LECTURE 4: BUSINESS ARCHITECTURE ASPECTS: BUSINESS PROCESS REDESIGN/REENGINEERING
Lecture Contents

• Where are we now?
• Business Process Management Timeline
• Recap & More on Business Processes
  – Dimensionality & Different levels of change
• Process Change in Theory - BP Redesign/Reengineering:
  – Hammer’s Theory of Process Change
  – Davenport and Short’s Methodology for Process Change
  – IT & Business Processes
• Success & Failure in BPR Projects:
  – Examples in practice: Private & Public Sector
  – What Good Ol’ Meaty Statistics tell us about BPR Success...
• A Mention for Robotic Process Automation (RPA)
Components of EA Covered on the Course

The Open Group Architecture Framework (TOGAF)’s Perspective of Enterprise Architecture

Business Architecture
- Descriptions of an Organization (Business model, MSGs, operating model).
- Business processes & workflows.
- Stakeholders and their roles and relationships.
- Business rules (what the actors must do in a BP)
- A lot about Process Change
  - Process Reengineering & Process Change,
  - Quality Movement
- BPMN, UML Use Case Models
SECTION 4.1: INTRODUCTION
BPM Timeline (the Whole Truth)

- **Origins in manufacturing (1700s):**
  - Originally one person making an item from start to finish
  - Development/Specialisation: division of labour (Adam Smith)
  - Analysis of Specialised Tasks/ 'Time & Motion' Studies (1900s)

- **Workflow (mid-1940s):**
  - Document-based at a departmental process level

- **The Quality Era (1980s):**
  - Continuous improvement (Total Quality Mgmt (TQM)- Deming & Juran, 6Sigma etc)

- **Business Process Reengineering (BPR) (1990s)**
  - Revolution V Evolution (Hammer & Champy)

- **Business Process Management/Modelling (2000s)**
  - Multilevel, whole organization process integration & modelling

- **Robot Process Automation (2010s)**
Recall: What is a Business Process?

- A collection of inter-related work tasks, initiated in response to an event, that achieves a specific result for the customer of the process.
Fundamental Question: Why Change a Business Process?

- **Business Process Management (BPM):**
  - Body of principles, methods & tools to design, analyse, execute & monitor BPs
  - BPM bridges IT and business, as many/most IT projects in enterprises are ultimately aimed at improving a BP

![Diagram showing the relationship between Information Technology, Process Change, and Business Value](Image)
Stages in Business Process Change

This is where we got to with Workflow Modelling

Source: Vakola et al. (1998)
Recap Aside: Some Examples of What is and What is **Not** a Business Process

<table>
<thead>
<tr>
<th>Suggested Process?</th>
<th>Actually Called</th>
<th>If not a Business Process, why not?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer Relationship Management</td>
<td>Process Area</td>
<td>Doesn't deliver a single, specific result.</td>
</tr>
<tr>
<td>Acquire new Customer</td>
<td>Business Process</td>
<td>Delivers a single, specific result and meets all other criteria. End-to-end BP.</td>
</tr>
<tr>
<td>Setup new Customer</td>
<td>Subprocess</td>
<td>Too small – delivers specific results but they are intermediate results in an end-to-end BP.</td>
</tr>
<tr>
<td>Calculate Credit Limit</td>
<td>Activity/ step/ task...</td>
<td>Much, much too small – a single step or instruction. Possibly one line in a procedure or step in a use case.</td>
</tr>
<tr>
<td>“Oracle CRM Process”</td>
<td>System</td>
<td>Doesn't deliver a single, specific result; a system that supports multiple Business Processes.</td>
</tr>
<tr>
<td>“Our e-business process”</td>
<td>Technology</td>
<td>Doesn't deliver a single, specific result; technology employed by multiple BP's.</td>
</tr>
</tbody>
</table>
Dimensionality of Processes

• Processes are identified in terms of:
  – Beginning/ end points, interfaces, organisation units (esp customer-facing)

• They can be defined based on three dimensions:

1. **Entities:**
   – Processes happen between organisational entities
   – i.e. Interorganisational (e.g. e-Commerce), interfunctional or Interpersonal
   – Heavily reliant on shared IT (known as *Groupware* (over))

2. **Objects:**
   – Processes result in manipulation of objects.
   – These objects could be *Physical* or *Informational*.

3. **Activities:**
   – Processes could involve two types of activities:
     – i.e. Managerial (e.g. develop a budget) and Operational (e.g. fill a customer order).
Dimensionality of Processes (/2)

- **Groupware**

  - Now many forms depending on space and time synchronicity

  ![Groupware Matrix Diagram]

  By Momo54 at English Wikipedia  https://commons.wikimedia.org/w/index.php?curid=6404249
SECTION 4.2: PROCESS CHANGE
Process Change

• *Levels of process change*

Three levels at which to consider process change:

– Business Process re-engineering (BPR)
  - Used at strategic level and at high risk
  - Often when major threats/ opportunities in external environment
  - Usually prompts basic re-think of large-scale core processes critical to value chain.

– Business Process redesign (also BPR)
  - Intermediate scale change, apt for medium-sized BPs requiring extensive change.
  - Efforts often result in changed job descriptions and intro of some automation.

– Business Process improvement/ Continuous Process Improvement (CPI)
  - Tactical level, incremental technique that is appropriate for developing smaller, stable, existing processes.
  - It can often be undertaken using a Six Sigma approach.
Process Change (/2)

- For efficient & effective process change, it is important that the level of process change is appropriate to the process concerned.
- However, the level of process change required is also likely to reflect the process capability maturity of the business
  - For a business with mature process capabilities, Process Improvement efforts are more or less continuous, undertaken by managers and process teams.
  - If a business has a low degree of process maturity then a Process Redesign effort might be required to establish the initial process capabilities.
  - With Process Reengineering should really only consider carrying out process change on 10-15% of processes at any given time, given risk & disruption.
Michael Hammer’s Principles of Reengineering

• As a key enabler of BPR should use IT to challenge the inherent assumptions from before the advent of modern ICT

• Core of reengineering is "discontinuous thinking -- or recognising and breaking away from dated rules/ assumptions underlying operations..."

• Key Principles:
  – Organise around outcomes, not tasks;
  – Have those who use the output of the process perform the process;
  – Subsume info-processing work into the real work producing the info;
  – Treat geographically dispersed resources as if they were centralised;
  – Link parallel activities instead of integrating their results;
  – Put decision point where work is done & build control into process;
  – Capture information once and at the source.
“The new industrial engineering” (Davenport & Short)

- BPR requires broader view of both IT and business activity, and relationships between them:
  - IT — more than an automating or mechanising force: to fundamentally reshape the way business is done.
  - Business activities — more than a collection of individual or even functional tasks.
- IT and BPR have a recursive relationship:
  - IT capabilities should support business processes,
  - Business Processes should be in terms of potential capabilities of IT.
  - Shouldn’t ask: how can we automate the process?
  - But: what can new forms of IT bring to the BP?
“The new industrial engineering”  
(Davenport & Short) (/2)

• How IT capabilities can affect the organisation

  – Transactional  — transform unstructured BPs into routinized transactions
  – Sequential  — can enable changes in the sequence of tasks
  – Automational  — replace or reduce human labour in a BP
  – Disintermediation — connect 2 parties in a BP that would otherwise talk thro an intermediary (more later)
  – Analytical  — bring complex analytical methods to bear on a BP
  – Informational  — bring vast amounts of detailed data into BP (i.e. Big Data)
  – Knowledge Management  — allows capture/ dissemination of knowledge
  – Tracking  — allows detailed tracking of task status
  – Geographical  — transform info quickly/ easily across large distances
Davenport and Short’s BPR Methodology.
• Assuming Organizations want to change a process, how to execute?
• Davenport & Short’s five-step (fairly generic) approach to BPR*:
  1. Develop the Business Vision and Process Objectives:
     o Prioritise objectives and set stretch targets
  2. Identify the Processes to be Redesigned:
     o Identify critical or bottleneck processes
  3. Understand and Measure the Existing Processes:
     o Identify current problems and set baseline
  4. Identify IT Levers:
     o Brainstorm new process approaches
  5. Design and Build a Prototype of the New Process:
     o Implement organisational and technical aspects
More on Business Process Redesign & IT

- According to Teng, the way related functions participate in a BP (functional coupling of a process) can be differentiated along two dimensions:
  - **degree of mediation** - extent of sequential flow of input and output among participating functions
  - **degree of collaboration** - extent of info exchange & mutual adjustment among functions when participating in same BP.
    - Frequency & intensity of info exchange between two functions ranges from none (completely insulated) to extensive (highly collaborative).
    - Many BPs can be improved by increasing the degree of collaboration.
    - This frequently involves extensive use of Groupware (as seen above)
Degree of Mediation (Teng)
**Functional Coupling Framework of Business Processes**

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**Insulated**

- **Coupling Pattern**: Functions participate in the process sequentially with no mutual information exchange.
- **Environment**: Participating functions are sequentially dependent and face low level of uncertainty in I/O requirements.
- **Example**: Sales function (A) sends customer order to inventory function (B) for shipping.

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**Collaborative**

- **Coupling Pattern**: Functions participate in the process sequentially with mutual information exchange.
- **Environment**: Participating functions are sequentially dependent and face high level of uncertainty in I/O requirements.
- **Example**: Engineering (A) provides manufacturing design specifications to production (B) with frequent consultation between A and B.

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**Direct**

- **Coupling Pattern**: Functions participate directly in producing the process outcome with no mutual information exchange.
- **Environment**: Participating functions are sequentially independent and face low level of uncertainty in I/O requirements.
- **Example**: Recruiting workers (A) and equipment requisition (B) participate directly in establishing a new plant with no consultation between A and B.

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**Indirect**

- **Coupling Pattern**: Functions participate directly in producing the process outcome with mutual information exchange.
- **Environment**: Participating functions are sequentially independent and face high level of uncertainty in I/O requirements.
- **Example**: Advertising (A) and production (B) directly participate in launching a new product with frequent consultation between A and B.
Functional Coupling Framework of BPs(/2)

- ICT lowers *Degree of Mediation* & enhances *Degree of Collaboration*.
- Innovative ICT facilitate new, coordination-intensive structures:
  - Making use of Cloud Storage and virtualization
  - Utilising Expert systems, Big Data etc
  - Groupware
- Enables them to coordinate their activities in ways that were not possible before to develop business advantage.
- Such coordination-intensive structures raise org's capabilities & responsiveness, can lead to strategic advantages.
Power of Information Technology (aka ICT)

• IT creates a “public good” i.e. a resource that can be accessed by many functions.
  - Shared info resource not used up by usage, retains value for others
  - Provides comprehensive info that facilitates accomplishment of process objectives on a more global basis.
  - **Caveat**: have to be very careful of data (not the same as info!):
    o Datasets often huge (PB), multi-dimensional, noisy & unstructured
    o So info from this is very challenging harvest even for modern computing resources (AI/ ML for Cloud/HPC resources)
    o Also lots of messy ethical, proprietorial issues in data use, storage
A Bit About Big Data/ Data Analytics (DA)

- DA works on Big Data to uncover hidden patterns, unknown correlations, market trends, customer preferences and other useful business info.

- Some facts about Big Data (from IBM):
  1. **Volume**
     - Up to 2003, created $5 \times 10^{18}$ Bytes of Data.
     - In 2011, generated the same every 2 days.
     - In 2013, same created every 10 min.
     - In Future???
  2. **Variety**
     - Types un/structured data (e.g. text, audio, video, -omics).
     - Est.d 2 Bn smartphones in 2015 giving out sensor data.
     - Govt monitors live video feeds from $5 \times 10^{8}$ of surveillance cameras.
  3. **Add the other V’s: Velocity & Veracity**
SECTION 4.3: BUSINESS PROCESS RE-ENGINEERING IMPLEMENTATION IN PRACTICE
What this Topic Focuses On

• Background History to BPR
• Case Studies of BPR Implementation in the Private Sector
  – Case Study 1: Ford Procurement
  – Case Study 2: IBM Credit
• Motivations for Change in Public Sector
• Reasons for differences between Public Sector Organizations (PSOs) and their Private Sector Counterparts
• Characteristics of Public Sector Organizations
• Case Studies of BPR Implementation in PSOs
  – Case Study 3: Housing Development Board in Singapore
  – Case Study 4: PubliCorp in Brazil
• Summary
Background: Some History

• BPR has been widely adopted by private businesses and has been a focus of research since the 1990s.
• Many private sector examples of (not always successful) BPR implementation over last two decades (we will look at two).
• As we will see, BPR still one of the top five management concerns for information technology (IT) executives globally.
• However, public sector adoption of BPR, (especially in developing economies), is relatively recent and little researched.
• We will look at two examples of this (in this lecture)
Case Study 1: The Ford Case Study [1]

• Background/Problems:
  – Ford needed to review its procurement process to:
    o Do it cheaper (cut costs)
    o Do it faster (reduce turnaround times)
    o Do it better (reduce error rates)
  – Accounts payable in N. America alone employed > 500 people
  – Turnaround times for processing POs/invoices O(weeks)

• Possible Fix:
  – Automation would bring 20% saving but Ford chose not to - Why?
    o technology needed for automation not available?
    o cannot develop the technology to automate the process?
    o not enough computers/computer-literate employees at Ford?
  – Correct answer: Mazda showed how to do it with 15 people! 人馬一体???
Case Study 1: Ford As-Is Process (cont'd)
Case Study 2: Ford To-Be Process (cont'd)

- **Purchasing**
- **Vendor**
- **Receiving**
- **Database**
- **Accounts Payable**

*Diagram shows the process flow starting with a Purchase Order, followed by Goods received by the Receiving department. Then, the database is updated, and最后支付给供应商.*

**Diagram Details:**
- Purchase Order from Purchasing to Vendor
- Goods from Vendor to Receiving
- Database update from Receiving
- Payment from Accounts Payable to Vendor

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*Lecture 4: Business Process Redesign/Reengineering*  CA4101 Lecture Notes (Martin Crane 2019)
Case Study 1: The Ford Case Study (cont'd)

- **Ford Motor Corp.**
  - **Old process** involved 3 functions - purchasing, receiving and accounts payable
  - All participated *indirectly*
  - Sequential document flow
  - **New process** uses shared database
  - Every function participates *directly*
  - 75% reduction in work-force (500 -> 125)

This is an example of reducing mediation through IT
Case Study 2: IBM Credit [2]

- **IBM Credit Corp**
  - Finances goods and services that IBM sells.
  - Five steps:
    1. On a request from an IBM field sales rep an operator in the central office wrote down the request on a piece of paper.
    2. Request sent to Credit Dept - specialist checked client creditworthiness,
       - Specialist wrote result on piece of paper & sent to Business Practices
    3. Business Practices customised the standard loan covenant to the client. Special terms attached to the request if necessary.
    4. Request went to Price Dept where Pricer assigned interest rate.
    5. Admin dept wrote a quote letter for the field sales rep.
       - Field sales rep passed quote letter to client
Case Study 2: IBM Credit (cont'd)

Field Sales Rep

Central Office

Credit Department

Business Practices Department

Price Department

Admin Department

Make financing request

Record request

Check credit-worthyness

Go back to customer

Quote to customer

Determine interest rate

Write a quote

Customise loan agreement

no

yes
Case Study 2: IBM Credit — Problems & Attempted Fix

1. Process took six days on average.
2. Meantime customer could be seduced by another vendor.
3. Request couldn’t be tracked.

Attempted Fix
- Install a control desk, so they could answer the sale representative's question about the status of the request.
- Request not forwarded to the next step in the chain,
- Instead, each dept sent request to control to log before sending it out again
- Solved tracking problem, but took yet more time.
Case Study 2: IBM Credit (cont'd)

Field Sales Rep

Make financing request

Record request

Central Office

Check credit-worthyness

Credit Department

log

Yes

Customise loan agreement

log

Business Practices Department

log

Price Department

log

Admin Department

log

Determine interest rate

Write a quote

Go back to customer

Quote to customer
Case Study 2: IBM Credit (cont'd) – Investigation & Solution

- 2 IBM senior mgrs walked a request thro all 5 steps.
- Performing the actual work took 90 minutes.
- Problem not in tasks/people performing them, but BP structure.
- IBM Credit replaced its specialists (credit checkers, pricers) with generalists who process entire request from start to finish.
- Old process design assumes every bid request was unique & difficult to process. WRONG! most simple & straightforward:
  - Find credit rating in DB; Plug numbers into a model; Pull clauses from a file.
- Easily done by single individual supported by an easy-to-use expert system which IBM Credit developed.
- In most cases, the system provides guidance and data to generalists.
- Otherwise, a few real specialists working in the same team can help.
Case Study 2: IBM Credit (cont'd) - gains

- Turnaround reduced from six days to four hours.
- Dramatic performance breakthrough by making a radical change to the process - i.e. reengineering.
- IBM Credit didn't ask, "how do we improve the calculation of a financing quote? How do we enhance credit checking?"
- Instead, it asked "How to improve entire credit issuance process?"
- In making its radical change, IBM Credit shattered the assumption that every request needed specialists.
Motivations for Public Sector Change

• Recently many Public Sector Orgs (PSOs) are following in footsteps of Private Sector Orgs:
  – Due to competitive pressures (direct competition with Private Orgs)
  – Public demands for (e.g.) better accountability, more efficiency, greater customer satisfaction, 'reinvention of govt' etc
  – Developments in IT (Cloud, Data Analytics, 'Big Computing', PDAs....)

• “While PSOs may not operate in the same competitive envt, changes in management philosophies are causing them to think and act like private orgs” [3]

• “Competitive pressures and changes in IT constantly force orgs to re-evaluate their business strategies” [4]
Differences Between PSOs & Private Sector Counterparts

Rainey [5] summarized differences between these 2 groups:

- Environmental Factors:
  - PSOs generally tend to have less market exposure, resulting in lack of incentive for productivity & efficiency
  - Also tend to have lower availability of market information
  - Hierarchical, external, political & legal constraints (e.g. no 'hire & fire')

- Organization-Environment Environment Transactions
  - PSOs interacting more frequently with the public due to nature of orgs
  - PSOs coming under heavy scrutiny from public/private officials
  - High levels of 'red-tape' & responsibilities across org boundaries
  - Frequent turnover of admin/support staff (=> loss of org memory)
Differences Between PSOs & Private Sector Counterparts (cont'd)

- **Internal Structure and Politics:**
  - Most PSOs have conflicting and intangible politics
  - Top managers tend to be more politically motivated (=> their decisions)
  - Can often be little incentive for employees to take part in BPR effort

- Rainey [5] found that unique factors of PSOs have big impact on BPR in these organizations, e.g. in:
  - Deciding on implementing BPR
  - Setting objectives for BPR
  - Carrying out BPR action
Further Characteristics of PSOs

- **Culture (From Harrington et al [6]):**
  - PSOs find it hard to implement BPR due to prevailing culture & politics
  - Problems arise as changes BPR causes are affected by culture & politics

- **Authority (From Eccles [7]):**
  - During BPR many PSOs don't empower employees, authority pushed down
  - “BPR empowerment can become little more than delegation: responsibility pushed down but staff don't gain empowerment”
  - No apparent inconsistency in BPR where delayering is advocated thro implementation of hierarchical/dictatorial methods!

- **Obstacles (From Hutton [8]):**
  - Traditional Attitudes emphasize continuity, predictability & fairness
  - Lack of senior mgmt buy-in/willingness to take risks, Not seeing business needs.
  - Other obstacles: communication with staff, initiative fatigue
Case Study 3: Housing & Devpt Board in Singapore

- **Case Study from Tong et al [9]**
  - HDB est'd Singapore, 1960 to provide high quality housing to Singapore Public
  - 1947 Singapore had ‘world's worst slum’, >0.5M in slums as lack of good homes
  - HDB increased housing: 8% to 86% by 1998, gave financial/admin services

- **Why was BPR initiated for HDB in 1998?**
  - Pre-98, HDB was organised around District Branch Offices (DBOs) with a complex structure with multiple layers of authority
  - DBOs had 5 specialized counters: finance, carparks, renovation, maintenance and Lease/Tenancy spread over separate floors
  - Visits to HDB were Tedious:
    - Repairs: Apply at Renovation Counter, then queue at Finance Counter to pay finally, return to Renovation Counter to collect permit
    - Reported counter waiting time up to 40 minutes! Up to 200 people per queue!
Case Study 3: HDB in Singapore (cont'd)

• **Solution:**
  - Neutral Mgmt Services Team in model Branch Office for 1 year intensive study
  - Studied the workflow of the as-is process.

• **After BPR:**
  - 'One stop service' created by merging five specialized counters into just two:
    - Housing Finance & Housing Services
  - Extensive use of:
    - IS, e.g. 'groupware' to support new processes
    - Flatter management structure with fewer middle management roles
  - Dramatic improvements post BPR:
    - Waiting times at HF counter down 97%; unanswered calls down 85%
    - Mean time to process maintenance request down 78% in two weeks
    - Savings of S$1M annually, staff morale up etc
Case Study 3 (cont'd)

• **Lessons for PSOs from HDB Case Study**

  – Most PSOs resist change => use social/political pressures for BPR change (social from press, political from legislative change).
  
  – Also press publicity is a powerful change agent, driving staff to BPR change with public attitudes.
  
  – Neutral staff in BPR team draws on expertise from other departments and helps overcome resistance.
  
  – Higher management support/approval is essential. In the HDB case, this was confirmed by interviews of staff post-BPR.
  
  – Hard to assess PSO improvements, so pilot site impln used for public/political buy-in (political/financial) for further project resources.
Case Study 4: PublicCorp Case Study from [10]

• Background to PublicCorp (a pseudonym)
  – PublicCorp (PC) was a large Civil Engineering Org in Brazil
  – Had technical/clerical side with politics behind 10-20% of management posts
  – BPR done due to building industry deregulation (due to standards eg ISO9000)
  – PC had a monopoly in local regulatory enforcement, e.g. land & building inspection (compulsory and closed to competition).

⇒ Current processes faced obsolescence

• Prior to BPR
  – To aid BPR, PC got 2 big companies to support technical, methodological sides
  1. BPR methods from multi-national Management Consulting Company (OR)
  2. IT company (with previous experience in the construction industry) tasked with setting up new IT systems for PC, & support of BP changes proposed by OR
Case Study 4: PublicCorp (cont'd)

Implementation of BPR: IT Company's Findings:
1. Central Processing Dept was main BP bottleneck
2. Must run jobs on central CPU to meet other depts’ info-intensive needs
3. Number of internal points of contact in core BPs
4. Negatively affected efficiency & QoS PublicCorp provided, as many separate organizational sub-groups involved in execution of core BPs.

Implementation of BPR: OR Group's Findings:
1. OR's work opposed by PC staff who hindered OR analysis of BPs, adding uncertainty to BPR proposals & related structural change
2. Some BPR proposals failed on legal issues (e.g. common BP of setting up public bids was complex/ cluttered with needless activities)
3. Frustration led OR to move to other tasks, e.g. helping understaffed depts with critical activities like setting up bids and contracts
Case Study 4: PublicCorp (cont'd)

- Reasons for BPR Failure in PublicCorp:
  1. CEO's levelling of political interests with objective goals; started with hard success measures; later any other 'apparently' positive results.
  2. Gradual shift in focus of OR group from core BPR to problem solving & automation of existing BPs.
  3. Hiding failure signs; consciously at first, for self-preservation then unconsciously.

- Lessons that can be learned from PublicCorp Case Study:
  - Immediate outcome can be misleading.
  - Success/Failure viewed differently by separate entities.
  - Effort can stray from original plans for apparently valid reasons.
  - Political issues can influence BPR in public sector more than private.
Summary

• More literature/experience of BPR in the Private Sector
• This doesn't mean it's always successful!
• As we will see, success depends on putting effort into changing the right areas
• Significantly more challenges in Public Sector BPR implementation
  – Motivations for change
  – Organizational structures
  – Politics (internal and external)
SECTION 4.4: SUCCESSFUL REENGINEERING PROJECTS

Based on: Teng, Jeong & Grover, Profiling Successful Reengineering Projects.
The questions

• Are BPR projects aimed at more radical change resulting in higher implementation success?

• If limited attention/ resources must be allocated among the different stages of a BPR project, which stage (or stages) should get more emphasis in order for better results?
Research Model

Re-engineering Project “Radicalness”

Re-engineering Project Stage-Efforts Profile

Re-engineering Project Implementation Success
Comparison of variables

- Re-engineering project radicalness
  - Measured in seven dimensions

- Re-engineering project stage-efforts profile
  - Eight typical stages in a project

- Re-engineering project implementation success
  - Perceived level of success
  - Goal fulfilment.
Stage 1: Identification of BPR opportunities
- Establish a steering committee
- Secure management commitment
- Align with corporate and IT strategies
- Identify major BPs with an “business model”
- Understand customers’ requirements
- Prioritise BPs & select one for implementation

Stage 2: Project preparation
- Plan for organisational change
- Organise a BPR team for the selected BP
- Train the team members
- Plan the project

Stage 3: Analysis of existing BP
- Analyse existing BP structures and flows
- Identify value-adding activities
- Identify opportunities for BP improvement

Stage 4: Development of a BP vision
- Understand BP customers requirements
- Identify BP performance measures
- Set BP performance goal
- Identify IT that enables BP re-design
- Develop a vision for the redesigned BP

Stage 5a: Solution: Technical design
- Develop & evaluate alternative BP designs
- Detailed BP modelling
- Design controls for BP integrity
- IS analysis and design for the new BP
- Prototype and refine the BP design

Stage 5b: Solution: Social design
- Empower customer contact personnel
- Define jobs and incentives
- Develop and foster shared values
- Define skill requirements and career paths
- Design new organisational structure
- Design employee performance measurement
- Design change management programme

Stage 6: BP transformation
- Develop and test rollout plans
- Implement the social and technical design
- Train staff and pilot new BP

Stage 7: BP evaluation
- Monitor performance
- Continuous improvement
Project Radicalness

• Extent of change to:
  1. Patterns of process workflow
  2. Rôles and responsibilites
  3. Measurements and incentives
  4. Organisational structure
  5. Information technology
  6. Shared values
  7. Skills
Success

- Perceived level of success
- Goal fulfilment
  - Cost reduction
  - Cycle-time reduction
  - Customer satisfaction level increase
  - Worker productivity increase
  - Defects reduction
Research sample

- Questionnaires sent to members of the Planning Forum, a professional association focussing on strategic management.
- 239 responses out of 853.
- 105 of the 239 had completed at least one BPR project
- 2/3 of respondents were in manufacturing, financial or service industries
- Most were large companies
Research sample

• 3 most popular processes were:
  − Customer service (13.7%)
  − Product development (13.7%)
  − Order management (10.5%)

• Others were:
  − Business planning and analysis (5.7%)
  − Financial systems (4.8%)
  − Accounting processes (3.8%)
Effort by Stage (averaged from 1 - 5)

- Stage 3: Analysis of existing process 3.94
- Stage 1: Identification of BPR opportunities 3.80
- Stage 4: Development of a process vision 3.63
- Stage 2: Project preparation 3.46
- Stage 6: Process transformation 3.39
- Stage 5a: Solution: Technical design 3.37
- Stage 7: Process evaluation 3.21
- Stage 5b: Solution: Social design 3.09
### Correlation of Radicalness with Success

#### Project Success

<table>
<thead>
<tr>
<th>Overall success level</th>
<th>Patterns of process workflows</th>
<th>Rôles and responsibilities</th>
<th>Performance measurements and incentives</th>
<th>Organisational structure</th>
<th>Information technology applications</th>
<th>Shared value (culture)</th>
<th>Skill requirements</th>
<th>Overall extent of change</th>
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#### Cost Reduction

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<th>.139 .058</th>
<th>.129 .022</th>
<th>.291** .110</th>
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<td>.019 .008</td>
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#### Customer Satisfaction Increase

| Customer satisfaction increase | .258 .187 | .282 * .366 * | .242 .129 | .282 * -.242 | .180 .039 | -.022 .024 | -.112 .024 | .182 |

#### Worker Productivity Increase

| Worker productivity increase | .122 .107 | .159 .431*** | .061 .197 | .131 .069 | .011 -.187 | .047 .053 | -.043 -.132 | .125 |

#### Defects Reduction

| Defects reduction | -.124 -.041 | .151 .113 | -.091 -.380* | .058 -.218 | -.133 -.272 | -.015 -.173 |
Correlation of radicalness with success

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<th>Patterns of process workflows</th>
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<th>Organisational structure</th>
<th>Information technology applications</th>
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<td>Worker productivity increase</td>
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## Correlation of stage efforts with success

<table>
<thead>
<tr>
<th>Project Success</th>
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<th>Process transformation</th>
<th>Process evaluation</th>
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</thead>
<tbody>
<tr>
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<td>.244**</td>
<td>.139</td>
<td>.242**</td>
<td>.199*</td>
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*Lecture 3: Business Process Redesign/Reengineering  CA4101 Lecture Notes (Martin Crane 2018)*
Correlation of stage efforts with success

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## Stage efforts vs. impact on perceived project success

<table>
<thead>
<tr>
<th>Stage</th>
<th>Average effort</th>
<th>Correlation with perceived success</th>
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<tbody>
<tr>
<td>• Stage 3: Analysis of existing process</td>
<td>3.94</td>
<td>.139 (8)</td>
</tr>
<tr>
<td>• Stage 1: Identification of BPR opportunities</td>
<td>3.80</td>
<td>.247 ** (4)</td>
</tr>
<tr>
<td>• Stage 4: Development of a process vision</td>
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<td>.242 ** (6)</td>
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<tr>
<td>• Stage 2: Project preparation</td>
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<td>.244 ** (5)</td>
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<td>• Stage 6: Process transformation</td>
<td>3.39</td>
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<tr>
<td>• Stage 5a: Solution: Technical design</td>
<td>3.37</td>
<td>.199 * (7)</td>
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<tr>
<td>• Stage 7: Process evaluation</td>
<td>3.21</td>
<td>.547 *** (1)</td>
</tr>
<tr>
<td>• Stage 5b: Solution: Social design</td>
<td>3.09</td>
<td>.390 *** (3)</td>
</tr>
</tbody>
</table>
SECTION 4.5: ROBOTIC PROCESS AUTOMATION (RPA): END OF THE (ASSEMBLY) LINE FOR PROCESSES?
Introduction

- Many changes in business over the last decade.....but a large improvement in office data-processing efficiency isn’t one of them.

- Workers are different now:
  - People today mix their time – choose when to work, learn, play, socialize.
  - Work on the move, check work emails in own time.
  - In return, expect to use social apps (maybe on own mobiles) at work.

- Business also different:
  - Valuations less based on physical & and more on soft assets e.g. size of online communities, the data assets held, and ability to convert ‘clicks to cash’.
  - Can scale faster, due to cloud, reaching more thanks to WWW & mobile computing.

- But little growth in office automation/ productivity - Still Need:
  - Paper forms & spreadsheets to gather, organize, analyze, report financial info
  - Manual data entry and aggregation, bespoke report creation
Consequences

• Huge demand for tech solutions to get rid of low-level manual data handling/processing tasks that workforce must fulfil.

• According to McKinsey 2016, ~60% of occupations could have 30% more of their constituent activities automated.

• In time terms, means each team member on a 37.5 hour week could spend up to 10 hours/week on menial tasks.

• These take from primary roles, impacting on QWL.

• Payroll is biggest cost for most businesses.

• McKinsey & Co say that automation could save the West ~$2Tn in wages pa & impact on >130M jobs.

• Not just for clerical staff - even CEOs could free up 20% of their capacity through automation.

Salaries as a percentage of operating expenses:

• 52% health care services
• 50% for-profit services
• 50% educational services
• 22% durable goods manufacturing
• 22% Construction/mining and oil/gas
• 18% retail/wholesale trade
What Robotic Process Automation (RPA) brings

- Fundamental differences to this kind of tech-enabled solution that differ from BPM tooling and other traditional IT dept-dependent solutions:
  - No change to BP’s operation a robot mimics a human tapping keys, building spreadsheets in a similar way. SHs see no basic change to their operating behaviours.
  - Robot training is generally done without code, so it’s quick to do and easy to adapt.
  - IT challenges like implementing complex APIs are removed by re-keying or robotically extracting/uploading data to legacy systems.
  - Not ‘a technology platform’ purchased & operated by IT, so:
    o no big up-front investment and lots of risk required,
    o ‘robots’ are a resource that can be outsourced in the same way as people,
    o they can be individually selected by departmental managers and billed monthly meaning similar contractual flexibility.
  - Means potential end to implicit conflicts between business & technology depts!
Business Processes in which RPA can be used

- Take over repetitive tasks that employees carry out 50-60 times a day
- Periodic reporting, data entry and data analysis
- Mass email generation, archiving, extracting
- Conversion of data formats and graphics
- ERP transactions
- Process lists and file storage
Know your bots

We see RPA handling 3 different levels of complexity. Our bots handle them all.

Task Bots  
Completing processes
Task bots replicate and perform the complex process actions taken by human workers at the presentation layer of any desktop-based application. Task bots are capable of executing multi-step processes by leveraging structured data and by following prescribed processes common in finance and accounting, claims processing and HR administration, to name a few.

Meta Bots  
Facilitating scalability
For organizations looking to apply robotic process automation at scale, Meta bots leverage API-level integrations to create repeatable, complex, system-to-system automations once and share them with Task bots. When combined with Task bots, Meta bots are ideal for complex, multi-skill processes.

IQ Bots  
Thinking and learning
IQ bots learn and adapt over time, becoming as independent as their human counterparts but with fewer errors and for a fraction of the cost. IQ bots uniquely leverage unstructured data and are capable of making decisions based on their accumulated learning and experience.

Core Competence  
Front-end automation
Best at  
Repetitive, rules-based tasks that rely on structured data

Core Competence  
Integration
Best at  
Complex, multi-system dependent processes

Core Competence  
Applying learning to process
Best at  
Managing through fuzzy rules and using unstructured data
RPA Use Case #1: Automotive Sales Assistant

- Robot harvests motor dealership back-office systems data for sales leads.
- Publishes these to dealers’ (separate) CRM system; delivering high quality leads, one lead at a time.
- What alternatives were considered?
  - One-off monthly reports (tried but, with lots of vague leads, salespeople did nothing)
  - Pay an intern/admin to manually capture data & upload it
  - Do nothing
- Benefits:
  - Data accuracy
  - Centrally managed, no need for in-house to support.
  - Legacy system needed
    - manual data aggregation/cleansing before leads sent.
    - Leads to be manually entered into the CRM system.
RPA Use Case #2: Road Works Admin. Assistant

- Robot validates road works requests, takes data from many sources, maps
- Builds up a complete picture of the context of the road work to be undertaken compared to other local traffic planning events.
- What alternatives were considered?
  - Keep admin, tho’ traffic manager knew team would be short-handed in future.
  - Purchase a new works planning system, but no budget for new system.
- Benefits:
  - No need to recruit & train more staff (no lunch-breaks etc.)
  - Lower investment requirement and scales well
  - Systematic; applies rules consistently
  - Easily repeatable
References - 1


References - 2


