Agenda

• It’s happened

• You already know the answer
It Cannot Be This …
Even ERP Vendors Agree …

The Next 50 Years of Business and IT?
Processes Are Not New, But Until Now the IT Industry Has Failed To Develop an Effective Platform for Their Deployment, Optimization, and Analysis

GE’s Evolution Towards Quality

- **High Intensity**
  - Six Sigma Quality: The Road to Customer Impact
  - Key Strategy Initiatives: QMI, NPI, OTR, SM, Productivity, Globalization
  - Change Acceleration Process: Increase Success and Acceleration Change
  - Process Improvement: Continuous Improvement, Reengineering
  - Productivity/Best Practices: Looking Outside GE
  - Work-Out/Town Meetings: Empowerment, Bureaucracy Busting

- **Low Intensity**

1990  Time
Business Strategy Has Always Been Defined by Processes, But the IT Industry Has Focussed on Data and Procedure and Object (To Make More Software)

**Business Process Continuum**

- **Supply-Chain Management**

- **Knowledge Management**

- **Customer-Driven**

- **Business Process**

- **Reengineering**

- **Excellence**

- **Value-Chain**
A Data Foundation Won’t Get Us Past Where We Are Today
A New Process Agenda

1993

THE MONUMENTAL NEW YORK TIMES BESTSELLER
UPDATED TO INCLUDE ANSWERS TO
THE MOST FREQUENTLY ASKED QUESTIONS ABOUT REENGINEERING

REENGINEERING THE CORPORATION

A MANIFESTO
FOR
BUSINESS
REVOLUTION

FORGET WHAT YOU KNOW ABOUT HOW BUSINESS SHOULD WORK—
MOST OF IT IS WRONG!

MICHAEL HAMMER
& JAMES CHAMPY

“May well be the best-written, most well-argued business book for the managerial issues since The Search for Excellence”—John Byrne, Business Week

2003

Business Process Management

the
third
wave

The breakthrough that redefines competitive advantage for the next fifty years.

HOWARD SMITH AND PETER FINGAR
Terminology

• BPML, Business Process Modeling Language
  – a PML
• BPMS, Business Process Management System
  – a PSE
• BPQL, Business Process Query Language
  – programmatic interface to a PSE and to PML data
• BPMN, Business Process Modeling Notation
  – simple notation for BPML, like RAD for a PML
• PIDL, Process Interface Definition Language
  – interface between PMLs
  – e.g. Web Services Choreography Interface, WSCI
Richard Davis

- “A process focus demands comprehension of customer requirements, knowing the actual performance against those requirements, and change which brings performance into line with requirements. The paper shows that a focus on process understanding brings business benefit whether or not information systems are changed as a result.”
- “Process Management, in which the process is monitored and continuously improved by the people who operate it.”
- “Process Improvement, where a project is undertaken to raise the performance of a process which is consistently failing to meet customer specifications.”
- “Process Redesign or Re-engineering to radically change a group of processes because they are not capable of simple improvement.”
- “Process Management is a continuous activity and should be applied to every process in the business which needs separately managing because of its impact on customers, its costs or the risks it is assessed to have.”
Mohammed Odeh and Richard Kamm

• “Is it feasible to make a productive and intelligible bridge between a model of a business and a model of an IT system meant in some way to mirror, support, or perhaps automate the business?”
• “The challenge is at least in part to find methods for modelling businesses on the one hand and IT systems on the other, between which a regular form of translation or conversion is possible.”
The Complexity of Business drives the Complexity of the Technical Solution

Ann Lindsay

- “Models are simplifications in order to bring clarity and understanding to some aspect of a problem where there is complexity, uncertainty, change or assumptions.”

- “The problem in reality is complex and more variability exists than can be modeled. Both the environment the process must operate in and the process itself are not static, and changes in either one could affect changes in the other.”

- “Modelling gives a snapshot of what is perceived at a point in time. Sustainable business processes carried out by human operators are a balancing act between learning from the past and experimenting with and adapting to the future, rules and constraints versus freedom and flexibility.”
Martyn Ould

• “The enterprise’s information is back in the hands of the IT department. Will the same happen to the enterprise’s processes? Or can computer support of those processes be put into the hands of the people who carry out the processes, who need to change them, combine them, separate them, chain them, spread them? What properties must our technology have to make this possible? Our PES must provide
• a process architecture
• total persistence
• collaboration-centric
• lazy instantiation
• contains all there is”
Bob Snowdon

• “In any organisation there are processes concerned with fulfilling the understood purpose of the organisation. These are generally called “operational processes”. There are also other processes concerned with such things as control, administration, training, procurement, resourcing, setting policy and so on. These are “meta” processes in the sense that their subjects can be thought of as the operational processes which they serve and manage.”

• “Meta-processes are processes, so there should be no reason why their fulfilment should not be supported by a computer system.”

• “Considering an organisation in these ways suggests a recursive pattern of interacting recursive active models. The challenge then is to develop a matching computer systems architecture so that an infrastructure to support such behaviours can be produced.”
B2B and A2A are paramount

Giacomo Piccinelli, Anthony Finkelstein, and Tommaso Costa

• “The time and costs involved in connecting the IT systems of two companies impact the actual formation of business relationships. A flexible infrastructure for process management is instrumental for rapid and cost effective B2B integration. One dimension of flexibility that system integrators identify as critical is node-level interaction.”

• “The investigation carried out within Nile points to interaction nodes as the main source of rigidity in B2B process integration. Standardisation helps simplifying the problem, but a complete working solution almost inevitably requires a degree of customisation.”
Ian Beeson and Stewart Green

• “The production of working information systems useful to the organization was achieved less by some formal process of translation from a high-level strategy statement, or by a gradual realization of a pre-formulated IS architecture, than through continuous processes of communication and decision making spread across the organization.”

• “What is needed is a more general theory and model of exchange, which incorporates the insights of speech act theory but which generalizes communication in the direction of cooperation.”

• “We have tried to show that a modelling of interaction as a ‘conversation for action’ usefully extends an organizational process model based on role activity diagramming.”
Elena Maslova

• “Due to the globalisation of economies and rapid growth of the Internet more and more business and software processes span multiple organisations. Thus process model integration and enactment can become increasingly difficult. Global processes are often very large, consisting of many sub-processes whereby these sub-processes may be defined in different process modelling notations, and they may be running in different PSEs (if at all).”

• “A process model that comprises of loosely coupled units is potentially more flexible in terms of addition of new units and changes within given units.”

• “Virtually decentralised process models describe a decentralised process, however the peers or sub-processes do not actually have to be physically distributed, merely logically decoupled and independent from other peers. The communication network however can be controlled in a centralised way, despite the fact that the actual sub-processes within the network may run on a completely independent Process Support Environment (PSE).”
Think You Know BPM, Think Again …

BPI Evolution and BPMS Revolution

Point to Point (Custom)
Messaging Middleware
Integration Brokers
Enterprise Application Integration
Continually Evolving

Data Replication
COM CORBA
TP Monitor
Workflow

Time

Pi-Calculus
BPML
Process VM
BPMS

Business Process Management
Forget Everything You Ever Knew About Processes
Some Surprising Facts About the New Processes

- They can grow, shrink, merge, morph, and move, even during execution
- They are distributed among many participants, but can be centrally managed and embed reliable transactional semantics
- They are inherently persistent and can acquire or lose capabilities during execution
- Everything you can program in Java you can program as processes, we’ve hit no functional scalability limits yet
- They can coexist with or “project” legacy code, but are explicit and abstracted from technology
Some More Surprises

• Live processes can be shared, as easily as business documents, using a variety of collaboration protocols
• They can be defined and put into operation by business people, without involvement by IT
• They are represented in a way that does not distinguish data, procedure, and workflow
• Processes can be participants in processes, processes can process processes
• Process patterns can be used to recursively define other processes
• There is no distinction between the process and the process of change
Fragmented Process Representation and Insufficient Process Semantics Have Plagued IT for Years

- The three-way application silo
  - Data model, function, time
- Processes are ingrained, frozen by data model and software code
- Workflow semantics insufficient to express realistic processes
- Process definition fragmented and embedded n-factorial times
Trends in Business Infrastructure

“I run my business…”

On this mainframe
Using ERP
By managing processes
On this database
On the Internet

Sharing data (RDBMS)
Sharing functions (Web Services)
Sharing processes (BPMS)

Data-centric architecture
Distributed computing
Process-centric architecture
<table>
<thead>
<tr>
<th>First Wave</th>
<th>Second Wave</th>
<th>Third Wave</th>
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<tbody>
<tr>
<td><strong>1920s</strong></td>
<td><strong>1980 – 1990s</strong></td>
<td><strong>2000s</strong></td>
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<tr>
<td>- Methods and procedures analysis</td>
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<td>- Process implicit in work practices</td>
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<td>- Little automation</td>
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<td>- ERP, other packages</td>
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<td>- Manual reengineering</td>
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<td>- IT Enablers/automation</td>
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<td>- One-time creation</td>
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<td>- Process focus of IT</td>
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<td>- Path to execution</td>
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<td>- Agility, adaptation</td>
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<td>- Closed loop optimization</td>
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<td>- Life cycle</td>
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<td><strong>DBMS</strong></td>
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<td>- Data aware applications</td>
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<td>- Sharing functions</td>
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<td>- Distributed applications</td>
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<td>- Sharing processes</td>
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<td><strong>BPMS</strong></td>
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# The Changing Platform for Business Capability

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<tr>
<th>Applications</th>
<th>MRP</th>
<th>ERP, CRM, SCM</th>
<th>BPM, BPO …</th>
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<tbody>
<tr>
<td>Platform</td>
<td>Mainframe</td>
<td>Operating System</td>
<td>Web Services</td>
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<td>Language</td>
<td>DL/1</td>
<td>SQL</td>
<td>BPML</td>
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<tr>
<td>System</td>
<td>HDBMS</td>
<td>RDBMS</td>
<td>BPMS</td>
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Example of a Successful IT Product
Learning From the Past: E F CODD Revisited …
Or Why Larry Ellison Got Rich

• Large data banks must be protected from having to know how the data is organised in the machine (the internal representation)
• Activities of users and most application programs should remain unaffected when the internal representation of data is changed
• Changes in data representation will often be needed as a result of changes in query, update, and report traffic and natural growth in the types of stored information
• A model based on n-ary relations, a normal form for database relations, and the concept of a universal data sublanguage are introduced
• Three of the principal kinds of data dependencies that still need to be removed from existing systems: ordering dependence, indexing dependence, and access path dependence
The Third Wave BPMS

- A data-driven architecture aligned to the reality of business processes
- The simplicity and ease of use of a business spreadsheet
- The scalability and resilience of transaction processing
- A formal foundation creating a new platform, like RDBMS
- Freeing process work from the “IT logjam”
- Encompassing all previous computer science
- Heritage friendly, legacy free
IDS Scheer and Intalio Extend Relationship to Develop Joint Business Process Management Solution

IDS Scheer, the leading provider of business process excellence services and tools, today announced that IDS Scheer Inc., Philadelphia, USA, has extended its relationship with Intalio, a most important developer of business process management software. Through the agreement, IDS Scheer and Intalio will develop a joint solution to integrate the Intalio3 Business Process Management System into ARIS to offer a complete solution to design, implement, execute, and manage intra- and inter-enterprise processes using IDS Scheer’s award-winning ARIS Tools.
... is a decreasing sequence of relations.

The aim is a consequence of the fact that the transition relations

\[ \sim_\omega Q \text{ iff } P \sim Q. \]

from the definitions that \( P \sim Q \) implies \( P \sim_\omega Q \).

\( \sim_\omega Q \) implies \( P \sim Q \) by establishing that \( \sim_\omega \) is a bisimulation.

\( Q \) and \( P \overset{\alpha}{\rightarrow} P' \). Then for each \( n < \omega \) there is \( Q_n \) such that

Since \( \overset{\alpha}{\rightarrow} \) is image-finite, there is \( Q' \) such that \( Q \overset{\alpha}{\rightarrow} Q' \) and

\( n \) times many \( n \). We deduce that \( Q' \sim_n P' \) for infinitely many \( n \), \( P' \).

\[ \forall i \in P_i \text{ abbreviates } P_{i_1} + \cdots + P_{i_r}, \text{ where } I = \{ i_1, \ldots, i_r \}. \]

Suppose that \( n \geq 0 \) and \( P \not\sim_n Q \). Then there is a summation \( \overset{\perp}{\exists} \subseteq \text{fn}(P, Q) \) and any fresh name \( s \),

\[ (\nu \overset{\perp}{\exists} (P | (M + s))) \not\sim (\nu \overset{\perp}{\exists} (Q | (M + s))). \]

Definition on \( n \). For \( n = 0 \) there is nothing to prove, so suppose that

there are \( \alpha \) and \( P' \) such that \( P \overset{\alpha}{\rightarrow} P' \) but \( P' \not\sim_{n-1} Q' \) for all \( Q' \) (or vice versa, when the argument is the same). Since \( \overset{\alpha}{\rightarrow} \) is image-finite, there is \( Q' \) such that \( Q \overset{\alpha}{\rightarrow} Q' \) and any fresh name \( t \),

\[ (\nu \overset{\perp}{\exists} (P' | (M_i + t))) \not\sim (\nu \overset{\perp}{\exists} (Q_i | (M_i + t))). \tag{2.2} \]

For the cases, one for each form that \( \alpha \) can take. We give the details

Since \( A \overset{\perp}{\rightarrow} B \) there is \( B' \) such that \( B \overset{\tau}{\rightarrow} B' \)

\( B' \perp_s \) does not hold. The only way this is possible

\[ B' \overset{\text{def}}{=} \nu \overset{\perp}{\exists} (Q_j \ | \ \Sigma_i \in I \tau'). \]

for some \( j \in I \). We now exploit the inductive

We have

\[ A' \overset{\tau}{\rightarrow} A'' \overset{\text{def}}{=} (\nu \overset{\perp}{\exists}) (P' \ | \ Q_j \ | \ (M_j)). \]

Since \( A' \overset{\perp}{\rightarrow} B' \) there is \( B'' \) such that \( B' \overset{\tau}{\rightarrow} B'' \)
we must have \( B'' \perp_{s_j} \). The only possibility is

\[ B'' \overset{\text{def}}{=} (\nu \overset{\perp}{\exists}) (Q_j \ | \ (M_j)). \]

But \( A'' \perp B'' \) by (2.2), a contradiction. Hence

Case 2 Suppose that \( \alpha \) is \( \bar{x}y \). Let \( s_i (i \in I) \) a

\[ M \overset{\text{def}}{=} x(w). \Sigma_i \in I [w = y] \tau \]

The argument is then similar.

Case 3 Suppose that \( \alpha \) is \( \bar{x}(z) \). Suppose \( \text{fn}(P, \tau) \) \( w \) and \( t \) are fresh names, and set

\[ M \overset{\text{def}}{=} x(w). (\Sigma_{h=1}^k [w = a_h] t + \Sigma \]

The argument is then similar. In this case, we have

\[ A \overset{\text{def}}{=} \nu \overset{\perp}{\exists} \nu \overset{\perp}{\exists} (P' \ | \ (\Sigma_{h=1}^k [z = a_h] t + \Sigma \]

and not \( A' \perp_s \) and not \( A' \perp_t \). It follows that the

from \( O \) performing a name
A Third Wave Timeline

- Milner, R., A Calculus of Communicating Systems (CCS), 1980
- Hoare, C., Communicating Sequential Processes (CSP), 1985
- Milner, R., Communication and Concurrency, 1989
- Milner, R., J. Parrow and D. Walker, A Calculus of Mobile Processes, 1992
- First exolab.org meeting 1999
- Milner, R., Communicating and Mobile Systems: The Pi-Calculus, 1999
- Founding of BPMI.org, 2000
- Arkin, A., et al, BPML 0.1, 2002
- Intalio n3 BPMS, 2001
Business Process Management Initiative (BPMI.org)
Mobile Processes

- Systems whose participants communicate and change their structure
  - Grow, shrink, morph, merge, split
- Systems that evolve independently of their environment (move)
  - Activity within a system and interaction of the system with its environment
- Systems with transient links have mobile structure

Examples
- Computer networks
- Cellular mobile telephony networks
- Air traffic control networks
- Mobile code, distributed computing
- Business processes

Poorly understood compared to computational processes
Foundations for Computational and Interacting Systems

• Lambda-calculus
  – Free standing computer systems
  – Single thread of execution
  – Parallel noninteracting threads (multitasking)
  – Sequential, goal-oriented, hierarchical, deterministic
  – Types represent values
  – Focus on computation as the primitive

• Underlies imperative and functional programming languages (e.g., FORTRAN, Pascal, Lisp, Java)

• Pi-calculus
  – Systems interact, collaborate, and interrupt one another
  – Interacting threads of execution (distributed processing)
  – Aims to predict whether mobile systems behave in a proper way
  – Types represent behaviours — what it means to say two different processes behave the same way
  – Focus on interaction as the primitive

• Basis only for experimental programming languages (Pict, Join, TyCO)
  – Until now …
Today’s BPM Standards Stack

- Process Templates
  - BPML for Doc. Mgt.
  - BPML for Task Mgt.
  - BPML for Project Mgt.
  - CPFR
  - SCOR
  - STP
  - TMF

- Process Notation
  - BPMN

- Process Implementation
  - BPML
  - BPEL4WS

- Process Interface
  - BPQL
  - WS-Security
  - WS-Transaction
  - WS-Coordination
  - WSCI

- Service Disruption
  - WSDL

- Service Transport
  - SOAP
Return On Process Investment

What if this process could be deployed under that time frame?

What if this process could be deployed under that budget?

What if this process could be fully automated?

What if this process could be tailored to each customer’s needs?

What if this process could be completed in 1 day instead of 3?

What if this process could be updated on a daily basis?

What if this process could be executed with 10 times fewer errors?

What if this process could involve these partners?

Total cost of process ownership

Process design to production time

Process design to production cost

Process design automation coverage

Process customisation level

Process completion time

Process life-cycle continuity

Process transactionality level

Process value-chain coverage
Process Engineering Emerges As a Major New Discipline

• Process representation
• Process discovery
• Process design
• Process transformation
• Process composition
• Process de-composition
• Process mass customisation
• Process analysis
• Process adaptation
• Process metrics
• Process life cycle
Technology Planning Horizon for Global 5000 Firms Is a Synthesis of Process and Software Engineering

- Methodology critical to clients moving ahead with projects
- Methodology must be independent of tools and platforms
- Migration path to/from different process representations rests on semantics
- Architecture must be independent of technology choices in all product categories