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International Conference on  
Computing in Civil Engineering

# Collaborative Working: its effects on the AEC Organisation

**PIECC**

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# Contents

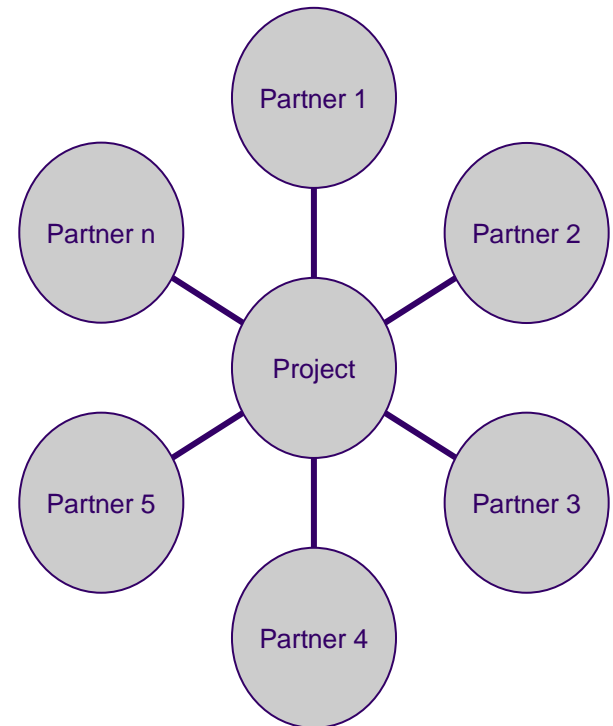
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- PIECC project
- Collaborative working
  - Business
  - People
  - Technologies
- Requirements capture field work
- Future challenges

- Planning & Implementation of Effective Collaboration in Construction
  - <http://piecc.lboro.ac.uk/>
- To investigate the business and project requirements for the planning and implementation of effective collaborative working in construction.

# Project Output

*"...to develop a strategic decision making methodology that will guide organisations in the planning for effective collaborative working practices and the implementation of suitable tools and techniques..."*



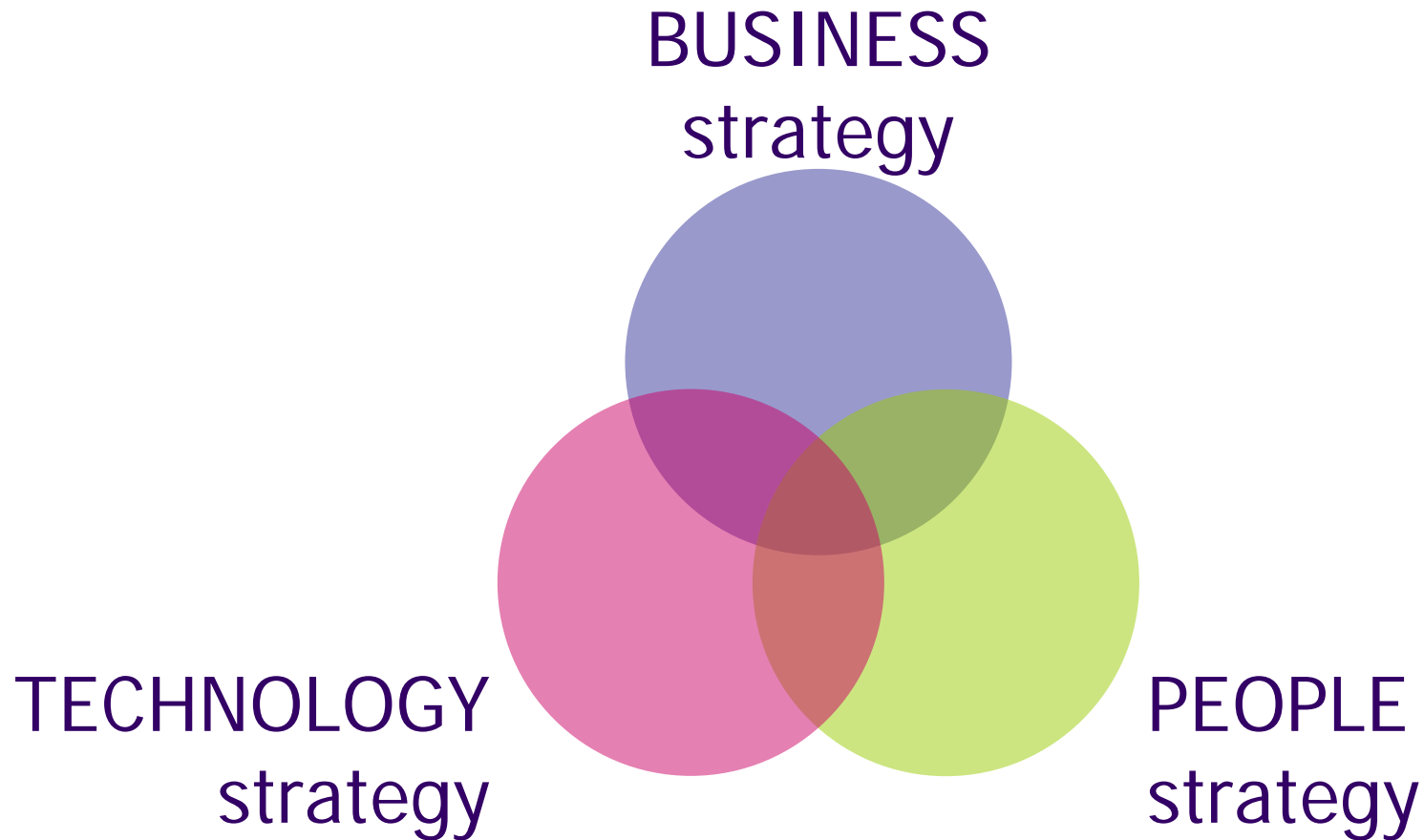
# Project objectives

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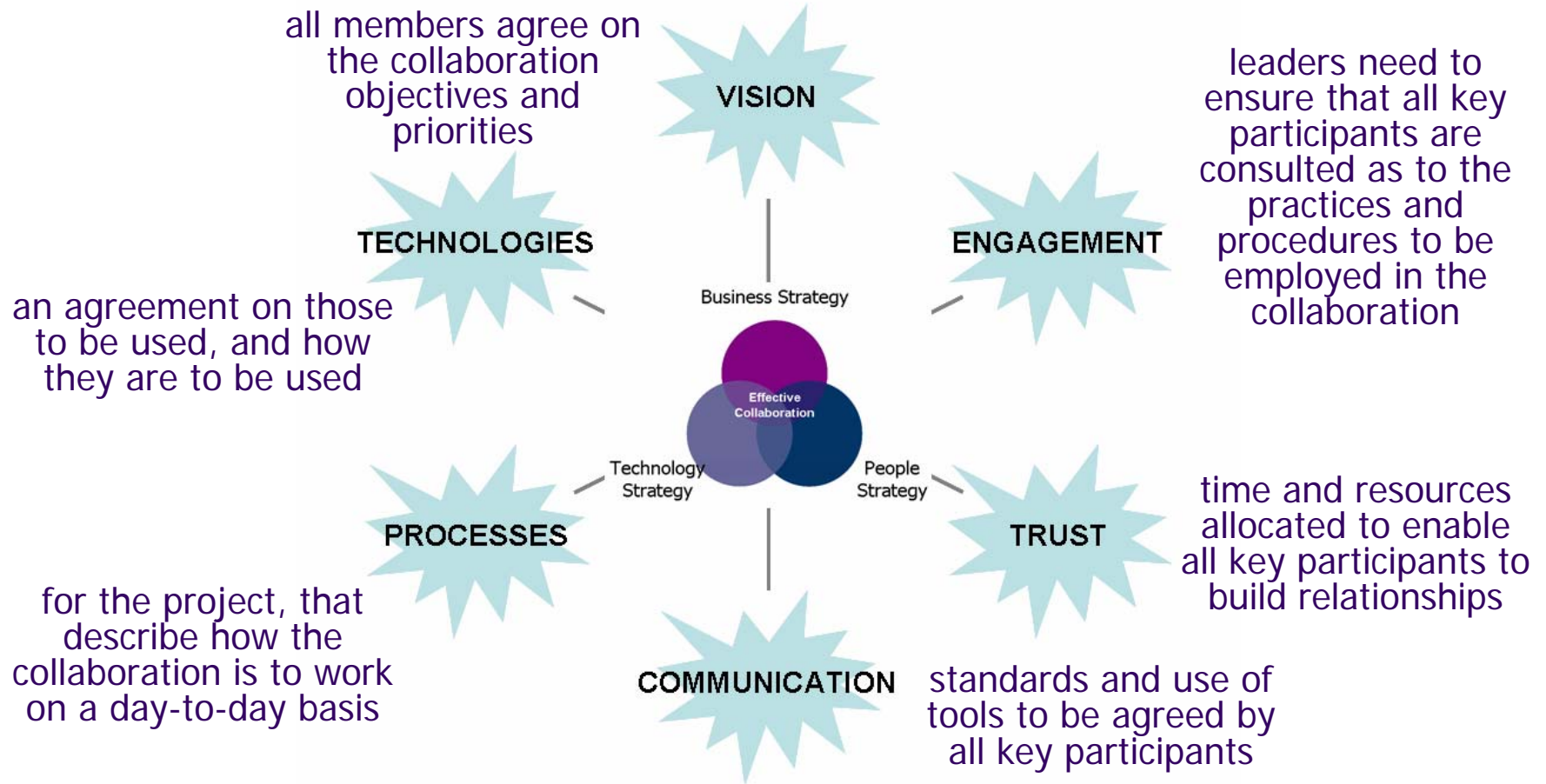
- Review state of the art in collaborative working
- Capture requirements for collaborative working in construction, and identify key areas for improvement
- Develop a methodology for the planning and implementation of effective collaborative working
- Test and validate the methodology

# Collaborative Working Dimensions

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# Collaboration Working key factors



# Business Dimension

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- Culture
- Management structures
- Shared Vision
- Processes
- Protocols
- Management of Change
- Organisational boundaries (groups, departments, units)



# People Dimension

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- Build trust
- Engagement
- Transparency (processes and protocols)
- Motivation
- Foster knowledge sharing

# Technological Dimension

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- Flexible to support different processes
- User Friendly
- Adaptable to different needs
- Easily accessible for collaborative working
- Intelligent
- Supports learning
- Interoperable

# Enabling Technologies

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- Communication and Information/Knowledge management
- Advanced Visualisation Systems
- Grid
- Agent technology

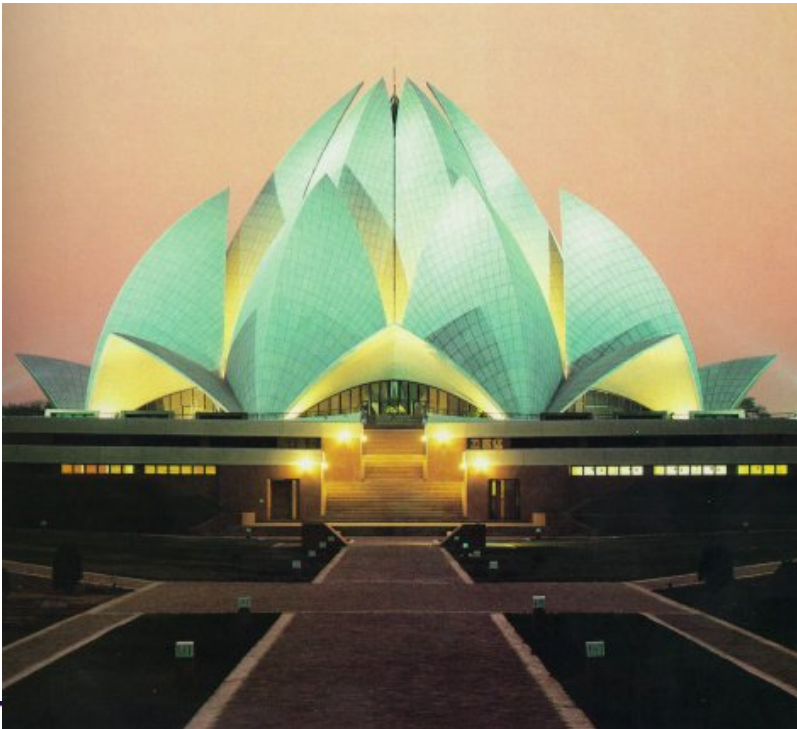
# Communication, Information/KM management

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- Network links:
  - LAN, WAN, VPN, Wireless
- Extranets
- Intranets
- Mobile Technologies
- Projects databases, Info. warehousing, KM systems

# Advanced Visualisation Systems

*‘The soul does not think  
without an image’ -  
Aristotle*



- Need for shared views
- Technology convergence is enabling:
  - collaborative visualisation systems
  - shared simulation environments
  - group design

# Grid Computing

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- Grid Computing focuses on large-scale resource sharing, innovative applications and high performance computing;
- It provides the key infrastructure for distributed problem solving in dynamic data-intensive situations;
- Offers potential for the exploitation of large scale data sets and CPU-intensive applications in the construction sector (e.g. in emergency disaster response scenarios).

# Agent Technologies

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- Based on distributed Artificial Intelligence (AI)
- Agents ideal for large complex problems
  - distributed expertise
  - distributed collaboration
- Agents are core components of the Semantic Web and enable:
  - problem decomposition
  - system-system interaction/negotiation
  - integration with legacy systems

# Needs & Requirements Capture

Methodology



# Methodology

- Questions associated with organisational and collaborative working aspects
  - First instance
  - Concentrating on "*decision makers*" in the organisation



Analysis and reflection

Take lessons learned into second stage

# Methodology

- Questions associated with project activities and ways of collaborative working
  - Second part
  - Concentrates on "*project workers*" in the organisation



Analysis

Add to first stage



**Requirements  
for PIECC**

# Methodology

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- Identification of the main issues for a structured approach
- Can be used in a number of fora:
  - One-to-one interviews
  - Questionnaire
    - Over the phone
    - Completed individually / remotely
  - Subset are to be used in 'workshop' style events

# Questionnaire contents

- Aim and introduction
  - About you
  - Organisational information & strategy
  - IT strategy & implementation
  - Collaborative working
  - Any other information
- 
- Shared vision
  - Engagement of stakeholders
  - Building trusting relationships
  - Good communication
  - Clearly defined processes
  - Well integrated technologies

# Questionnaire Completion



## Planning and Implementation of Effective Collaboration within Construction

### CONTENTS

- Project Overview
- Aims and Objectives
- Methodology
- Timetable
- Partners
- Results
- Publications

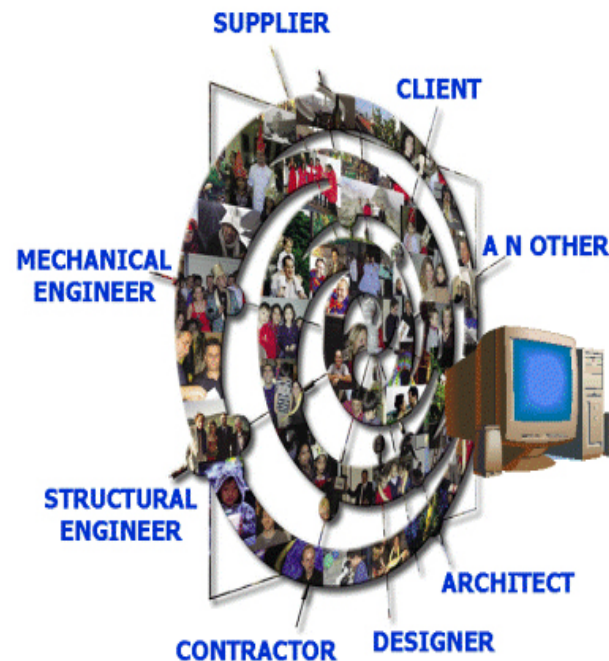
Contact us

### LATEST NEWS

Project Questionnaire - [fill in now!](#)

Project presenting at [ICCC 2005 Conference](#) - Cancun, Mexico

There is widespread recognition that the UK construction industry must embrace new and better ways of working if it is to remain competitive and meet the needs of its ever demanding clients. Project delivery in construction is highly dependent on the effectiveness of the team put together to execute the project.



In many cases this is a function of how well members of the team work collaboratively and how effective the communications infrastructure used by the team is. Significant efforts have been invested in recent years to develop tools and techniques that enable distributed teams of professionals to work collaboratively. Some of these systems were able to improve some aspects of collaborative working but did not address the dynamics of construction organisations, projects,

and processes sufficiently enough. The business and cultural environments within which collaboration takes place still remain important issues to be investigated.

Image adapted from: [http://www.imp.univie.ac.at/qeninfo/qi\\_soc.html](http://www.imp.univie.ac.at/qeninfo/qi_soc.html)

Please visit project website and fill in

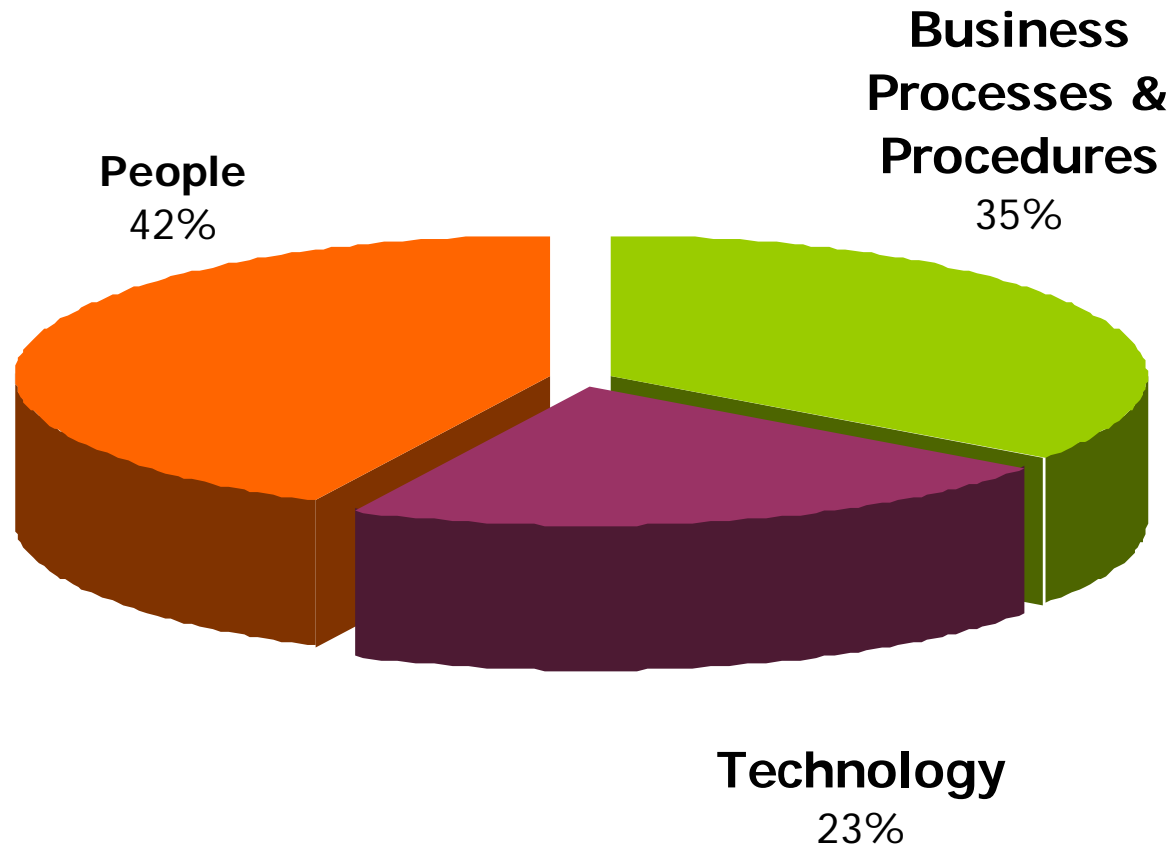
<http://piecc.lboro.ac.uk>

# Needs & Requirements Capture

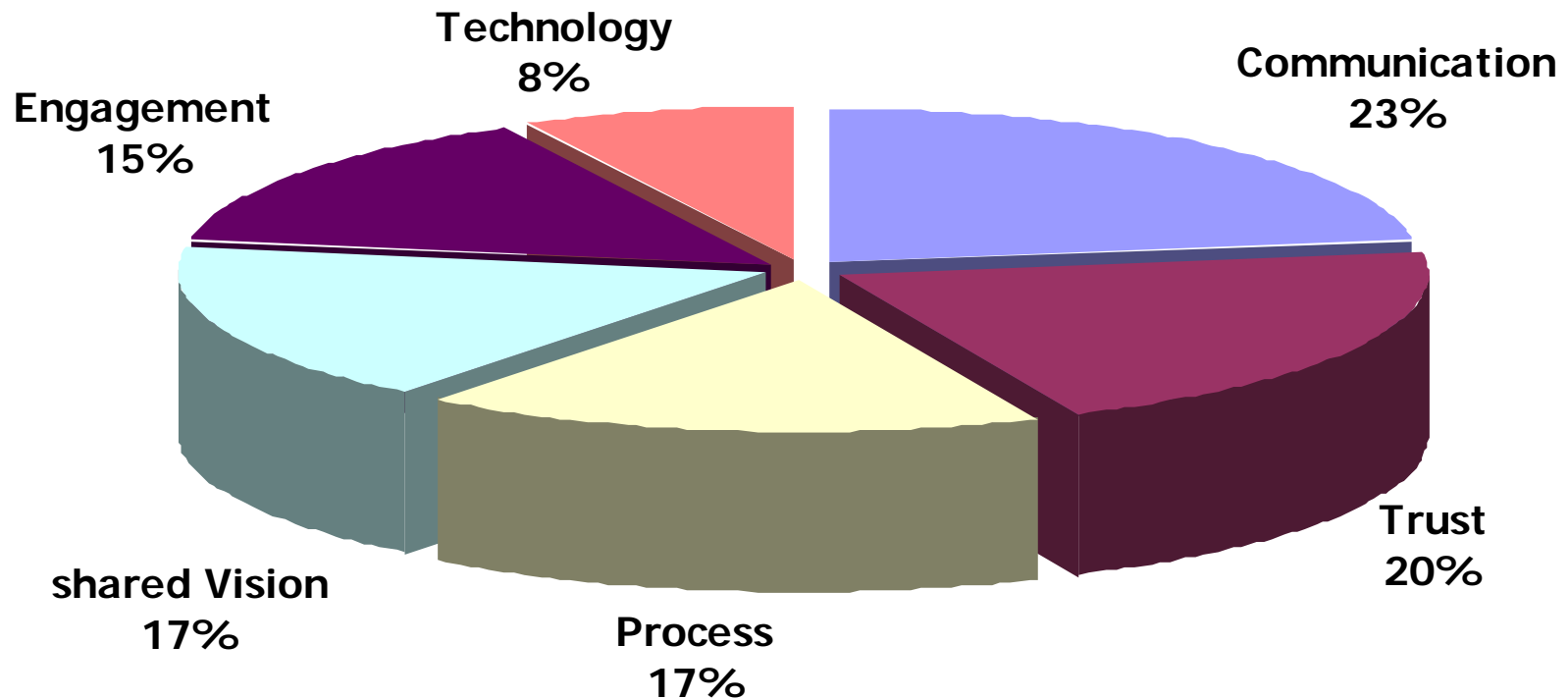
Initial findings

# Initial findings – 3 strategies

## % of importance



# Initial findings – 6 key factors % of importance





# Initial findings – 6 key factors

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Importance for Effective Collaboration

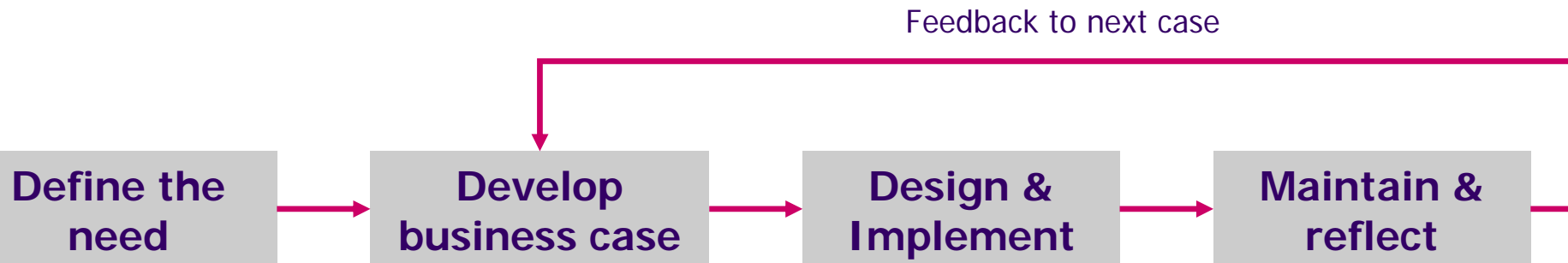
- COMMUNICATION
- TRUST
- PROCESSES & VISION
- Stakeholder ENGAGEMENT
- TECHNOLOGIES

# Initial findings – essential factors for a protocol

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- "...processes that enable participants to agree a common vision & priorities for the collaboration..."
- "...standards that facilitate interoperability between systems..."
- "...tools that measure business benefits of collaborative working..."
- "...procedures to promote trust in the collaboration..."
- "...a set of communication procedures that all stakeholders should use in the collaboration..."

# Prototype framework



- A set of processes and protocols
- A list of resources to include:
  - Suitable technologies & techniques to collaborate
  - Organisational change considerations
  - Examples of good & poor practices from previous efforts
  - Others??

	DEVELOP BUSINESS CASE			DESIGN & IMPLEMENT			MAINTAIN & REFLECT		
	PEOPLE	PROCESS	TECH						
VISION	Aims & objectives								
	Issues								
	Risks								
	Good practice								
	Poor practice								
	Resources								
ENGAGEMENT									
COMMUNICATION									
TRUST									

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**Thank-you for listening**

Any Questions?

**PIECC**

