

Balanced Scorecard Driven Business Process Definition Using XML

Carolyn McGregor
Centre for Advanced Systems Engineering
University of Western Sydney
c.mcgregor@uws.edu.au

Abstract

During the last decade a variety of information technologies have emerged relating to business process modelling. One issue resulting from the introduction of these technologies is the inability to link the business process definition with the information gathered during the development of the business strategy. Organisations require the ability to define their business strategy, then use the outcomes of this definition to drive the business process definition. This paper details a methodology that applies XML to link business strategy with business process definition. The key contribution of this work is an extension to the Balanced Scorecard XML draft standard that incorporates quantified business process performance measures. This methodology is then applied to a specific case study where an organisation plans to provide personal loans to its customers.

1 Introduction

During the last decade a variety of information technologies have emerged relating to business process modelling, workflow management and workflow monitoring [1,2,3,4,5,6,7]. One issue resulting from the introduction of these technologies is the inability to link the business process definition with the information gathered during the development of the business strategy. Organisations require the ability to define their business strategy, then use the outcomes of this definition to drive the business process definition. This will ensure that as the organisation enacts business processes, performance will be monitored, in relation to the predefined business strategy and process definition.

Kaplan and Norton's [8] Balanced Scorecard is a methodology that has been proposed to address the need for organisations to structure their high level decision making based on business strategy and objectives. It defines four key areas of organization performance within which objectives should be set.

1. Customer Perspective
2. Internal Business Perspective
3. Innovation and Learning Perspective
4. Financial Perspective

The Balanced Scorecard Collaborative (BSC), founded by Kaplan and Norton, was established to *facilitate the worldwide awareness, use, enhancement and integrity of the Balanced Scorecard as a value-added management process* [9]. To date, two standards have been proposed by the BSC, namely the *Balanced Scorecard Functional Standards* [9] and the *BSC XML Draft Standards* [10].

The Balanced Scorecard functional standards provide guidance for organisations preparing to purchase Balanced Scorecard applications, and provide a functional baseline for Balanced Scorecard application vendors.

The purpose of the BSC XML draft standard is to define the data interchange format for the exchange of information between Balanced Scorecard management systems and other systems. The current BSC XML draft standards do not specifically define a means to structure the business strategy information so that it can be used to drive business process definition. It does not allow for the provision of 'objectives' within customer and product groupings. There is also no provision to identify the 'type' of measure being recorded, for example the service level for cycle time, a throughput target or a rework target.

Leymann and Altenhuber [2] state that business processes prescribe the way in which the resources of an enterprise are used i.e., they describe how an enterprise will achieve its business goals. They further state that the recognition of business processes (and their representation in workflow) as a major asset of an enterprise, is becoming more widely accepted. The quality of the business processes will influence the quality of the performance of an enterprise.

The Intelligent Workflow Monitoring Systems (IWMONS) methodology is a metamethodology that has been developed to address an important problem within organisations - the effective use of business strategy, business process definition and business enactment for automated business performance monitoring. Within IWMONS the business strategy is defined using the Balanced Scorecard.

In this paper, the link between business strategy and business process definition is described in the context of its implementation in XML. To link business strategy with business process definition explicitly, IW-MONS contains an original approach to the development of the Balanced Scorecard within the context of the organisation's business processes. This paper describes an extension to the Balanced Scorecard XML draft standard that incorporates quantified business process performance measures.

This paper further describes the application of that component of IW-MONS to a specific case study known as 'sell loan'. The sell loan case study is based on a real case study from an Australian financial institution.

We begin with a brief overview of the architecture. We then introduce the case study and describe its specific goals and objectives. This is followed by a description of the Balanced Scorecard perspectives and the generation of the IW-MONS Balanced Scorecard XML as they relate to the case study. Other research that relates to this work and future research opportunities are then described.

2 Architecture

IW-MONS links business strategy, business process definition, business enactment and business performance measurement explicitly [11]. An overview of the IW-MONS methodology is shown in Figure 1. IW-MONS is a companion methodology designed to be used in conjunction with the Balanced Scorecard methodology and business process modelling methodologies.

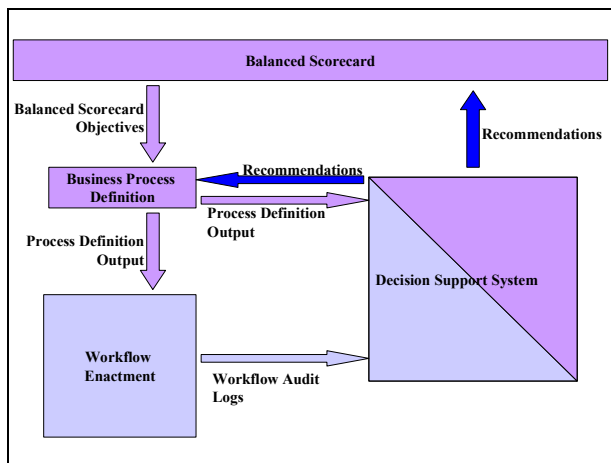


Figure 1 IW-MONS Overview [11]

Within IW-MONS the business strategy is defined using the *Balanced Scorecard*. The *business process definition* is defined using a business process modelling technique, such as ARIS [6], BPMS [1], WfMC Business Process Definition [7] for example. Workflow management systems are used to oversee business enactment (denoted as *workflow enactment*). Business

performance is monitored through the use of an original intelligent *decision support system*.

Within IW-MONS there are three broad stages, the Design Stage, the Implementation Stage and the Review Stage.

The IW-MONS Design Stage is further decomposed into three phases, namely the Strategic Analysis Phase, Process Analysis Phase and DSS Auto Generate Phase.

The Strategic Analysis Phase of IW-MONS incorporates the Balanced Scorecard and Balanced Scorecard objectives output steps, and is shown in its expanded form in Figure 2.

The steps within the Strategic Analysis Phase are:

- Construct Vision and Strategy
- Construct Customer Perspective
- Construct Internal Business Perspective
- Construct Innovation and Learning Perspective
- Construct Financial Perspective
- Generate Balanced Scorecard Objectives Output

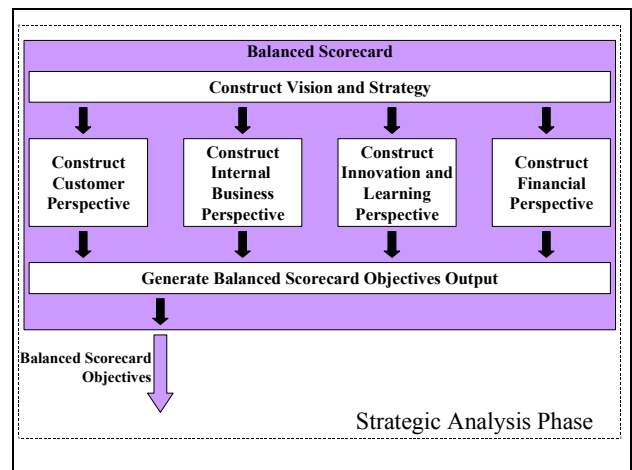


Figure 2 IW-MONS Strategic Analysis Phase

While the Balanced Scorecard is used as the basis for the Strategic Analysis Phase, IW-MONS extends the concepts of the Balanced Scorecard through the determination and documentation of milestones, service levels and targets based on the organisation's business processes. The business processes are determined for each valid customer group and product/service group combination. Measures are also categorised into 'types' explicitly within IW-MONS to identify whether they refer to cycle time or throughput targets for example.

The format for the Balanced Scorecard Objectives Output is based on the Balanced Scorecard Collaborative XML Draft Standard [10]. IW-MONS extends the BSC XML Draft Standard to incorporate the provision of objectives within 'customer' and 'product' groupings and the identification of the 'type' of measure being recorded, such as the service level for cycle time, a throughput target or a rework target. The following amendments have

been made to this standard to facilitate its incorporation with IW-MONS.

1. The Customer Perspective and Innovation and Learning Perspective outputs are grouped, based on customer type to facilitate the establishment of objectives within customer type groupings.
2. Information within each perspective is grouped based on the product group to which it applies, to facilitate the establishment of objectives within product groupings.
3. The ability to add milestones has been added to the Customer and Internal Business Perspectives. This enables cycle time service levels and rework targets based on these milestones to be defined.
4. A 'type' field has been added to the construct for 'measure', to provide the ability to identify the type of measure that is being recorded, for example: 'cycle time'; 'product ratio'; or 'productivity'.

3 Case study

In this section, a case study is presented of an organisation in which the introduction of a new product necessitates the definition of a new business process. The goal is to demonstrate the techniques discussed so far using a concrete example.

3.1 Introduction

This business case relates to an organisation that has chosen to introduce a new product for its customers and thereby requires the development of a business process to support the sale of this product to its customers.

We begin with an assessment of the organisation's new goals and objectives as they relate to this case study through the use of the Balanced Scorecard. The organisation's structure together with the business process rules are then defined.

3.2 Goals and objectives

Resulting from a vision and strategy review, the organisation has decided to offer unsecured personal loans to its customers. This will be the basis of the case study.

3.3 Balanced scorecard perspectives

The following objectives have been set within the four Balanced Scorecard perspectives of management reporting:

Customer Perspective

Within the Customer Perspective, such questions as "How do the organisation's customers see it?" and "How does the organisation become its targeted customers' most valued supplier" are addressed. As a result, the organisation has determined the following service levels for its customer's service that they would like to be able to measure:

1. It will take no more than 24 hours from the completion of the application with the Sales Person, to sending the 'Letter of Offer' if the application is approved.
2. If previously declined, then it will take no more than 24 hours from the modification of the application with the Sales Person, to sending the 'Letter of Offer' if the modified application is approved.
3. A customer has 90 days to accept, sign and return the letter of offer.
4. It will take no more than 24 hours from the receipt of the completed 'Letter of Offer', for the funds to be released to the customer.

The following tasks are required to construct the IW-MONS Balanced Scorecard Customer Perspective:

- Determine Customer Segments
- Document Customer Goals and Milestones
- Determine Service Levels for Cycle Time
- Determine Quality (Rework) Targets

This product is available only to personal customers, denoted by C_1 .

The following table defines the end goal and intermediary milestones as determined for this example.

Milestone	Description
$C_1P_{upl}M_{cm0}$	Commence Sell Loan Process
$C_1P_{upl}M_{cm1}$	Request Loan
$C_1P_{upl}M_{cm2}$	Send Letter of Offer
$C_1P_{upl}M_{cm3}$	Receive Signed Letter of Offer
$C_1P_{upl}M_{cm4}$	Settle Loan

These same service levels for cycle times are reflected in the table below:

Milestone	Service Level
$C_1P_{upl}M_{cm1} - C_1P_{upl}M_{cm2}$	24 Hours
$C_1P_{upl}M_{cm1} - C_1P_{upl}M_{cm2}$	24 Hours
$C_1P_{upl}M_{cm2} - C_1P_{upl}M_{cm2}$	90 Days
$C_1P_{upl}M_{cm3} - C_1P_{upl}M_{cm4}$	24 Hours

The organisation has determined the following customer rework target associated with this product:

1. Of those loans declined, no more than 10% will be because of information that was not collected at the time the customer applied for the loan.

This rework target is reflected in the table below:

Milestone	Service Level
C ₁ P _{upl} M _{cm1}	10%

Internal Business Perspective

The Internal Business Perspective focuses on “What processes – both long and short term – must the organisation excel at, to achieve its financial and customer objectives?”. Therefore, the organisation has chosen to measure the following service levels for its internal business process:

1. It will take no longer than 4 hours to release funds to the customer once the receipt of the signed letter of offer has been recorded.

The following tasks are required to construct the Internal Perspective of the IW-MONS Balanced Scorecard:

- Document Business Goals and Milestones
- Determine Service Levels for Cycle Time
- Determine Quality (Rework) Targets

The following table defines the end goal and intermediary milestones as determined for this example.

Milestone	Description
P _{upl} M _{bm0}	Commence Sell Loan Process
P _{upl} M _{bm1}	Request Loan
P _{upl} M _{bm2}	Approve Loan
P _{upl} M _{bm3}	Settle Loan

These same service levels for cycle times are reflected in the table below:

Milestone	Service Level
P _{upl} M _{bm3}	4 Hours

Innovation and Learning Perspective

The Innovation and Learning Perspective provides measurement techniques to determine “How can the organisation continue to improve our processes and systems in order to create value?”

The following tasks are required to construct the Innovation and Learning Perspective of the IW-MONS Balanced Scorecard:

- Document Product Definitions
- Determine Product Ratio Targets
- Set Rates of Improvement for Customer Measures
- Set Rates of Improvement for Internal Measures

The information to define this product is as follows:

Field	Value
Product Type	"UPL"
Product Name	"Unsecured Personal Loans"
Product Description	"Personal Loans that are not secured to any assets"
Product Group	"Personal Loans"

The organisation has determined the following two product ratio targets associated with this product:

Field	Value
Product Type	"UPL"
Start Date	01/07/2002
Product Ratio Target	5%

Field	Value
Product Type	"UPL"
Start Date	01/01/2003
Product Ratio Target	8%

Financial Perspective

The Financial Perspective addresses the issue of “How does the organisation look to its Shareholders?”. It has decided to measure the following internal business targets:

1. The number of Personal Loan applications over the next three months will equal or exceed an average of 5 per week per sales person.

The following tasks are required to construct the Innovation and Learning Perspective of the Balanced Scorecard:

- Determine Productivity Targets
- Determine Volume Growth Targets

The productivity target shown above is reflected in the table below:

Field	Value
Product Type	"UPL"
Start Date	01/07/2002
Productivity Target	5
Timeframe	Weekly

3.4 Balanced Scorecard XML

Customer Perspective

IW-MONS extends the Balanced Scorecard XML draft standard definition of the Customer Perspective by allowing the grouping of customer perspectives by customer and product groupings, through the definition of customer and product types within the perspective definition. Customer perspectives would be defined for each valid customer and product combination.

```
<CUSTOMERTYPE id="C1" name="Personal"/>
<PRODUCTTYPE id="UPL" name="Unsecured
Personal Loans"/>
```

Milestones are then added within each customer perspective that enables the definition of cycle time service levels and rework targets based on these milestones.

```
<Milestone id=CM1 name="Request Loan"/>
```

Measures within customer perspective objectives are identified by the type of measure that is being recorded, for example: 'cycle time', 'rework'.

```
<MEASURE id="CM1M2" name="Send Letter of
Offer" type="cycle time" unit="hours" ownerRef="">
...
</MEASURE>
```

Internal Business Perspective

Similarly to the Customer Perspective, the Internal Business Perspective definition is extended by allowing the grouping of Internal Business Perspectives by product groupings, through the definition of product types within the perspective definition. Internal Business Perspectives would be defined for each product grouping.

Milestones associated with the internal business are added within each Internal Business Perspective.

Measures are identified by the type of measure that is being recorded, for example: 'cycle time', 'rework'.

Innovation and Learning Perspective

As with the Customer Perspective, the Innovation and Learning Perspective is extended to enable the grouping of perspectives by customer and product groupings. Their type also identifies the type of measures.

Customer and Product grouping definitions are also contained within the Innovation and Learning Perspective definition.

Financial Perspective

The Financial Perspective is also extended to enable the grouping of perspectives by product groupings and their type also identifies the type of measures.

The Balanced Scorecard (BSC) XML output for the 'sell loan' case study is shown in Appendix A.

4 Related work

The Balanced Scorecard Collaborative (BSC), proposed the *BSC XML Draft Standards* [10]. The current BSC XML draft standards do not specifically define a means to structure the business strategy information so that it can be used to drive business process definition.

BPMS [1] and ARIS [6] are business process definition methodologies that cater for the need to include the corporate objectives, strategies and success factor constraints. While the information can be stored in BPMS, it is only implied information and is not available on the BPMS process model diagrams. Neither methodology provides a framework to link to the Balanced Scorecard.

5 Future work

The work described in this paper can be extended in several ways for future research. Firstly the architecture can be further applied to other business process case studies to further validate the methodology.

Second, IW-MONS does not contain or propose a specific business process modelling methodology. It relies on the ability of existing business process modelling methodologies to receive and output information in the formats required by IW-MONS. Future research in this area would lead to the development of a new or the extension of an existing business process modelling methodology to support the required input and output of information.

Finally, further research is required to incorporate these changes within the Balanced Scorecard Collaborative standards.

6 Conclusion

This paper has presented an XML implementation that links business strategy and business process definition. To link business strategy with business process definition explicitly, the IW-MONS methodology was described that contains an original approach to the development of the Balanced Scorecard within the context of the organisation's business processes. This paper described an extension to the Balanced Scorecard XML draft standard that incorporates quantified business process performance measures.

The presented case study and associated prototype provided a mechanism to validate the application of the XML to link business strategy and business process definition.

7 References

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8 Appendix A

The Balanced Scorecard (BSC) XML output for the 'sell loan' case study is shown below. The additions to the BSC draft XML made by IW-MONS are shown in **bold**.

```

<BSCDoc language="EN">
<BSC id="SLBSC" name="Sell Loan Balanced Scorecard">
  <PERSPECTIVE id="SLC" name="Sell Loan Customer Perspective"
    perspectiveType="Customer">
    <Description>Customer Perspectives associated with Sell Loan
    Example</Description>
    <CUSTOMERTYPE id="C1" name="Personal"/>
    <PRODUCTTYPE id="UPL" name="Unsecured Personal Loans"/>
    <Milestone id=CM0 name="Commence Sell Loan Process"/>
    <Milestone id=CM1 name="Request Loan"/>
    <Milestone id=CM2 name="Send Letter of Offer"/>
    <Milestone id=CM3 name="Receive Signed Letter of Offer"/>
    <Milestone id=CM4 name="Settle Loan"/>
    <OBJECTIVE id="CSL" name="Customer Service Levels" updateFrequency="" ownerRef="">
      <MEASURE id="CM1M2" name="Send Letter of Offer" type="cycle time" unit="hours"
        ownerRef="">
        <Description>Cycle time target from completion of application to sending letter of
        offer</Description>
        <StartMilestone>CM1</StartMilestone>
        <EndMilestone>CM2</EndMilestone>
        <Target id="CM1M2" TargetValue="24"/>
      </MEASURE>
      <MEASURE id="CM2M2" name="Send Letter of Offer" type="cycle time" unit="hours"
        ownerRef="">
        <Description>Cycle time target to send letter offer</Description>
        <StartMilestone>CM2</StartMilestone>

```

```

        <EndMilestone>CM2</EndMilestone>
        <Target id="CM2M2" TargetValue="4"/>
    </MEASURE>
    <MEASURE id="CM2M3" name="Receive Letter of Offer" type="cycle time" unit="days"
ownerRef="">
        <Description>Cycle time target from sending to receipt of signed letter of
offer</Description>
        <StartMilestone>CM2</StartMilestone>
        <EndMilestone>CM3</EndMilestone>
        <Target id="CM2M3" TargetValue="90"/>
    </MEASURE>
    <MEASURE id="CM3M4" name="Settle Loan" type="cycle time" unit="hours"
ownerRef="">
        <Description>Cycle time target from receipt of letter of offer to settling
loan</Description>
        <StartMilestone>CM3</StartMilestone>
        <EndMilestone>CM4</EndMilestone>
        <Target id="CM3M4" TargetValue="24"/>
    </MEASURE>
</OBJECTIVE>
</PERSPECTIVE>
<PERSPECTIVE id="SLI" name="Sell Loan Internal Business Perspective" perspectiveType="Internal">
    <Description>Internal Business Perspectives associated with Sell Loan
Example</Description>
    <PRODUCTTYPE id="UPL" name="Unsecured Personal Loans"/>
    <Milestone id=BM0 name="Commence Sell Loan Process"/>
    <Milestone id=BM1 name="Request Loan"/>
    <Milestone id=BM2 name="Approve Loan"/>
    <Milestone id=BM3 name="Settle Loan"/>
    <OBJECTIVE id="IBSL" name="Internal Business Service Levels" updateFrequency=""
ownerRef="">
        <MEASURE id="BM3M3" name="Settle Loan" type="cycle time" unit="hours"
ownerRef="">
            <Description>Cycle time target to settle loan</Description>
            <StartMilestone>BM3</StartMilestone>
            <EndMilestone>BM3</EndMilestone>
            <Target id="BM3M3" TargetValue="4"/>
        </MEASURE>
    </OBJECTIVE>
</PERSPECTIVE>
<PERSPECTIVE id="SLLG" name="Sell Loan Innovation and Learning Perspective"
perspectiveType="Innovation and Learning">
    <Description>Innovation and Learning Perspectives associated with Sell Loan
Example</Description>
    <CUSTOMERTYPE id="C1" name="Personal">
        <CustomerDescription>Personal customers</CustomerDescription>
        <CustomerTypeParent>All</CustomerTypeParent>
    </CUSTOMERTYPE>
    <PRODUCTTYPE id="UPL" name="Unsecured Personal Loans">
        <ProductDescription>Personal Loans that are not secured to any
assets</ProductDescription>
        <ProductTypeParent>Personal Loans</CustomerTypeParent>
    </PRODUCTTYPE>
    <OBJECTIVE id="PRT" name="Product Ratio Targets" updateFrequency="" ownerRef="">
        <MEASURE id="PRT" name="Ratio Targets" type="product ratio" unit="percentage"
ownerRef="">

```

```

        <Description>Product ratio targets for unsecured personal loans</Description>
        <Target id="UPL1" UpdateFrequency="31/12/2002" TargetValue="5"/>
        <Target id="UPL2" UpdateFrequency="30/06/2003" TargetValue="8"/>
    </MEASURE>
</OBJECTIVE>
</PERSPECTIVE>
<PERSPECTIVE id="SLF" name="Sell Loan Financial Perspective" perspectiveType="Financial">
    <Description>Financial Perspectives associated with Sell Loan Example</Description>
    <PRODUCTTYPE id="UPL" name="Unsecured Personal
    Loans"/>
    <OBJECTIVE id="PT" name="Productivity Targets" updateFrequency="" ownerRef="">
        <MEASURE id="PRT" name="Productivity Targets" type="productivity" unit="number"
        ownerRef="">
            <Description>Productivity targets for unsecured personal loans</Description>
            <Frequency>Weekly</Frequency>
            <Target id="UPLP1" UpdateFrequency="1/07/2002" TargetValue="5"/>
        </MEASURE>
    </OBJECTIVE>
</PERSPECTIVE>
</BSC>
</BSCDOC>

```