The Effectiveness of Workflow Technology

Hajo Reijers
Introduction

- “Automatically distribute work to the right person at the right time”
- Commercial systems available for over 20 years
- WfM technology incorporated in many other technologies (ERP, Web Services, etc.).

[Zur Muehlen 04]
Process execution (traditional)

Business Process

Defined in
Training
Procedure Manual

Composed of
Manual Activities
Automated Activities

Managed by
Army of Supervisors, Distribution Clerks

Assigned as a
Case (Process Instance)

Passed Along by
Work Item (Activity Instance)

Consisting of
Invoked Application
Workflow management (automated)

- **Business Process**
  - Defined in
  - Managed by
  - Composed of
    - Sub-Process
      - Process Definition
        - Composed of
          - Manual Activities
          - Automated Activities
    - Consisting of
      - Invoked Application
      - Work Item (Activity Instance)
      - Case (Process Instance)

- **Workflow Management System**
  - Assigned as a

- **Activities**
  - Manual Activities
  - Automated Activities
Organizational benefits

- Process efficiency
  - Optimization of process criteria such as processing time or faithfulness to deadline
- Resource efficiency
  - Efficient use of the resources available for the execution of processes
- Delegation efficiency
  - Efficient use of the competencies of superior (greater scope of vision) and subordinate (detailed knowledge) organizational units
- Market efficiency
  - The proper positioning of the enterprise in its relation to market partners (reliable prediction of delivery times, transparent communication with suppliers and customers, etc.)
- Motivation efficiency
  - Motivation of staff to work according to the business goals of the enterprise
Main presumed advantages of WfM technology:
- process and resource efficiency
- “Business processes execution is faster and more efficient”
- … but is that really true?
- … and, if so, to what extent?
Research outline

- Effectiveness study WfM systems
- Joint research by TU Eindhoven and Deloitte
- Started in 2001, ran until 2012
- Focus on performance improvement of:
  - Lead time, service time, wait time, resource utilization
- Involved 10 different organizations, 21 different business processes
## Involved organizations

<table>
<thead>
<tr>
<th>Organization Number</th>
<th>Organization description</th>
<th>Number of employees</th>
<th>Turnover/budget (∗million€)</th>
<th>Focus of involved processes in study</th>
<th>Number of involved processes in study</th>
<th>Cases per year (∗1000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Governmental agency</td>
<td>700</td>
<td>60</td>
<td>Debt collection</td>
<td>1</td>
<td>7000</td>
</tr>
<tr>
<td>2.</td>
<td>Health insurer</td>
<td>2300</td>
<td>5200</td>
<td>Policy maintenance</td>
<td>7</td>
<td>250</td>
</tr>
<tr>
<td>3.</td>
<td>Regional public works department</td>
<td>1000</td>
<td>250</td>
<td>Invoice processing</td>
<td>1</td>
<td>20</td>
</tr>
<tr>
<td>4.</td>
<td>Local municipality</td>
<td>300</td>
<td>210</td>
<td>Invoice processing</td>
<td>2</td>
<td>0.7</td>
</tr>
<tr>
<td>5.</td>
<td>Insurance intermediary</td>
<td>5000</td>
<td>29000</td>
<td>Policy maintenance</td>
<td>3</td>
<td>2000</td>
</tr>
<tr>
<td>6.</td>
<td>Domiciliary care agency</td>
<td>1450</td>
<td>50</td>
<td>Human resource management</td>
<td>2</td>
<td>1.5</td>
</tr>
<tr>
<td>7.</td>
<td>Local municipality</td>
<td>300</td>
<td>90</td>
<td>Appeals and sketch plans</td>
<td>2</td>
<td>0.1</td>
</tr>
<tr>
<td>8.</td>
<td>Medical insurance company</td>
<td>6500</td>
<td>5600</td>
<td>Medical screening and acceptance</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>9.</td>
<td>Bank</td>
<td>3000</td>
<td>68000</td>
<td>Management savings accounts</td>
<td>3</td>
<td>70</td>
</tr>
<tr>
<td>10.</td>
<td>Governmental agency</td>
<td>70</td>
<td>9</td>
<td>Granting of subsidies</td>
<td>2</td>
<td>0.1</td>
</tr>
</tbody>
</table>
Naive approach

WfM implementation

$t_0$  $t_1$

Performance measurement  Performance measurement
Naive approach

WfM implementation

$t_0$  
Performance measurement

$Staff\ reduction$

$t_1$  
Performance measurement
Advanced approach

**before WfM implementation**
- 1a-measurement
- 1b-measurement
- 0-measurement

**after WfM implementation**
- 2a-measurement
- 2b-measurement
- 3-measurement

**Simulation**
- Using initial circumstances
- Using final circumstances

**Real data**
Advanced approach

Simulation using initial circumstances after WfM implementation

Simulation using final circumstances before WfM implementation

Real data

1a-measurement - 2a-measurement
1b-measurement - 2b-measurement
0-measurement - 3-measurement
Advanced approach

before WfM implementation

1a-measurement

1b-measurement

0-measurement

predicted change

“real” change

validation

after WfM implementation

2a-measurement

2b-measurement

3-measurement

“real” data

simulation
using initial circumstances

simulation
using final circumstances

validation
Data gathering, analysis

No support

No official support for ExSpect is available, although we are happy to answer any questions you have about the product.

What we're offering here is the last version of ExSpect, released in 2000. Since then, development has stopped, and its designers rarely use it anymore.
Outcomes – The drop-outs

- **Five out of ten organizations never implemented any workflow**
- **Project overspending:**
  - In the case of the involved governmental agency (organization 1), the workflow implementations had been part of a large automation project. The project ran considerably out of time and over budget. Under pressure of the national court audit, the overall project was stopped, including the workflow implementations.
- **Change of management:**
  - For organizations 2, 5, and 10 the original management that initiated and supported the workflow implementations was replaced. For all three cases, the workflow implementations were terminated.
- **Change of owner:**
  - The insurance intermediary (organization 5) had been part of a much larger insurance company, which decided to sell this part to a foreign investor. The bank (organization 9) was acquired by a larger financial agglomerate. In both cases, the workflow implementations were discontinued as a result.

The Metamorphoses of Workflow Projects in their Early Stages

Thomas Herrmann, Marcel Hoffmann

Informatics & Society, University of Dortmund
August-Schmidt-Str. 12, D-44227 Dortmund,
tel: +49 231 755 4715, fax: +49 231 2012,
e-Mail: thomas.herrmann@udo.edu, marcel.hoffmann@udo.edu

Empirical studies on workflow usually focus on systems which have already been introduced and on the problems with these systems which mainly occur when handling exceptions. This study focuses on the problems occurring in the early stages of projects which intend to introduce workflow systems but do not necessarily succeed: In most cases of the companies under our investigation other types of software were introduced or the business processes were analysed and improved but not automated. We explain this phenomenon by referring to the concept of metamorphoses as observed by Orlikowski who analysed organizational change under the conditions of groupware usage. A number of empirical details of our study of seven companies during a three year period can be related to this concept as well as to literature on workflow: Summarizing our experience we come to a somehow irritating conclusion which we call the workflow paradox: It is sensible under certain circumstances to accept requests for workflow-introduction and to commence such a project since this might be the most promising way leading to alternative solutions.
## Outcomes – The ones that hung in

<table>
<thead>
<tr>
<th>Process</th>
<th>Org. number</th>
<th>Lead time (days)</th>
<th>Service time (minutes)</th>
<th>Wait time (days)</th>
<th>Utilization (rate)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Ex ante</td>
<td>Ex post</td>
<td>Ex ante</td>
<td>Ex post</td>
</tr>
<tr>
<td>Invoice processing</td>
<td>3</td>
<td>15.91</td>
<td>12.90</td>
<td>17.75</td>
<td>14.44</td>
</tr>
<tr>
<td>Invoice processing</td>
<td>4</td>
<td>13.34</td>
<td>11.13</td>
<td>19.6</td>
<td>24.23</td>
</tr>
<tr>
<td>Mutations HRM record</td>
<td>6</td>
<td>9.42</td>
<td>16.88</td>
<td>22.86</td>
<td>5.66</td>
</tr>
<tr>
<td>Processing sick leaves</td>
<td>6</td>
<td>1.91</td>
<td>1.64</td>
<td>13.99</td>
<td>7.21</td>
</tr>
<tr>
<td>Appeals</td>
<td>7</td>
<td>106.00</td>
<td>146.00</td>
<td>24.50</td>
<td>12.60</td>
</tr>
<tr>
<td>Disability insurance acceptance</td>
<td>8</td>
<td>45.51</td>
<td>11.79</td>
<td>59.87</td>
<td>45.53</td>
</tr>
<tr>
<td>Life insurance acceptance</td>
<td>8</td>
<td>20.06</td>
<td>11.84</td>
<td>35.01</td>
<td>29.48</td>
</tr>
</tbody>
</table>

Table 2: Ex ante and ex post measurements workflow implementations  
(*: Resource data was not available)
Outcome – Validation

• For two of the seven processes, it was not possible to validate the 0- and 3-measurement.
• For the appeals process within organization #7, the registrations by the WfMS did not provide reliable data.
• The invoice process within organization #4 turned out to be configured so inherently flexible that no reliable simulation model could be built.
<table>
<thead>
<tr>
<th>Process</th>
<th>Org. number</th>
<th>Lead time change (%)</th>
<th>Service time change (%)</th>
<th>Wait time change (%)</th>
<th>Utilization change (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Prediction (1a-2a)</td>
<td>Real (1b-2b)</td>
<td>Prediction (1a-2b)</td>
<td>Real (1b-2b)</td>
</tr>
<tr>
<td>Invoice processing</td>
<td>3</td>
<td>-25</td>
<td>-20</td>
<td>-2</td>
<td>-26</td>
</tr>
<tr>
<td>Invoice processing</td>
<td>4</td>
<td>-48</td>
<td>**</td>
<td>-32</td>
<td>**</td>
</tr>
<tr>
<td>Mutations HRM records</td>
<td>6</td>
<td>-43</td>
<td>147</td>
<td>-16</td>
<td>-77</td>
</tr>
<tr>
<td>Processing sick leaves</td>
<td>6</td>
<td>-9</td>
<td>-50</td>
<td>-22</td>
<td>-48</td>
</tr>
<tr>
<td>Appeals</td>
<td>7</td>
<td>-48</td>
<td>**</td>
<td>-6</td>
<td>**</td>
</tr>
<tr>
<td>acceptance</td>
<td>8</td>
<td>-18</td>
<td>-61</td>
<td>-2</td>
<td>-38</td>
</tr>
</tbody>
</table>

Table 3: Prediction and comparison

(**: No reliable simulation model for 2b-measurement could be obtained)
Outcomes – Prediction and comparison

- **Prediction vs. Comparison:**
  - For nearly all performance measurements/processes, real contribution much surpassed predicted improvements.

- **Comparison:**
  - For all processes – except one – all performance measures developed in the predicted, positive direction.
  - Smallest decrease is 13% reduction of service time for disability insurance process; all other reductions between 20% and 94%.
Outcomes – the odd process

• For the processing of mutations of HRM records within organization #6, the lead time did not decrease. In fact, the average lead time more than doubled.
• In new set-up, additional control for a HRM manager to check quality of the data as entered by the department and to authorize the mutation. While a routine task, not given much priority by HRM managers.
• It did not worry the organization that much: They realized a 77% reduction of average service time per case.
## Outcomes – Was the method worth it?

<table>
<thead>
<tr>
<th>Process</th>
<th>Org</th>
<th>Lead time (days)</th>
<th>Service time (minutes)</th>
<th>Wait time (days)</th>
<th>Utilization (rate)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>0-3</td>
<td>1b-2b</td>
<td>0-3</td>
<td>1b-2b</td>
</tr>
<tr>
<td>Invoice processing</td>
<td>3</td>
<td>-3.01 (-19%)</td>
<td>-3.37 (-20%)</td>
<td>-3.31 (-19%)</td>
<td>-5.01 (-26%)</td>
</tr>
<tr>
<td>Invoice processing</td>
<td>4</td>
<td>-2.21 (-17%)</td>
<td>**</td>
<td>4.63 (24%)</td>
<td>**</td>
</tr>
<tr>
<td>Mutations HRM record</td>
<td>6</td>
<td>7.46 (79%)</td>
<td>10.08 (147%)</td>
<td>-17.2 (-75%)</td>
<td>-19.24 (-77%)</td>
</tr>
<tr>
<td>Processing sick leaves</td>
<td>6</td>
<td>-0.27 (-14%)</td>
<td>-1.93 (-50%)</td>
<td>-6.78 (-18%)</td>
<td>-6.56 (-48%)</td>
</tr>
<tr>
<td>Appeals</td>
<td>7</td>
<td>-40.00 (38%)</td>
<td>**</td>
<td>-11.9 (-49%)</td>
<td>**</td>
</tr>
<tr>
<td>Disability insurance acceptance</td>
<td>8</td>
<td>-8.23 (-41%)</td>
<td>-23.69 (-67%)</td>
<td>-14.34 (-24%)</td>
<td>-7.00 (-13%)</td>
</tr>
<tr>
<td>Life insurance acceptance</td>
<td>8</td>
<td>-33.72 (-74%)</td>
<td>-18.67 (-61%)</td>
<td>-5.53 (-16%)</td>
<td>-17.88 (-38%)</td>
</tr>
</tbody>
</table>

Table 4: Straightforward vs. simulated comparison
(*: Resource data was not available; **: No reliable simulation model for 2b-measurement could be obtained)
# Implementation success

<table>
<thead>
<tr>
<th></th>
<th>Application management</th>
<th>Redesign</th>
<th>Management support</th>
<th>Change strategy</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.</td>
<td>Regional public works department</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>4.</td>
<td>Local municipality</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>6.</td>
<td>Domiciliary care agency</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>7.</td>
<td>Local municipality</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>8.</td>
<td>Medical insurance company</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

Table 5: Success factors WfMS implementation.
We consciously decided not to change too much. We did not want to change both the procedure and the technology.

We more or less implemented the as-is situation.
On change strategy

From the moment on that you implement a digital procedure, you should allow ‘no escape’ to follow the paper procedure still.
On change strategy

We are big enough to reap the benefits of using a WfMS, but we are not too big so that no-one knows each other. That is the perfect balance.

Because our unit is a small one, we were able to manage the project ourselves; our application management was able to implement changes to the workflow itself, which is a ‘must have’: Otherwise, the system will not be accepted by the end users.
Insights

• From a workflow perspective:
  • High failure rates
  • Great benefits when not-failed

• From a methodology perspective:
  • Better insights than naïve comparisons
  • Simulation is a powerful, underused tool

• From the “doing research” perspective:
  • Research on basis of student projects
  • Journal paper submissions have no deadlines