systems and processes. Technology based on such an approach should be 'composable' so that different coordination rules can be combined to quickly develop new service offerings. This helps organizations build software solutions that implement and facilitate business relationships, inside and across the firewall.

Transaction models for application co-ordination

Application coordination technology, such as Cohesions 1.0™ from Choreology®, can be used to solve the problem of inconsistent business results and achieve well-synchronized business processes. It deals with cross-process, cross-service linkage and integration. But crucially this is done at the application level rather than at the data-store level. This means it is more suitable for loosely coupled environments where systems belong to different processes, departments or organizations. Such environments often use very disparate technology, and frequently use incompatible standards, or fail to implement the relevant ones.

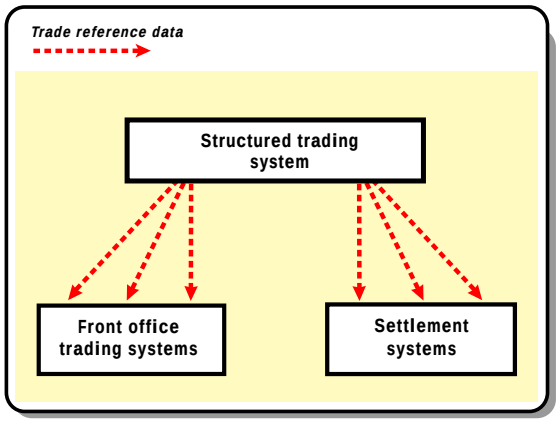
The main purpose of an application coordination product is to ease, cheapen and standardize the elimination of inconsistencies in information held in different systems.

We have identified four key patterns or models where application coordination is applicable. A solution that provides application coordination can be used in any industry, but for the sake of illustrating the potential in a complex environment, the examples of the following models focus on the financial services industry:

1. Coordinated dispersal of information

Under this model, business information is propagated or dispersed on an 'all, some, or nothing' basis. The dispersing system knows the exact outcome of processing by each recipient and business rules determine viable outcomes, enabling partially correct results.

Figure 1: **Information replication**



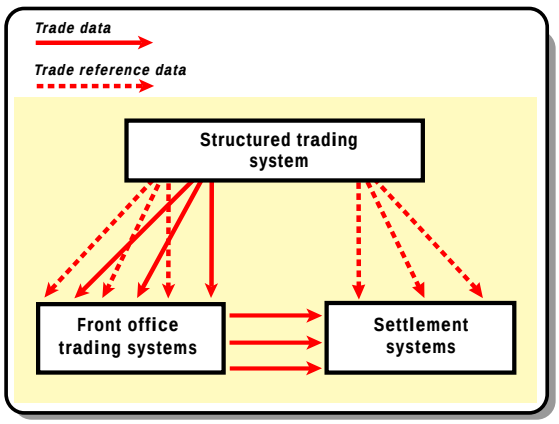
A good example is the propagation of trade reference data such as counterparty information for a structured trade (see figure 1). This static data can be fed through from front office to settlement systems to avoid downstream fails when the trade is processed. Propagation is coordinated and because the outcome is monitored there is an opportunity for intra-day repair.

The downstream systems are participants in the business transaction. If one of these systems cancels a transaction, because it already has the correct counter-party code and has been sent the wrong one, the controller identifies the problem and cancels the whole business transaction. A new business transaction is then originated with the existing counter-party code. This simple case of data propagation illustrates the potential to gain a new level of information about the state of participant systems.

2. Creating synchronization barriers

In this model, complex, coordinated action is contingent on the result of a prior coordinated action. Following the same example in the previous model, an organization ideally won't propagate trade data throughout the front office and settlement systems until all of the reference data has been coordinated and checked throughout the system (see figure 2).

Figure 2: **Synchronization of contingent actions**

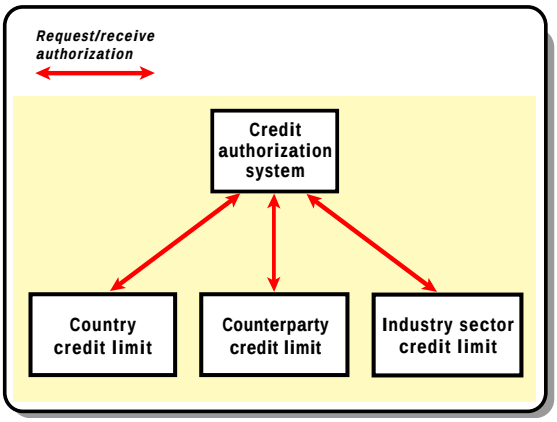


This is particularly important for groups of trades, such as structured products, trades with hedge or back-to-back trades. A synchronization barrier such as this ensures consistency within each system, removing the risk of partially impacting both payment and risk processes. It also reduces the number of trades in the various fail queues.

3. Coordinated aggregation

This is can also be thought of as the escrow model and appears frequently in credit check or payment-against-delivery processes. It involves obtaining information or commitments that build up to a coherent outcome. The receiving system and sending service both know information has been delivered, and the receiving system uses business rules to determine viable aggregations.

Figure 3: **Coherent information aggregation**



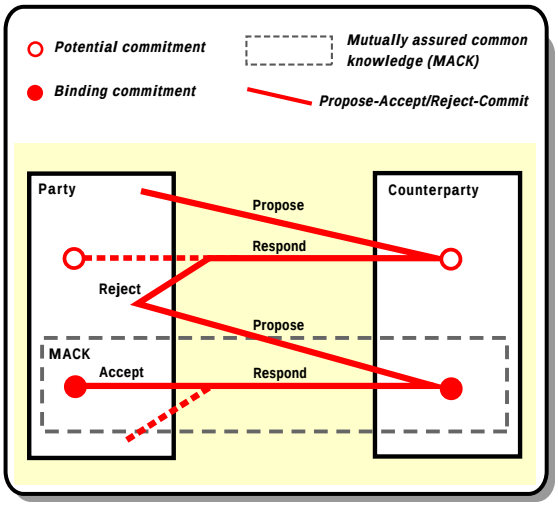
A typical example is gathering multiple credit authorizations prior to line draw down (see figure 3). Counterparty, country, industry-sector and cross-border limits can be applied before triggering credit. Provisional authorizations cause reversible reserves to be allocated against limits, while aggregate authorization triggers firming of reserve allocations.

4. Coordinated creation of binding contracts

This pattern is used for negotiation leading to a deal being struck. Other uses include the sending and acceptance of confirmations. Many trading protocols and information exchanges follow this fundamental pattern.

Acceptance of an offer creates a binding commitment – the parties are bound to deal and acknowledge involvement. Rejection induces counterproposal or re-proposal. Any outcome is common knowledge, and is mutually assured by comparable records (see figure 4). Examples include quote or offer-driven trading in the securities industry or purchasing via online B2B portals.

Figure 4: **Propose-Accept/Reject-Commit**



The Choreology solution

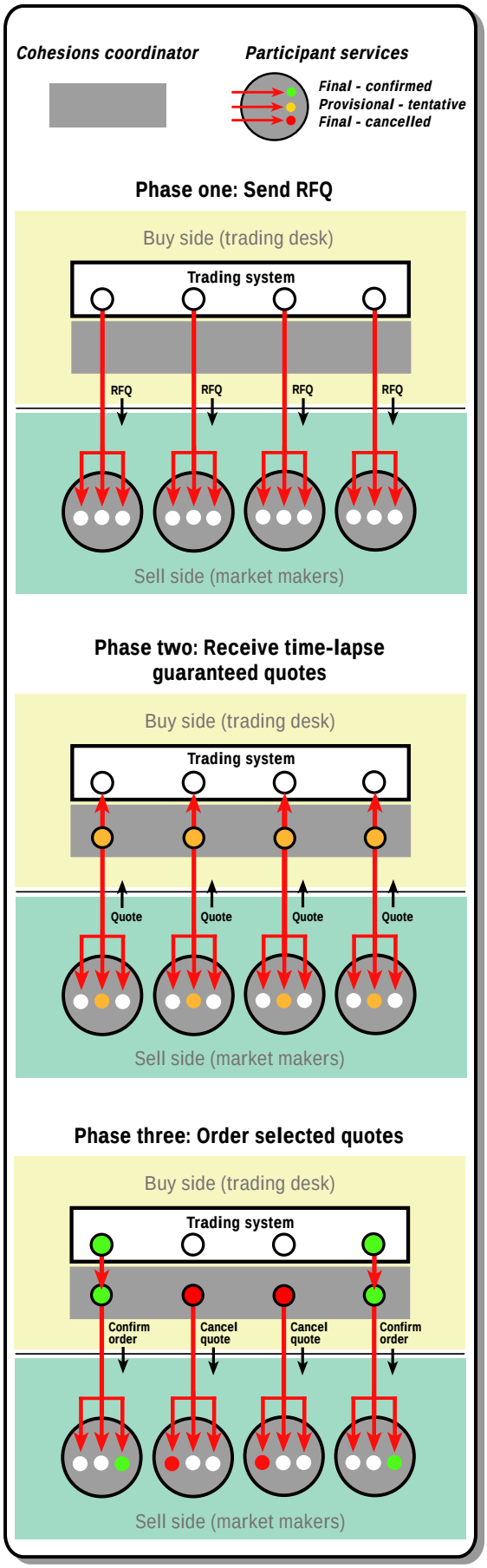
Cohesions 1.0™ helps eliminate costly discrepancies and inconsistencies in related pieces of information, enabling business services to be created that reliably combine and hide multiple transactional systems. The solution enables organizations to tie the outcome of one event to others and provide for partial or complete rollback. It also gives you immediate information about the failure of an event.

The systems that are coordinated by our product may be owned by the same organization, or split between a party and its counterparties, either point-to-point, or using a hub.

Because coordination takes place at the level of the application service, the product is designed to fit into the heterogeneous environment of large enterprises, where different platforms, languages, containers and distribution mechanisms are used at the same time.

Cohesions 1.0 enables application coordination by making the transition from unconditional operations to contingent operations. While a business service undertaking an unconditional operation offers but one command – 'do it' – contingent operations have three. The first is a provisional, tentative action that can elicit a response from the other system, preparing it for the next step. This final step will either be a final confirmation or a final cancellation of the provisional action.

Figure 5: **Securities Trading example**



This concept can be illustrated by the simple example of a buy-side firm sending out a request for quotes on a stock and a related option (see figure 5). This example forms the basis of Choreology's Securities Trading demo that can be downloaded at www.choreology.com/downloads/software.

At the buy side firm, Cohesions 1.0 is used by a trading system that acts as a controller. This system determines which quotes should be accepted. This means that the quotes offered by some participating services are to be confirmed, while the remainder are to be cancelled.

The controller (i.e. the trading system) first sends out the requests for quote, and the counterparties that are prepared to offer time-lapse guaranteed quotes respond. Their response (including the time-lapse interval) is recorded by the Cohesions 1.0 product. This ensures that the participant services will be able to obey the controller's decision to confirm, or to cancel, even in the event of computer or communications failure.

The controlling application, in this case the trading system, uses Cohesions 1.0 as a coordination service. The final confirm/cancel decision is recorded and delivered by this coordination service. Again, the completion of the business transaction (buy a stock and an option) will be enforced even in the event of network or service failures.

This example illustrates an important new feature introduced in business transaction management software: the ability to apply business rules – in this example price improvement – to decide which applications should be involved in the final outcome of a coordinated action.

As illustrated in the above example, Cohesions 1.0 has three main components:

- The *Control API*, which enables events arising from a business transaction's members or participants to be observed or monitored;
- The *Coordination Service* is used to create transaction state managers that ensure that business transactions communicate correctly with participants and controllers;
- The *Participant Framework* enables some or all of an application service's operations to become capable of participating in coordinated outcomes.

Within the business transaction environment, these components work together to provide the ability to go forward to confirm, or to go backwards to cancel any particular action, as part of a coordinated composite result. The Cohesions 1.0 product implements these capabilities in fully-documented Java class libraries.

A low-impact, non-invasive solution

Cohesions 1.0 is interoperable, scalable and non-invasive. It can be first implemented at a departmental level or at the edge of the organization and configured to address a particular coordination problem. Once results have been achieved here, the solution can be easily expanded to serve other areas – within the organization or with counterparties – anywhere that consistent business results are required.

Benefits of application coordination

Cohesions 1.0 can yield a wide range of business and technical benefits. Working with Choreology, an expert pioneer in the field of application coordination, can also bring significant relationship benefits.

Reducing cost, risk and delays resulting from poor coordination and inconsistent processing can provide significant benefits for the business. The reliable delivery of new services and products by composition of back-end services is also enabled.

The ability to enforce application-level consistency has another powerful by-product. It becomes possible to expose, in a carefully controlled way, partial, or tentative work – intentional data. Classic transactions are closed: tentative or provisional actions are invisible until the transaction ends. Business service transactions as implemented by Cohesions 1.0 enable MIS or retry work to be driven off intended results, providing additional timely data that reflects the actual state of an incomplete business process.

On a technical level, application or business service level coordination based on loose-coupling provides flexible participation and outcome management. By ensuring application consistency Cohesions 1.0 enables strong links between two parties. A strong link can provide guaranteed delivery and processing of a message that causes an operation to be run, and keeps records for both parties.

Cohesions 1.0 massively simplifies the job of organizing and monitoring coordinated activities or business transactions. Self-programming this type of functionality at an application level is very hard, and very error-prone. The use of a carefully written standard protocol such as BTP, which is the work of a group of industry experts from many vendor companies, enables you to access a systematic, well-defined and general purpose solution that is designed for heterogeneous technology environments.

On a relationship level, Choreology's expert team gives you a productized, supported solution, greatly reducing likely maintenance and enhancement costs.

Many of our staff have substantial experience in delivering sophisticated distributed computing solutions in end-user organisations, particularly in financial services.

By working with our product you can benefit from our customer and vendor backgrounds and our design expertise by accessing our professional services. We monitor numerous commercial initiatives and participate in the formulation of several standards in our technology space. This 'peripheral vision' enables us to add value to the strategic IT planning of our customers.

For more information on Choreology and Cohesions 1.0, please contact our Sales Director, Cameron Khan.

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Choreology – Experience and industry expertise

Choreology® is a privately held software product company that was founded in January 2001 by a group of commercial specialists in the field of distributed transaction management. Our senior management and technical staff average nigh-on 20 years in the IT industry.

Headquartered in London, the company also has staff in North America and is backed by Atlas Venture.

Choreology personnel were heavily instrumental, as part of a collective multi-vendor effort, in writing and editing the OASIS Business Transaction Protocol (BTP) open standard, which forms the basis of our product Cohesions 1.0.

> *"Our aim has always been to contribute to business transaction management standards and to protect our customers from standards competition and flux. Cohesions 1.0 implements OASIS BTP. We have also implemented WS-Transaction, proving its fundamental similarity to BTP.*
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> *As and when WS-Transaction is usable as a truly open standard, we will support it in our product. However, BTP allows coordination of Web Services and of non-Web Services applications, while WS-T is Web Services-only. Therefore we intend to support both specifications, while seeking convergence between them."*
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> *Dr. Peter Furniss*
> *Chief Scientist, Choreology*

The first specification of BTP was published in June 2002 after fifteen months of collective work by companies such as BEA Systems, Oracle, HP, and numerous other participants. Choreology's Chief Scientist, Dr. Peter Furniss, is editor of the BTP specification. He and three other Choreology staff are among the seven co-authors of the specification.

Choreology has stated its desire to see BTP converge with the WS-Coordination and WS-Transaction (WS-C+T) proposals, which were released in August 2002 by IBM, Microsoft and BEA. We are pleased that these companies, by publishing these early-draft specifications, have endorsed the need for application-level coordination.

Choreology has already conducted a research and analysis implementation of WS-C+T, the maximum level of implementation permitted by the highly restrictive initial licensing terms currently imposed. We have committed to support these proprietary, Web services-specific specifications in our product when they have gone through a public revision and review process in an open standards consortium, and are freely available for independent, clean-room implementation.

Our aim is to support all relevant standards in our area, but to make these transparent to our users, protecting them from standards flux. Our experience in defining, implementing and using transaction management standards and products over the past 15 years makes Choreology an ideal partner for enterprises seeking to reap the benefits of application coordination with business transaction management software.

For further information: **www.choreology.com.**

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