

# Imperfect Information: Evolving Systems

Professor John Beckford

Manchester Business School

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IT Leaders Forum

# **Information, Organisation and Management Matters**

**Professor John Beckford PhD, MMS, F.Cyb.S, FRSA**

**Beckford Consulting  
Loughborough University, Department of Information Science**

**IT Leaders Forum  
Manchester Business School  
October 2011**

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  - Chaos Theory, Gleick
  - Complexity Theory, Waldrop

- A tiny change in initial conditions in a system can generate enormous changes in outcome.....
  - Chaos Theory, Gleick
  - Complexity Theory, Waldrop
- And this year there has, for me, been more than a small change in the initial conditions for this thinking!



# A Question?

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- What does every organisation and individual in the world (actually The Universe) depend on for its continued existence?

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- Information



# A Question?

- What does every organisation and individual in the world (actually The Universe) depend on for its continued existence?
- Information
- Every organisation and individual is:
  - A generator of information
  - A consumer of information
  - A function (or product) of information exchange



# Introduction

- Organisation as a function of Information
  - A Model for an Information System
- Essentials of Management
  - The Essential Conflict
  - The Trialogue
- Information and Management
  - Information and Infrastructure
  - Information for Decisions
  - The Mechanism of Management
- Information Strategy
- Re-Introduction



# Organisation as a function of Information

# Organisation as a function of Information

- Any physicists?

# Organisation as a function of Information

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  - The lower the entropy, the greater degree of order

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  - The Big Bang – pure energy exploding!
- Information is the measure of the balance between chaos and death
- An organisation at that balance point is viable

# Organisation as a function of Information

- The viable system

# Organisation as a function of Information

- The viable system
  - cybernetic in its behaviour,
  - is purposeful and ordered, adaptive, learning,
  - dynamic, indescribably complex, opaque
  - runs on information

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- More?
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  - Dudley, 1998, 1999, 2000
  - Espejo, Harnden, Hoverstadt, Haynes

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  - Dudley, 1998, 1999, 2000
  - Espejo, Harnden, Hoverstadt, Haynes, oh yes Kawalek
  - And last week – Mulhaney!

# Organisation as a function of Information

- What could make a good model of an information system to support a viable system?
- A viable system?
- Identify one

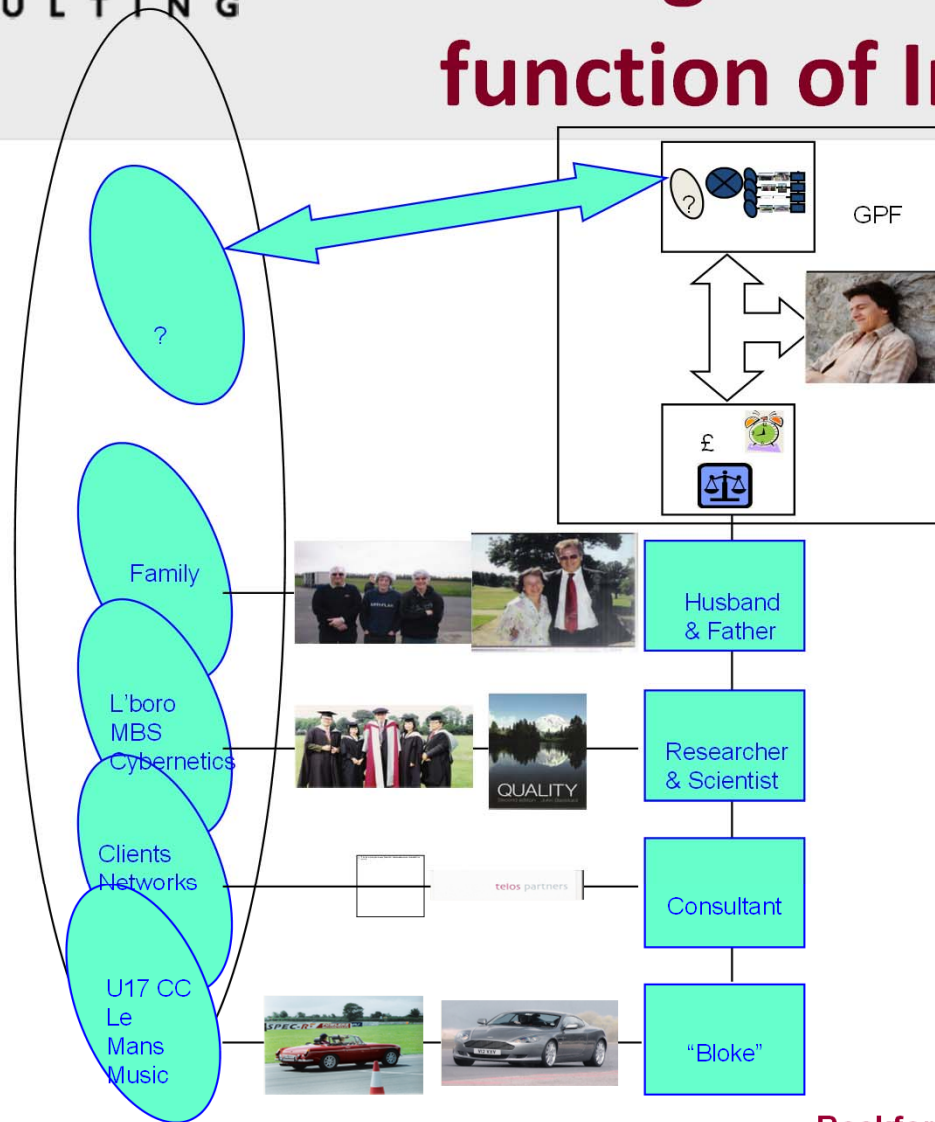
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- The human nervous system?

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- Identify one
- The human nervous system?
- The neuro-cybernetic model for a viable organisation

# Organisation as a function of Information

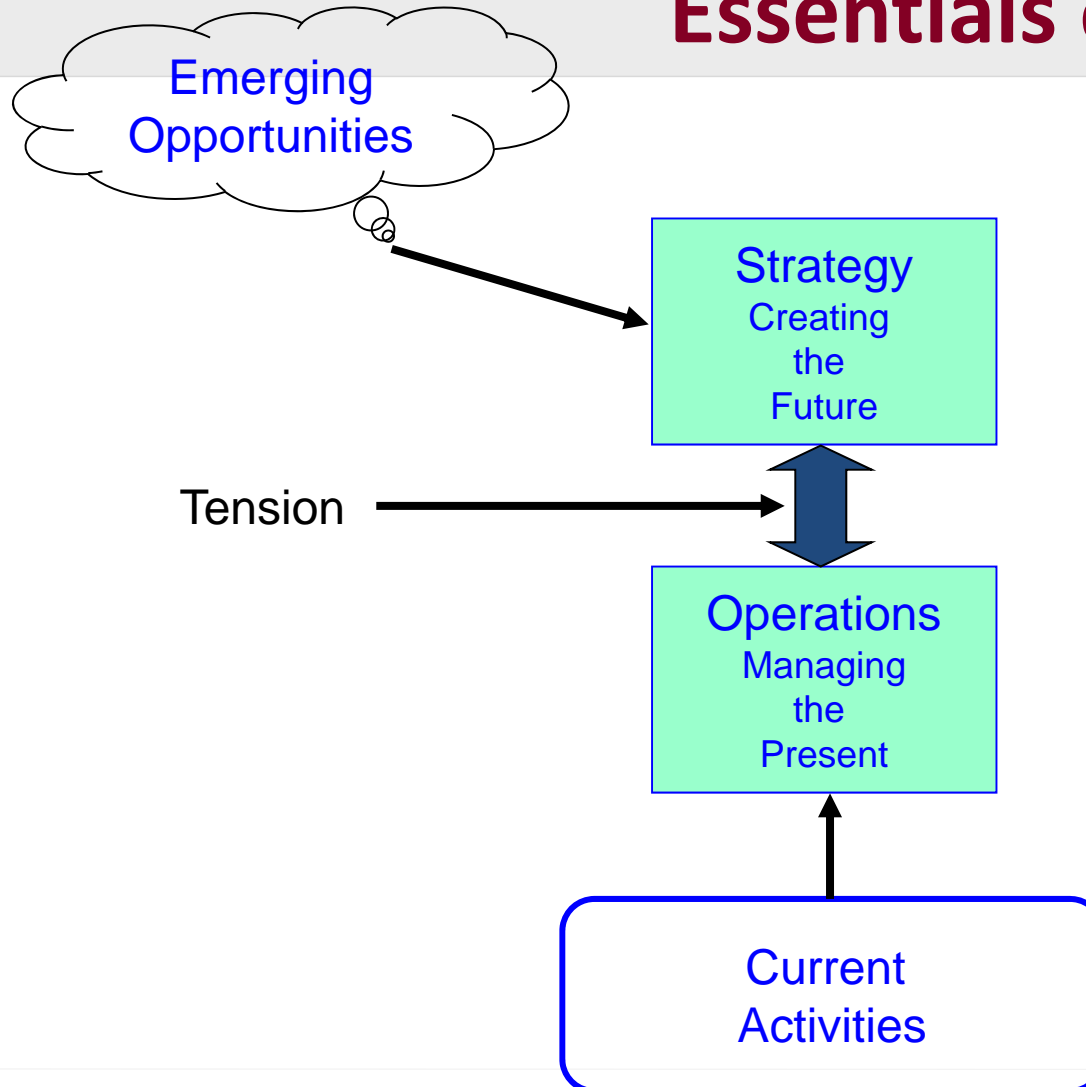




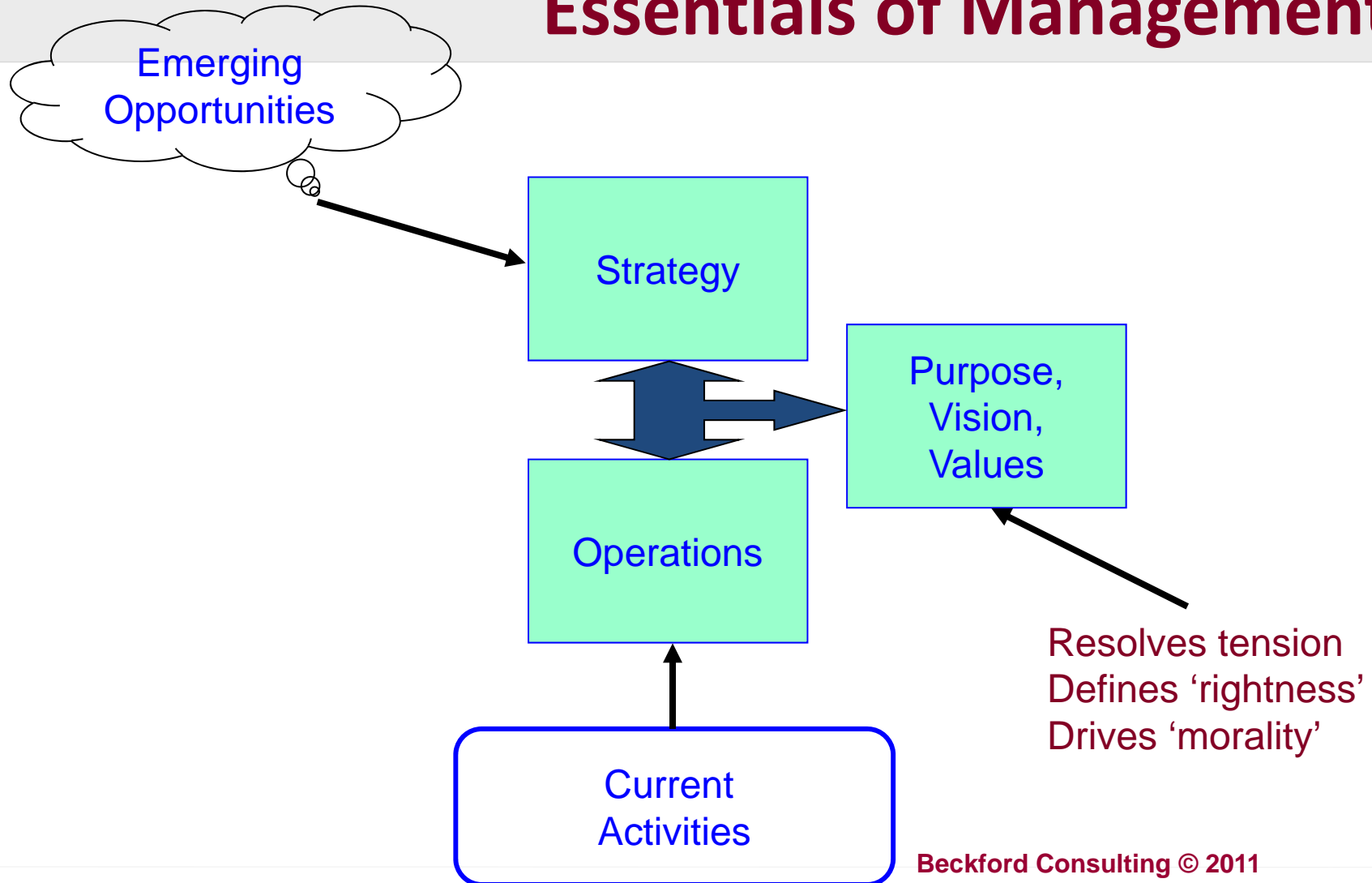


# The Trialogue: Essentials of Management!

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# The Trialogue: Essentials of Management!



- Adopting a new paradigm
- Einstein on madness?
  - “Doing the same thing and expecting a different result”
- If we want to change the way things work (and it rather looks like we need to) then we need to adopt different methods
- Ageing Infrastructure
  - Congestion, Beyond Design Capacity, Questionable Resilience
  - Potential for Systemic or Cascade Failure
    - Rooted in increasing and often unrecognised interdependence
- Especially on ICT

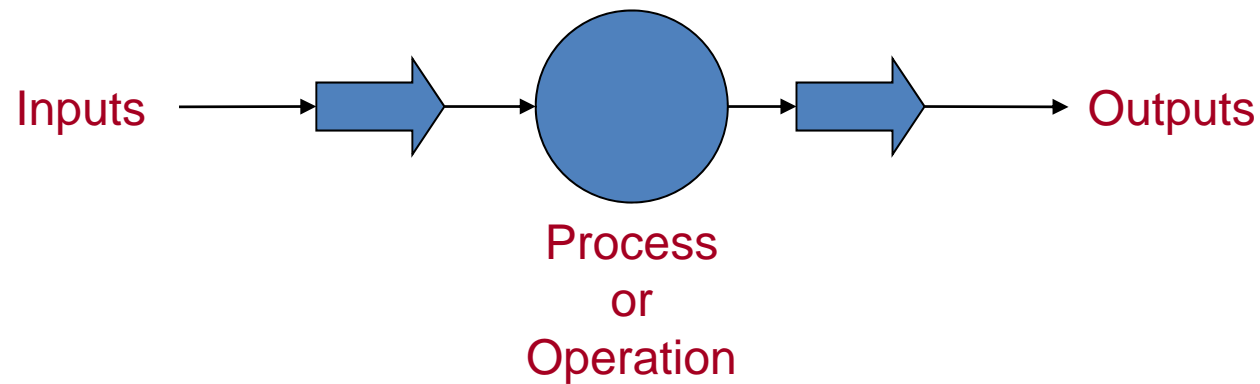
# The Challenges

- Adopting a new paradigm
- We are beginning the 3<sup>rd</sup> generation of Information Systems investment, this time it's a REAL challenge!

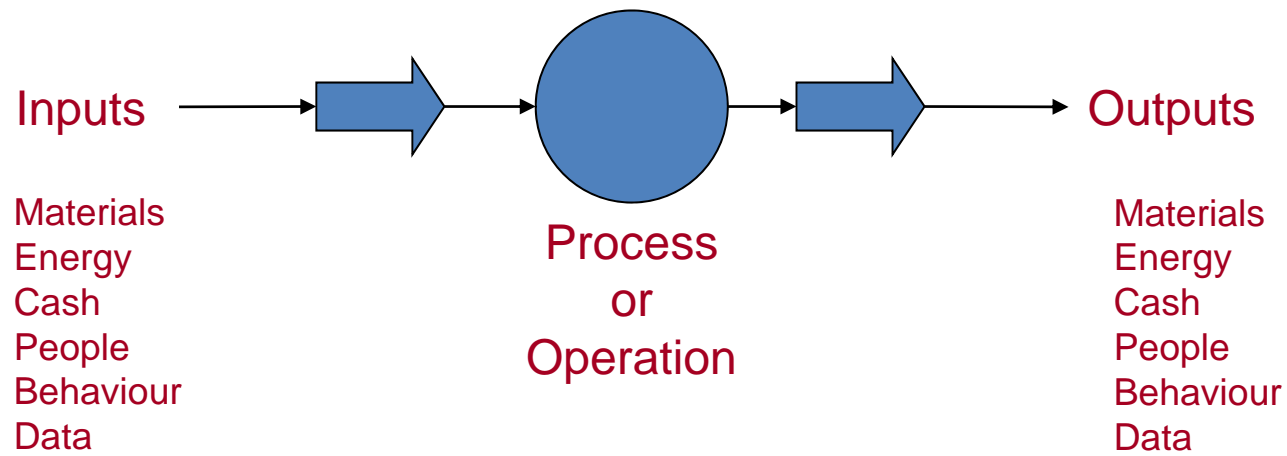


# Information and Management

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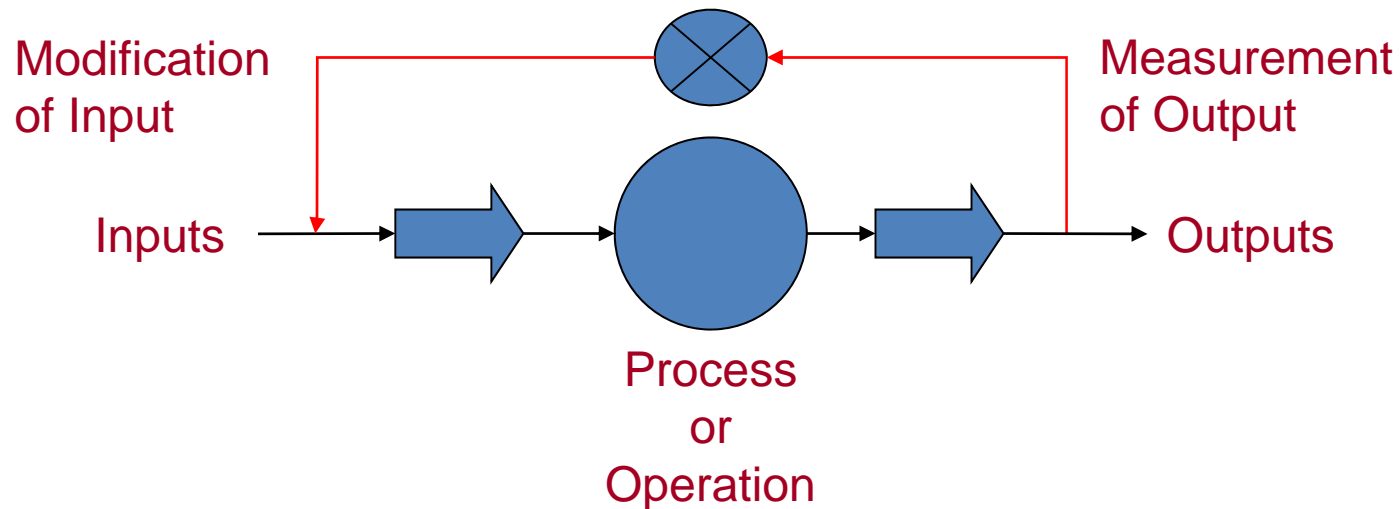
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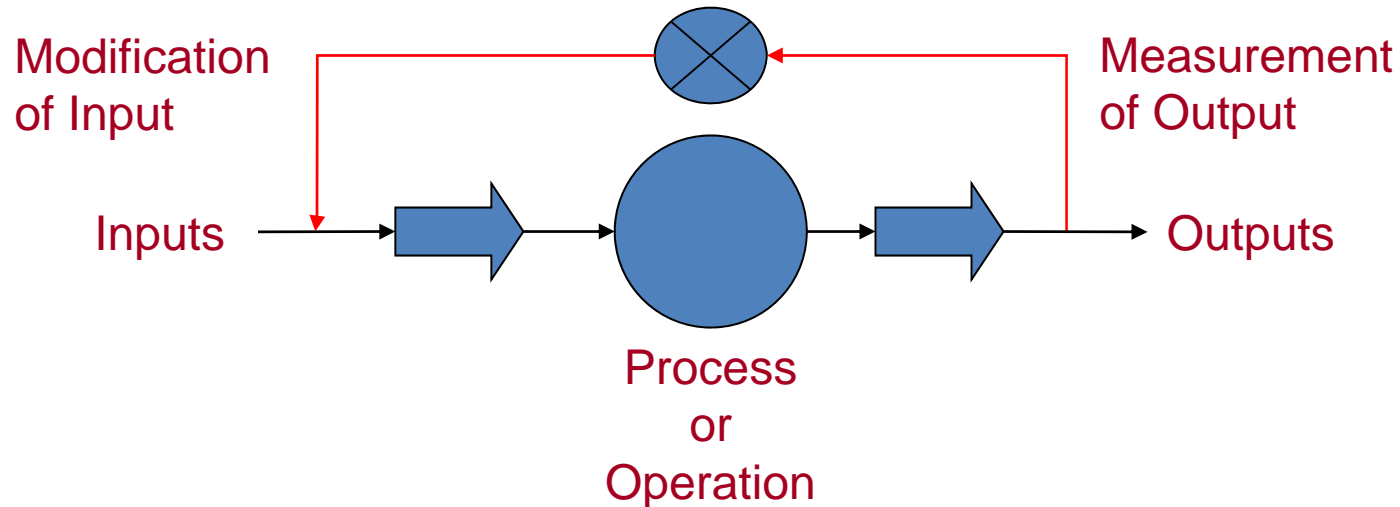
## Information for Decisions



# Information and Management

Did we do things right?  
How could we do better?

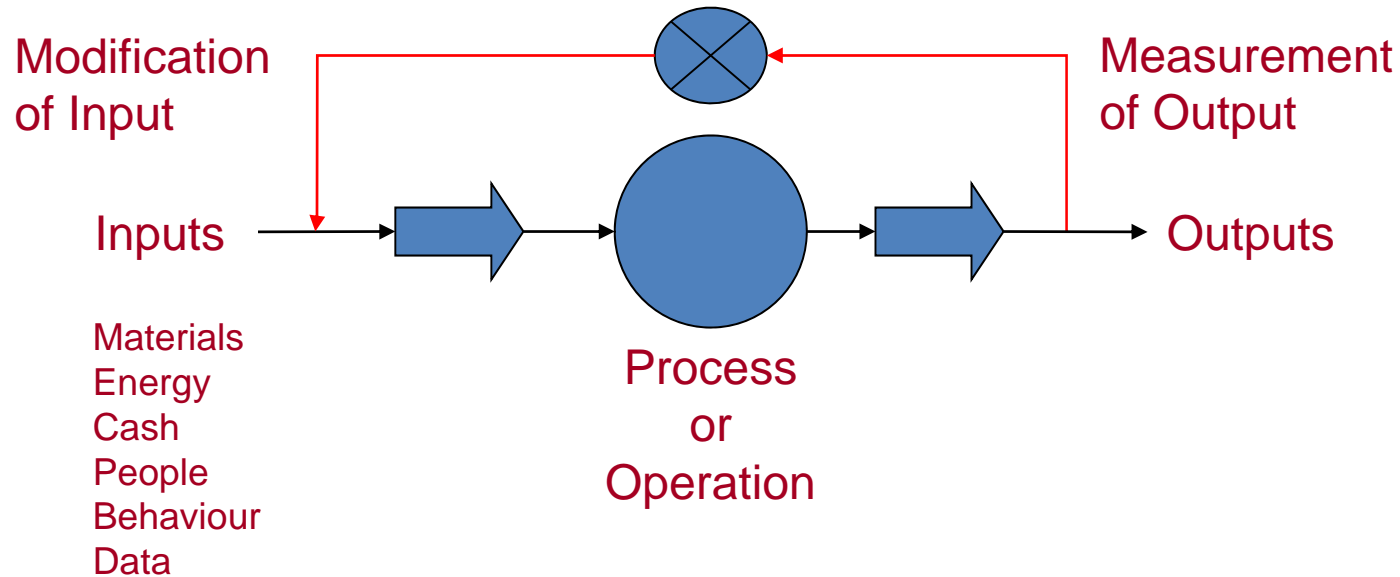
Information for Decisions



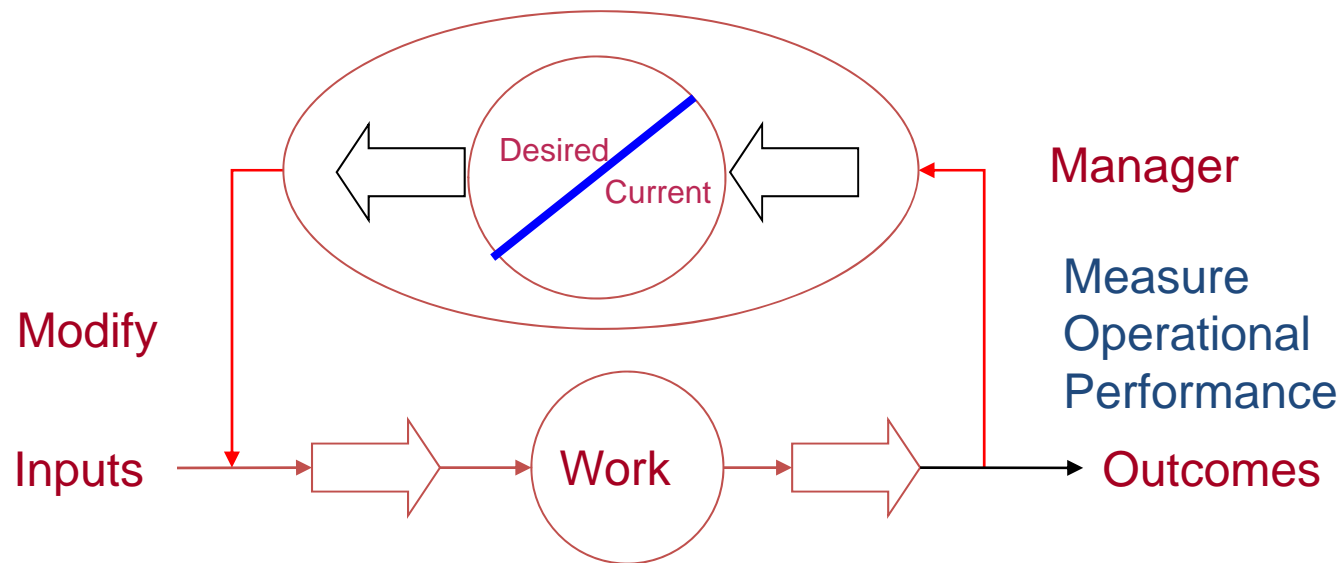
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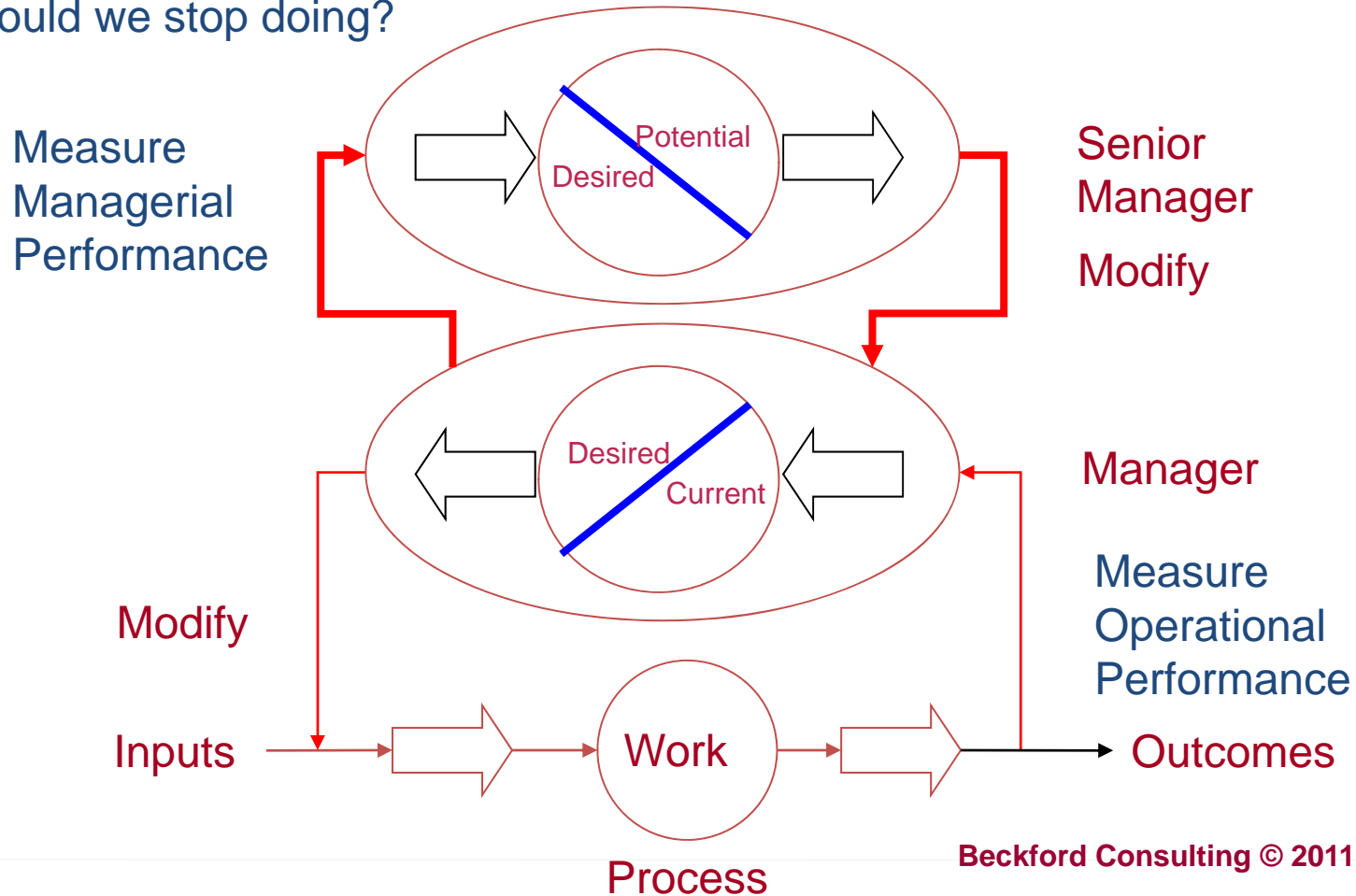


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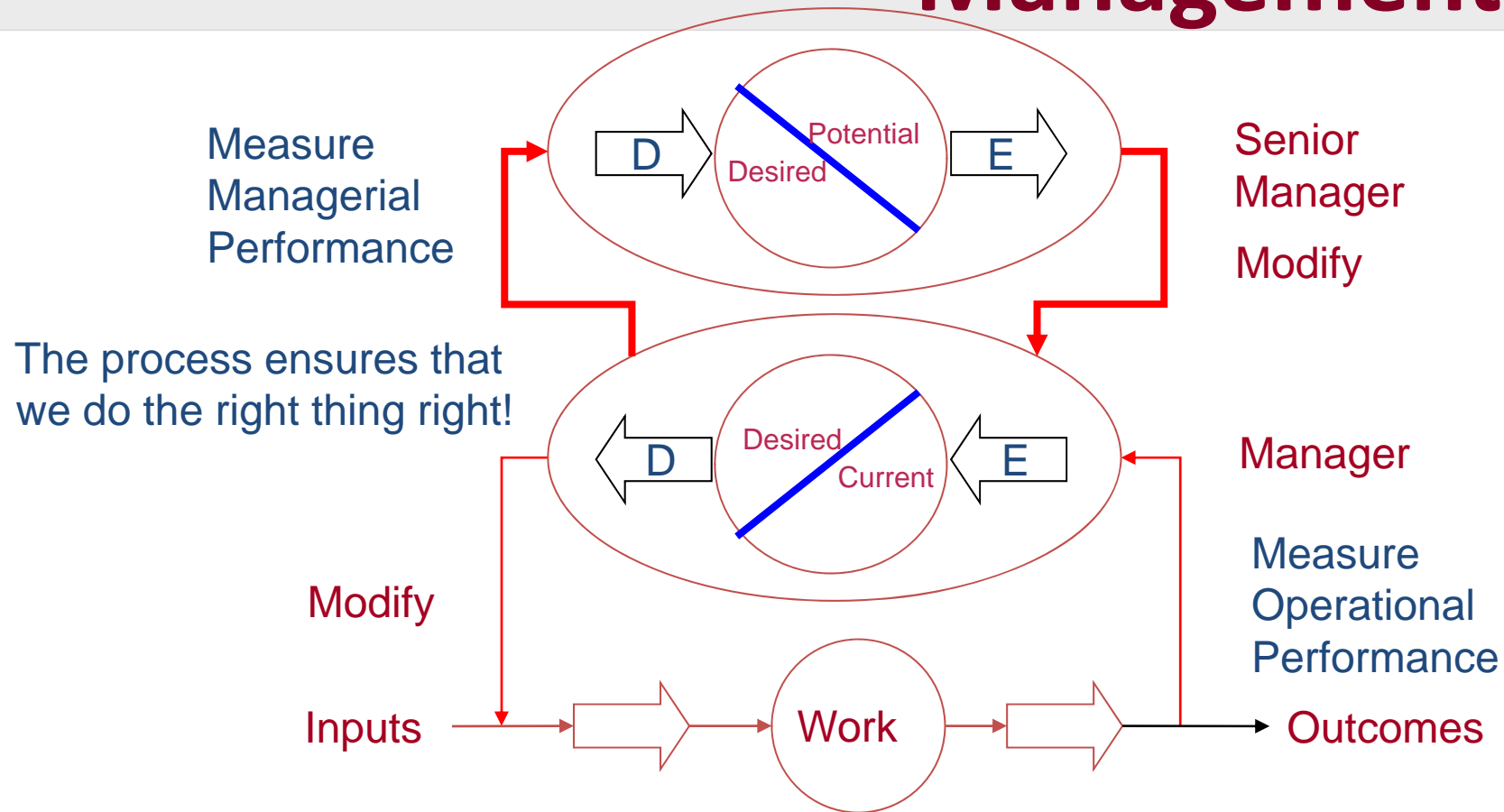


# Information and Management

Did we do right things?  
What else could we do?  
What should we stop doing?



# Information and Management





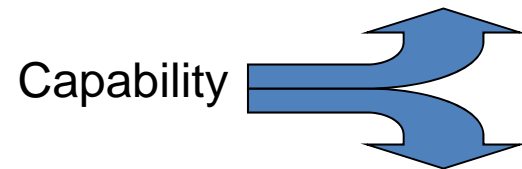
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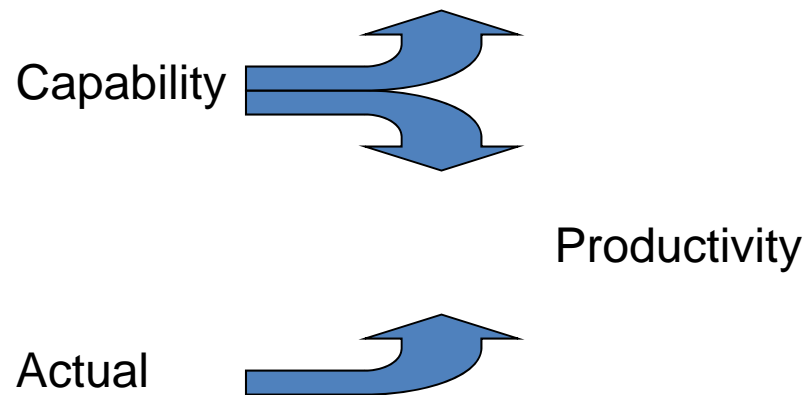


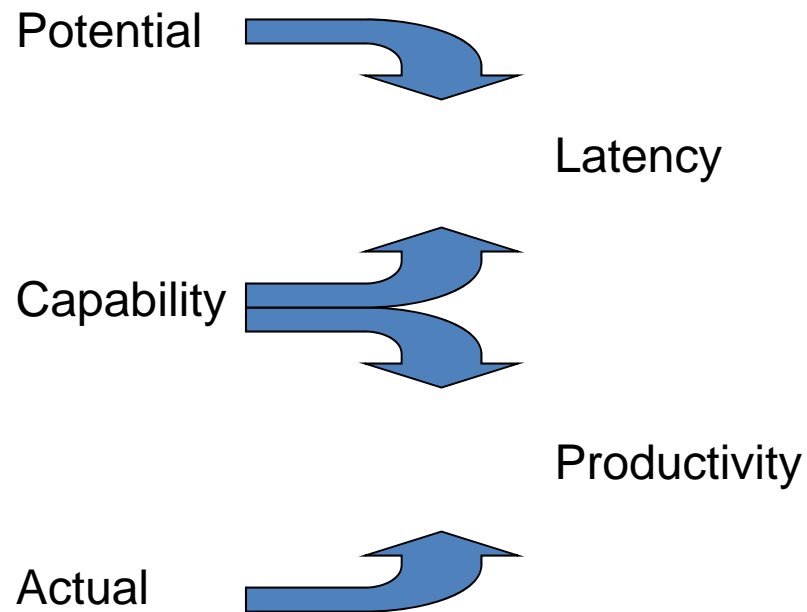
# The Potentiometer

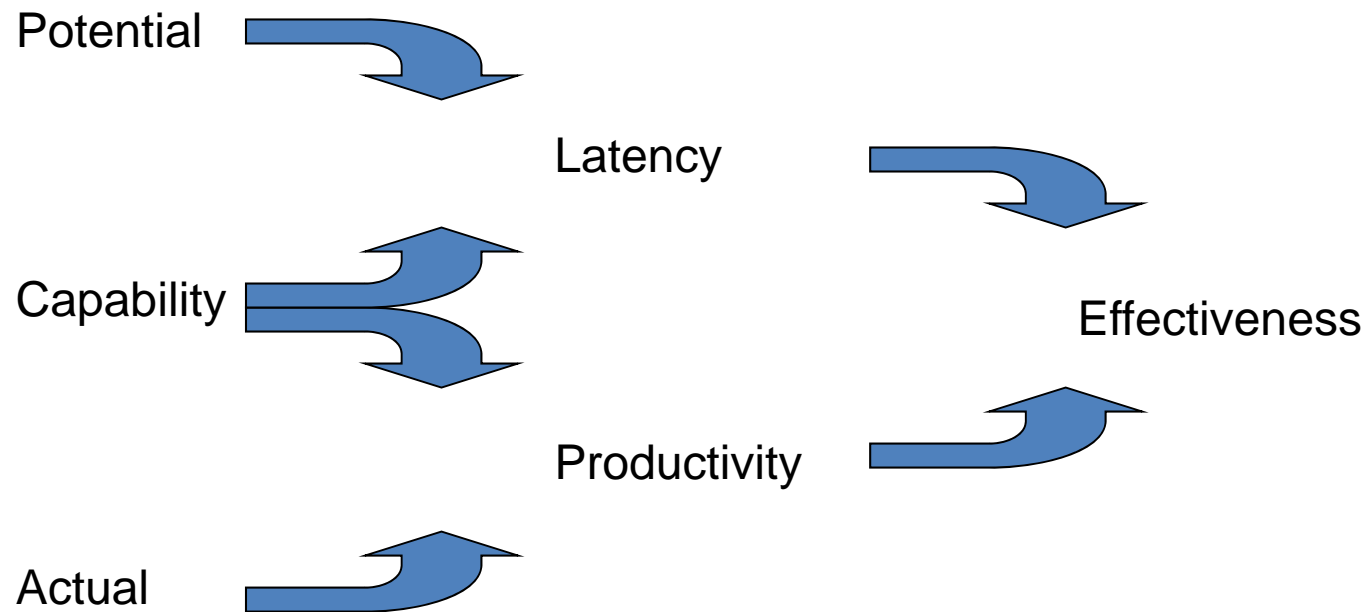
The device for measuring viability



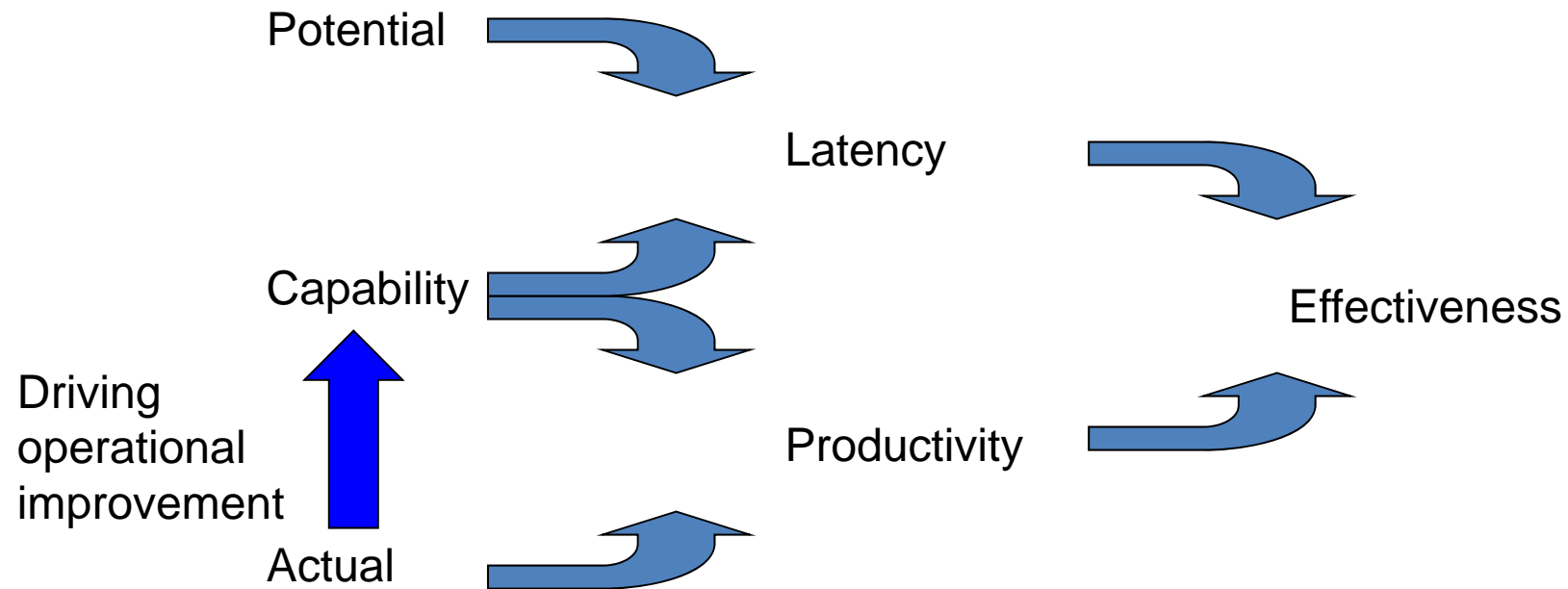




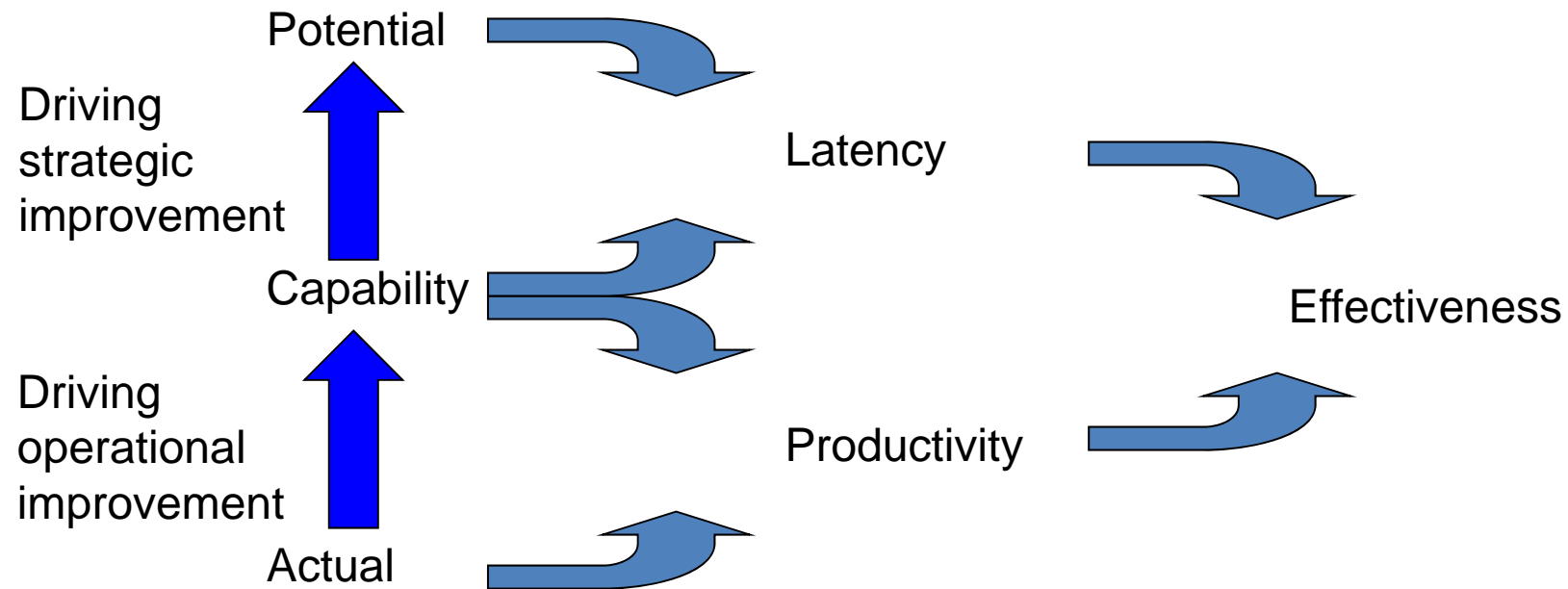




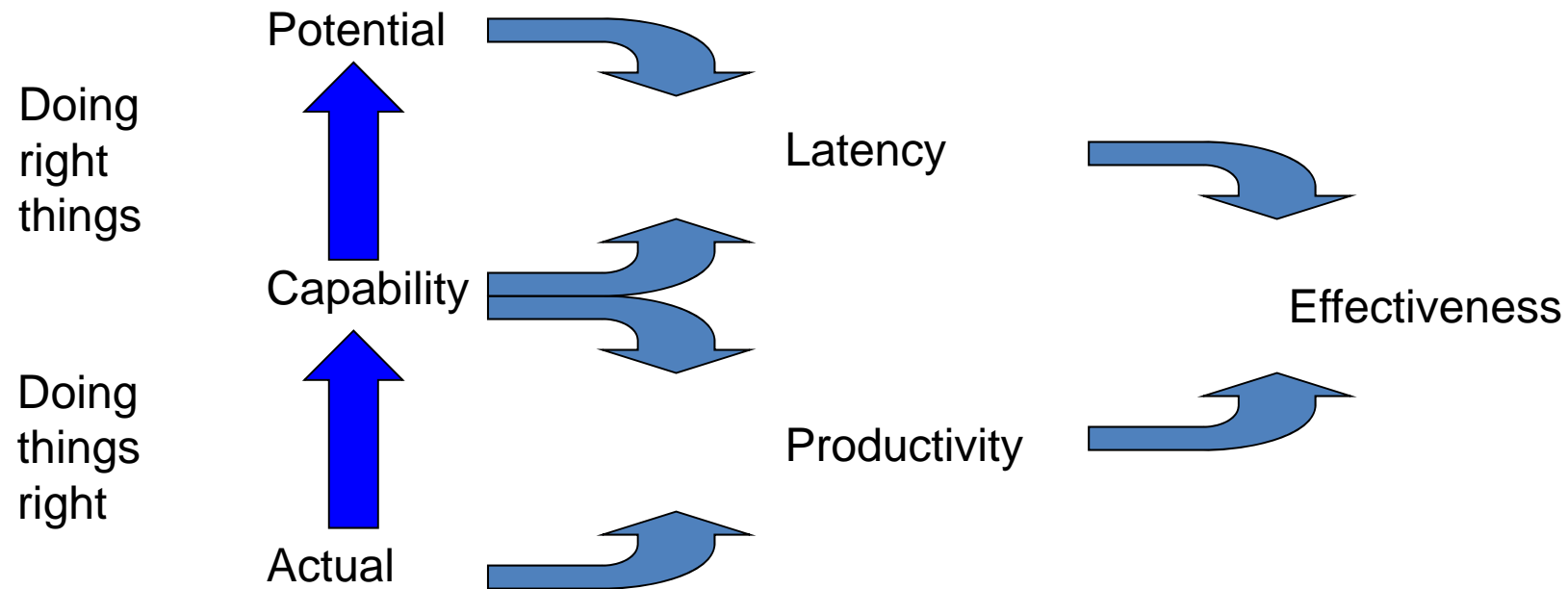
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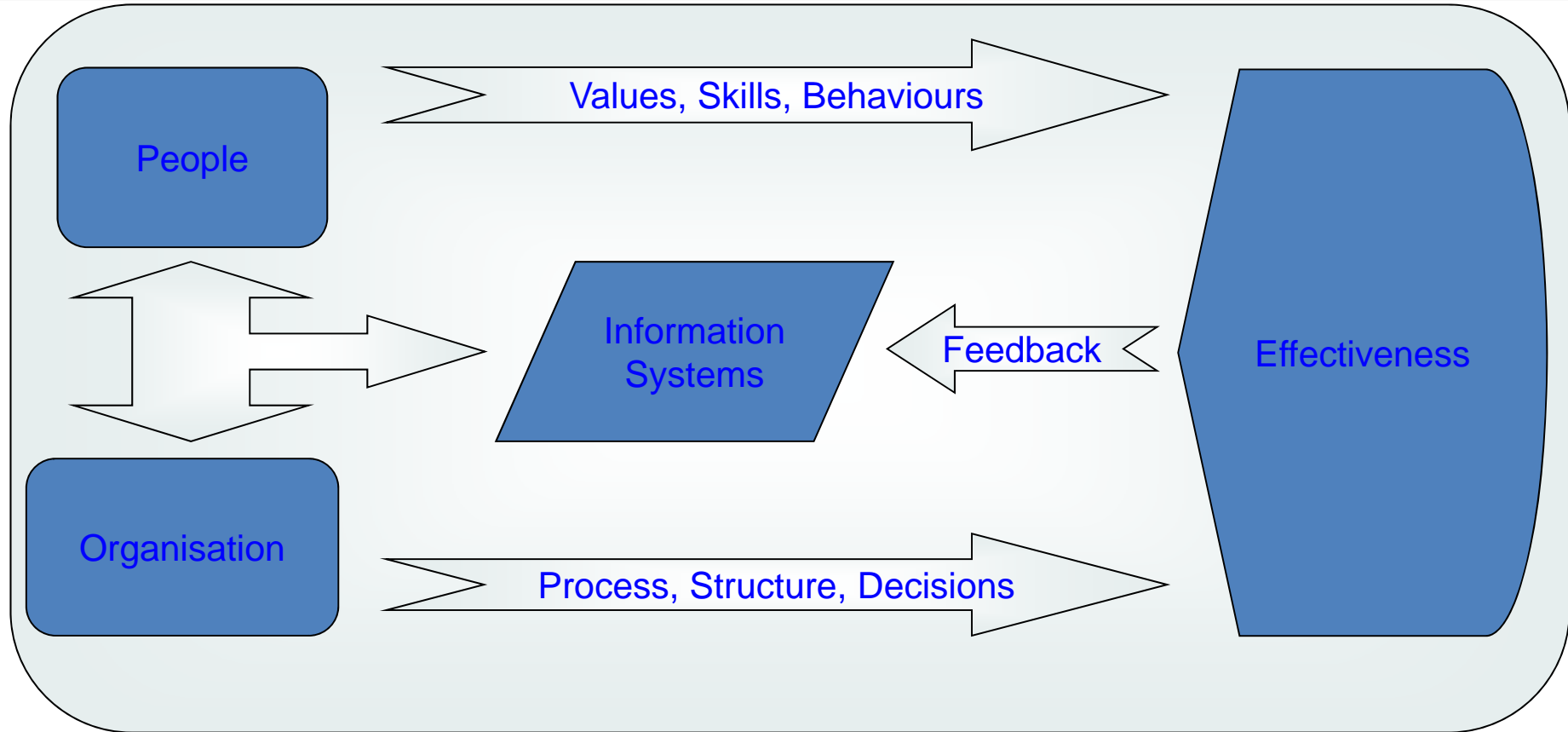
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# Information Strategy





- What information strategy could best ensure viability?

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  - Management
    - how will it be controllable and adaptive?
    - what decisions will need to be made?

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  - Management
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    - what decisions will need to be made?
  - Information
    - what information will be needed?
    - when? where? how frequently?

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# Information Projects

# Information Projects

Understand the information  
needed to manage the business

Business Effectiveness



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Business Effectiveness

Understand the value to the business  
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Business Financial Performance

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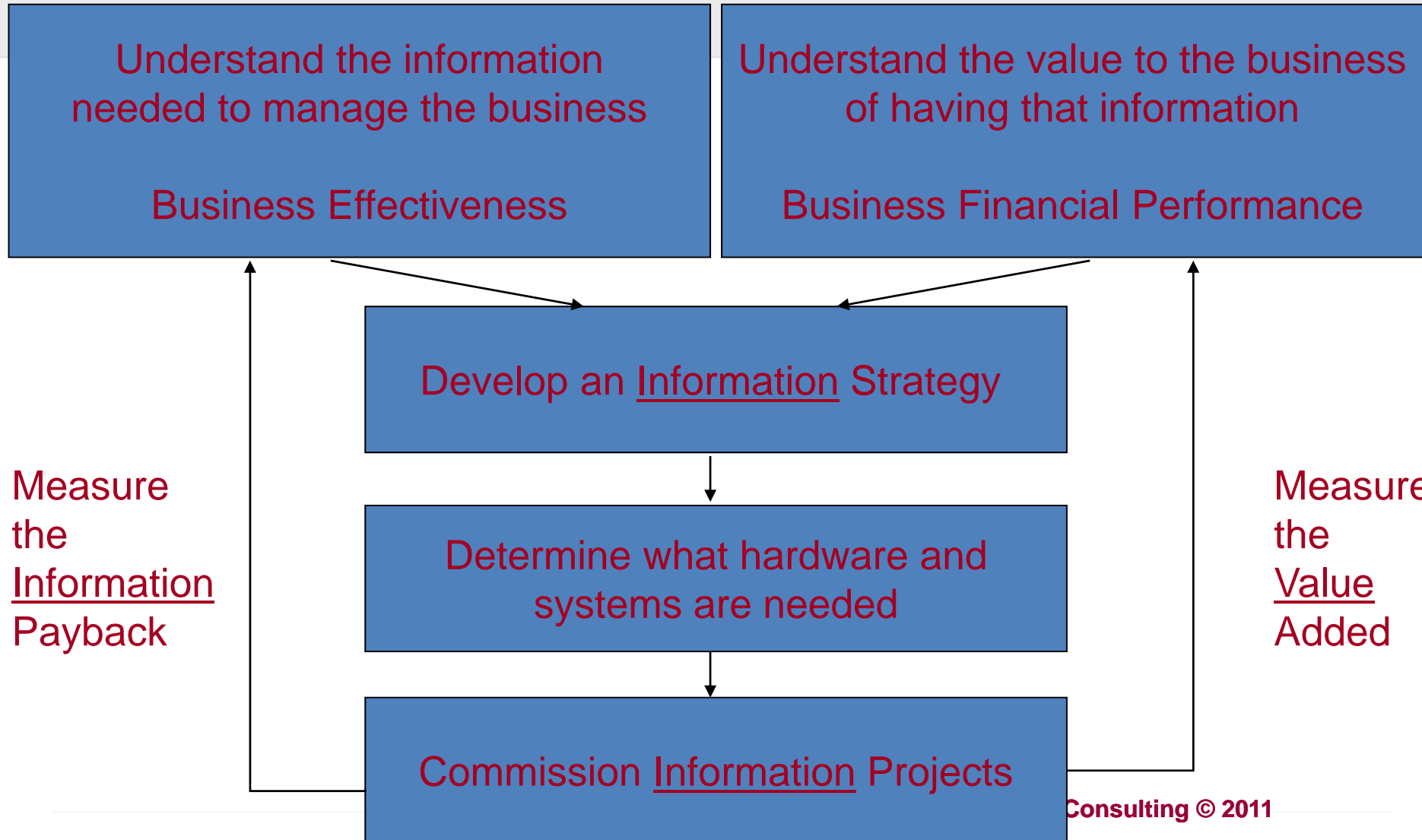
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Commission Information Projects

Measure  
the  
Information  
Payback

# Information Projects



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  - The Mechanism of Management
- Information Strategy

- Information is the measure of the balance between chaos and death – debate.
- Submit to:
  - peter kawalek
  - [john.beckford@beckfordconsulting.com](mailto:john.beckford@beckfordconsulting.com)



- Imperfect Information: Evolving Systems
- The Price of Everything....
- The Data Proliferation Engine
- Beckford's Law
- Keep it simple, stupid!
- So what?

- Perfectly Right Wrong Answers: Evolving Information Models
- Frederick Taylor – organisations as machines, people as ‘machine parts’
  - Standards as the eradication of diversity
  - Diversity as the basis of all forms of evolution: The necessity of imperfection
  - Borgian Library: Library of all possible books
  - The Internet: A Borgian Data Store?
  - Data replication errors
- Data Efficiency: Information Effectiveness
- Paper Mill Cost model: Imperfect Information Systems
- The Data Genie has escaped the bottle
- Making Meaning – A Human Task

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# The Price of Everything

- How often do we hear:
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  - “We don’t have the right .....”
  - “How can I make a decision with....”
  - “What we need round here is a better information system”

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  - “How can I make a decision with....”
  - “What we need round here is a better information system”
- Truth is most managers are overwhelmed with data
  - BUT data is NOT information
  - Data has no context, no connectivity, no meaning
  - It only becomes information when we can do something with it!

# The Price of Everything

- Bragging rights?
  - Paper and Steel - Tonnage
  - The ‘Information Industry’?

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    - The size of the data pipes?
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  - What about SMART Infrastructure?

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  - What about SMART Infrastructure?
    - Number of devices?
    - Frequency of transmission?
    - Volume of data?

# The Price of Everything

- What about SMART Infrastructure?
  - Number of devices?
  - Frequency of transmission?
  - Volume of data?
- Oxford Road, Manchester
- Others?

# The Price of Everything

- What about SMART Infrastructure?
  - Number of devices?
  - Frequency of transmission?
  - Volume of data?
- Example?
- How about the VALUE of the INFORMATION?
  - What we can DO with it?
    - Improve capacity and utilisation
    - Improved reliability and uptime
    - Reduced operating and maintenance costs

# The Price of Everything

- How about the VALUE of the INFORMATION?
  - What we can DO with it?
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- Data generates COST

Information generates VALUE

# The Data Proliferation Engine

- How has this come about?
  - Our ability to process data has increased exponentially
  - Data is multiplied, often hundreds of times
    - Email chains?
  - We put so much time into data processing we have no time left for turning it into information

# The Data Proliferation Engine

- How has this come about?
  - 1973 Texas Instruments Calculator
  - 1976 IBM3982 Golf Ball Terminal
  - 1980 Word processors
  - 1983 Personal Computers
  - 1990 Apple Power Book
  - 1995 Desktop Computing & Internet
  - 2000 PDA's & broadband
  - 2005/6 Smartphones and Blackberries
  - 2008/9 'I' EVERYTHING

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  - We put so much time into data processing we have no time left for turning it into information
- Enablers?
  - Cheap, powerful devices
  - Cheap, fast, data transmission
  - Cheap, easy storage



# The Data Proliferation Engine

- How has this come about?
  - Reductions in cost, increases in speed!
  - It is, relatively, easy to explain and justify grey boxes and bellwire
    - And they can be admired, polished, depreciated and pictured in the annual report
    - And they can be fitted into a 'rolling replacement' cycle!

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    - And they can be admired, polished, depreciated and pictured in the annual report
    - And they can be fitted into a ‘rolling replacement’ cycle!
  - It is, relatively, hard to explain information!
    - it is, largely, invisible
    - It is difficult to ‘count’ (so we don’t bother)
    - very hard to admire
    - it’s ‘value’ is poorly understood and, after the first report, the audience always wants more
      - ‘can you make it do.....?’
      - The ‘customer’ is always disappointed!



150k excel spreadsheets

5000 access databases

103 business systems

507 locations

Direct 1 to 1s

352 managers

Department Meetings

5 regulators

Section Heads

Individual Performance

Board Meeting

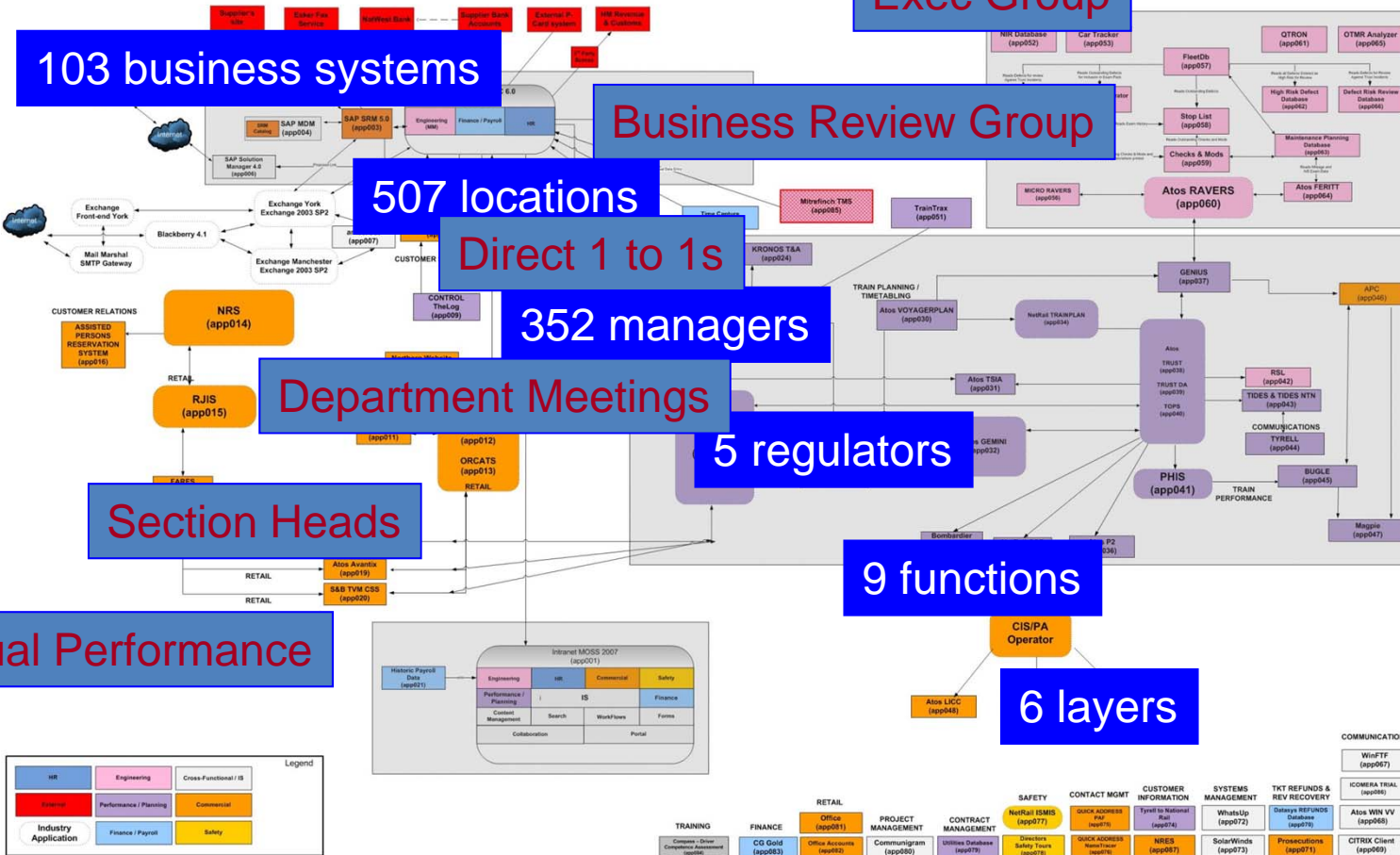
Exec Group

Business Review Group

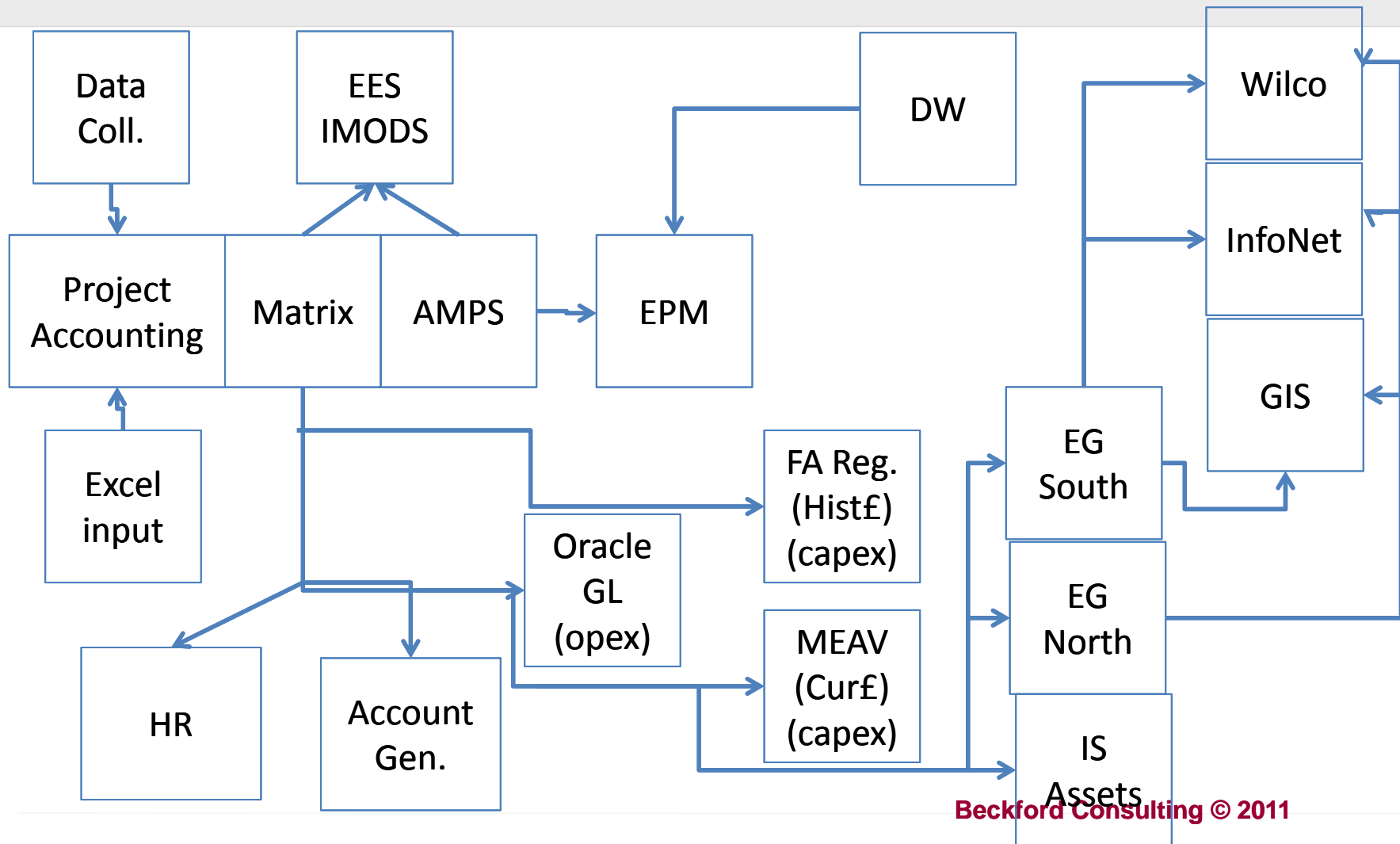
Project Reviews

9 functions

6 layers



# The Data Proliferation Engine



# Beckford's Law!

- Moores Law
  - processing speed doubles every 2 years
  - a driver of the growth in cheap, fast machines
  - we get a lot more bang for our buck!

# Beckford's Law!

- Beckford's Law
  - Data proliferates as a function of:

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  - Data proliferates as a function of:
    - the number of users



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    - multiplied by the number of applications
    - multiplied by ease of transmission (the propagation rate)

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  - Information proliferation is the inverse function!
- Data proliferation is therefore exponential in volume and frequency
- Information declines in proportion
- Upshot – the more data, the less information!

# Beckford's Law!

- And, 'as evry fule kno' this:
  - Answers to the law of second law of thermodynamics
  - Reflects the notions of entropy (chaos) and negentropy (organisation):
    - Chaotic systems are higher energy/less organisation
    - Stable systems are lower energy/higher organisation
    - Data is free (unconstrained) energy – generating chaos
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    - Data is free (unconstrained) energy– generating chaos
    - Information is constrained energy – generating order
  - Order is the basis of management
  - The key to consistency, coherence, performance



# Keep It Simple, Stupid

- The NHS Electronic Health Record System
- The Child Support Agency
- CJIT (Criminal Justice IT System)
- Border Controls
- FiReControl
- Tax Credits
- ID Cards
- Defence Procurement
- Integrated Tax and Social Security (coming your way soon!)

# Keep It Simple, Stupid

- “Every time Whitehall has made the case for technological innovation on the grounds of efficiency, it has ended up costing more not less”
  - *Daily Telegraph, 20<sup>th</sup> September 2011*

# Keep It Simple, Stupid

- Information lets us make decisions
- For data to become information it must be presented
  - in context
  - in relation to other relevant data
  - in the right quantities
  - at the right time
  - in comparison to ‘model’ data (the desired outcome) which enables a decision to be made about change or improvement
- Decisions are not about having the right data – but about asking the right questions!

## So what?

- Establish NOT

what questions we can answer given the data we have

BUT

what questions we need to answer and what data is required to do so!

# Value for Information Systems

- A utility
  - 200 applications (and rising!)
  - Capital spend on IS £10m+ annually!
  - IS Operational Expenditure £12m+ annually
  - Annual value of information provided?

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- Unknown

# Value for Information Systems

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  - 200 applications (and rising!)
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  - IS Operational Expenditure £12m+ annually
  - Annual value of information provided?
- Unknown
  - No one held to account for it
  - Basis of investment? Best endeavours!
  - AND
    - they don't have the right information to make good decisions!

# Value for Information Systems

- A small manufacturer
  - £24m t/o
  - 150 employees
  - low volume batching, high complexity product range
  - only use
    - on plant SCADA systems (not connected or integrated)
    - manufacturing planning system
    - accounts system
  - BUT business out of control
  - WHY? The data genie has escaped from the bottle!
    - uncontrolled, duplicated and triplicated, lacking integrity



# Value for Information Systems

- As matters stand today, many organisations are like this:
  - they don't know why they are buying what they buy
  - they don't know why they are using what they use
  - they really don't know what it costs (to buy or run)
  - they really don't know the value it provides

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  - they don't know why they are buying what they buy
  - they don't know why they are using what they use
  - they really don't know what it costs (to buy or run)
  - they really don't know the value it provides
- AND:
  - money is more easily spent on boxes and bellwire than on information
  - they spend on the 'S' when they SHOULD be investing in the 'I'!

# Understanding Information

- Information lets us make decisions
- For data to become information it must be presented
  - in context
  - in relation to other relevant data
  - in comparison to ‘model’ data (the desired outcome) which enables a decision to be made about change or improvement
    - not improvement in the data but in the activity that generates the data

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- CEO: “I want better results”
- Information delivers:
  - the right value
  - at the right time
  - in the right format and language
  - the right decision

# Understanding Information

- Effective investment in IS requires a value proposition that:
  - offers realisable information benefit
- as an enabler of
  - realisable business benefit
- and
  - “sweats the asset”
- This requires:
  - a deep understanding of information needs
    - now and tomorrow
  - intelligent exploitation of existing systems

# Understanding Information

- Effective investment in IS can, in many cases, be derived from effective exploitation of existing systems:
  - the 'data' is already there
  - we are just not asking the right questions

# Understanding Information

- Effective investment in IS can, in many cases, be derived from effective exploitation of existing systems:
  - the 'data' is already there
  - we are just not asking the right questions
- Contention:
  - there is significant benefit to be obtained by many organisations from existing systems
  - there is more value in realising that benefit than from investing in new systems (and more data!)
  - the IS department won't like it!



- So what SHOULD we do?
  - Develop an Information Strategy rooted in:
    - Understanding the information needs of the business
    - Understanding the value to be obtained from it
    - Commission Information Projects
    - ‘Sweat the asset’ – work the IS as hard as we work other capital assets (most computers do only a small fraction of the work of which they are capable)
    - When the pips are squeaking....
    - Invest against ‘Return on Information Investment’
      - Measure the information benefit against the cost of provision

# Conclusion

Understand the information  
needed to manage the business

Business Effectiveness

Understand the value to the business  
of having that information

Business Financial Performance

Develop an Information Strategy

Determine what hardware and  
systems are needed

Commission Information Projects

Measure  
the  
Information  
Payback

Measure  
the  
Value  
Added

# Assignment 2

- Beckford's Law - Discuss

# Assignments

- Information is the measure of the balance between chaos and death – debate.
- or
- Beckford's Law - Discuss
- 500 words – plus references!
- Submit to:
  - peter kawalek
  - [john.beckford@beckfordconsulting.com](mailto:john.beckford@beckfordconsulting.com)