

# FD2117 - Development and Demonstration of Systems Based Estuary Simulators (EstSim)

## Introduction

**Alun Williams, ABPmer**

# Overview

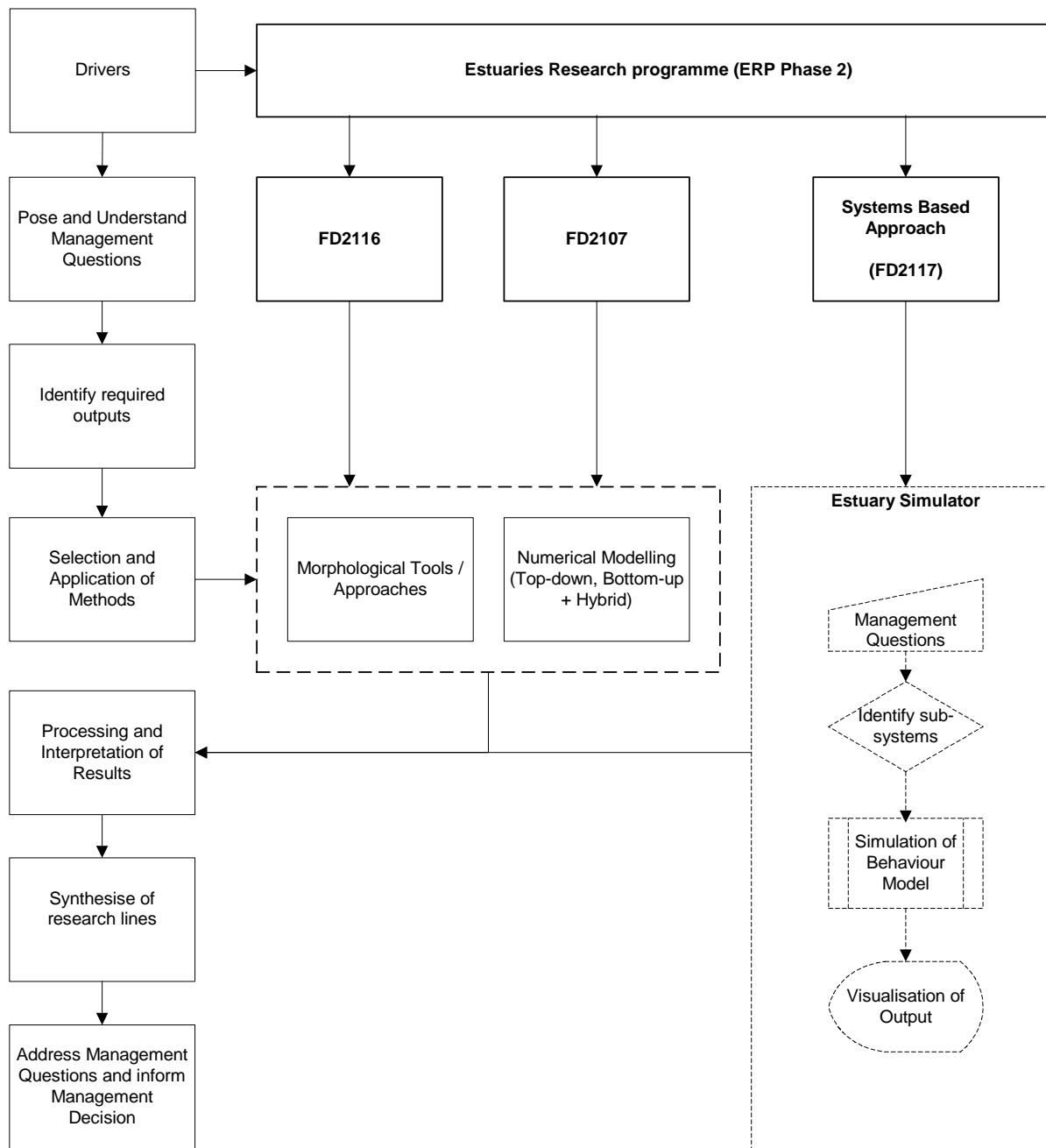
- Application of Systems-Based approach to estuary environments;
- Alternative, yet complementary approach to understanding morphological behaviour in estuaries



# Overview

- Provide qualitative framework to assist in understanding:
  - Presence and behaviour of geomorphological features in an estuary;
  - Linkages that exist between them;
  - Their response to change.





# FD2117: Project Details

- Defra / EA FCERM Joint R&D Programme
- Estuaries Research Programme (ERP) Phase 2;
- Consortium of 6 organisations.



# Project Team



- ABP Marine Environmental Research



- University of Plymouth



- Delft Hydraulics



- University College London



- Discovery Software



- HR Wallingford

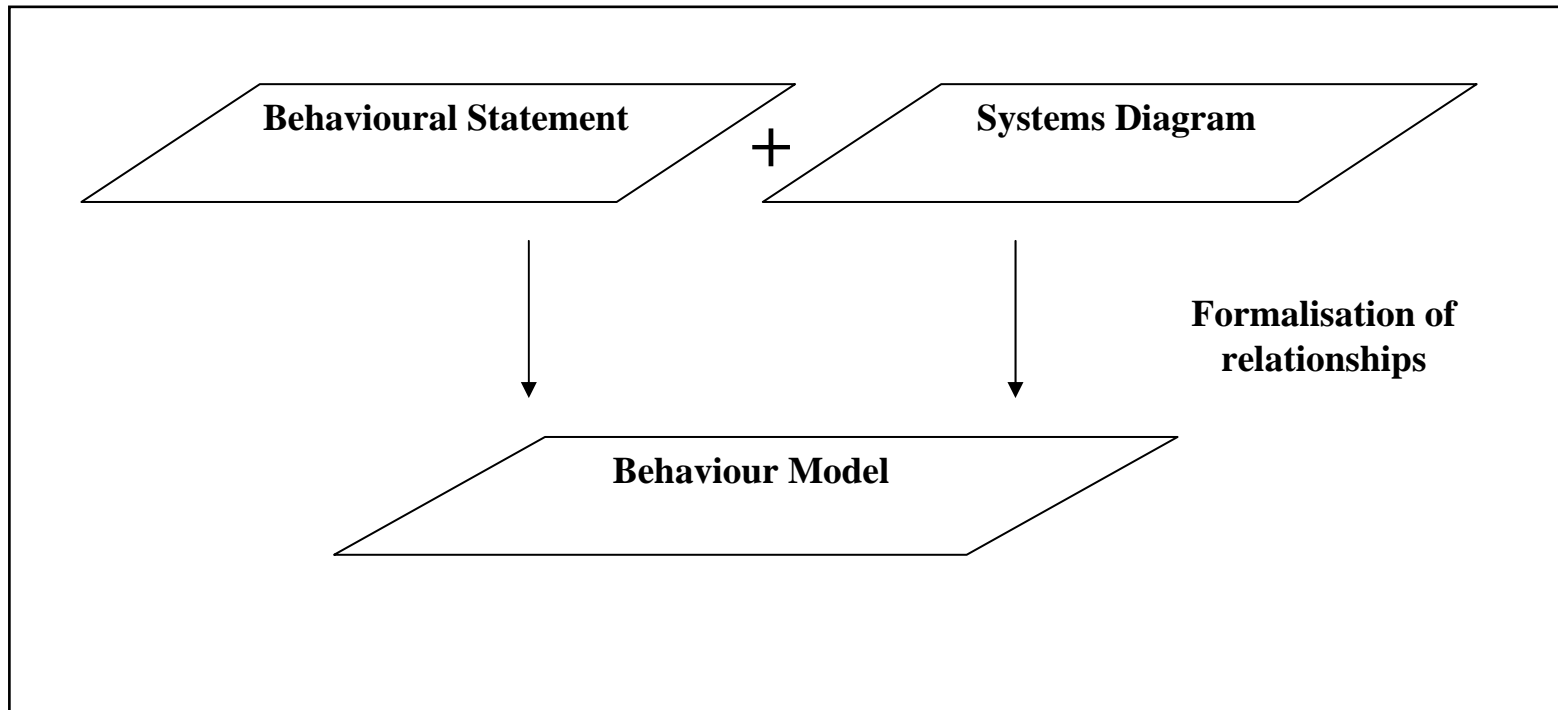


# The Systems-Based Approach and Behavioural Models

- Defining individual components that make up a given environment and characterising how these components interact;
- Mathematically formalising defined components and linkages to develop behavioural model.



# The Systems-Based Approach and Behavioural Models





# Scientific Objectives

**Behavioural Statements**

**Mathematical Formalisation**

**System Simulation**

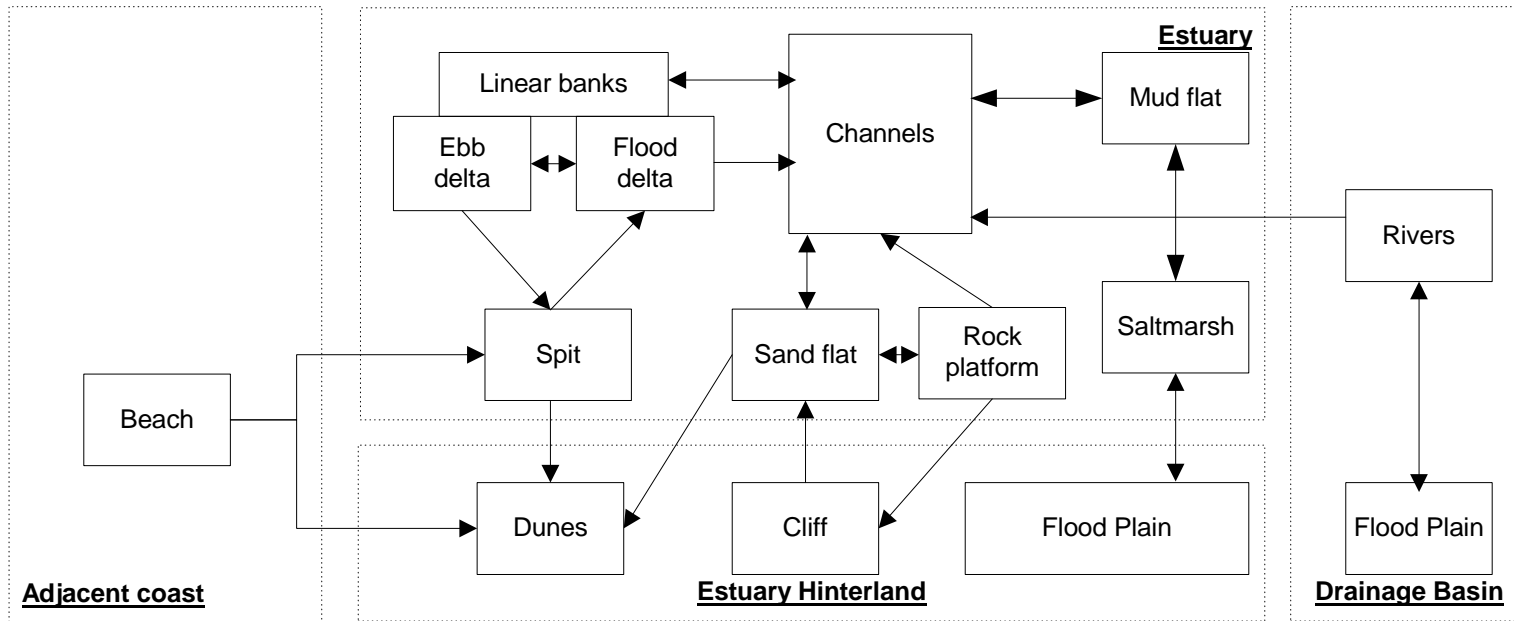
**Manager-System Interface**

**Management Questions**

**Pilot Testing**



# Behavioural Statements



- Systems diagrams / behavioural statements

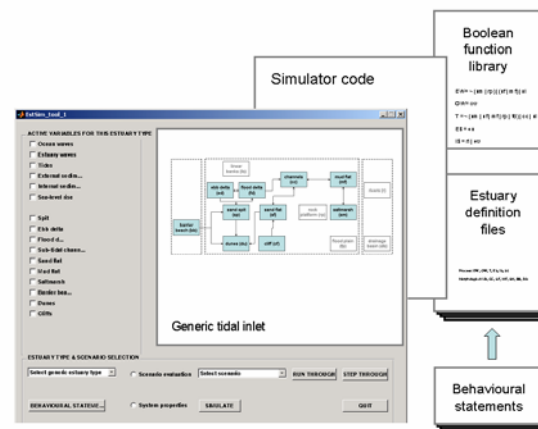
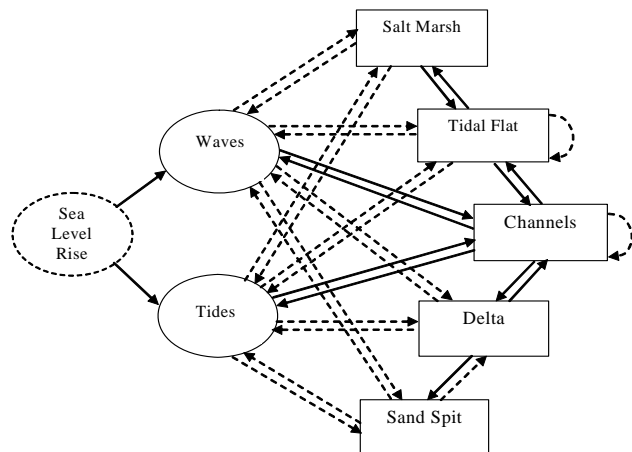


## Behavioural Statements

## Mathematical Formalisation

## System Simulation

- Number of Alternative Approaches
- Boolean network Approach
- *Proof-of concept* prototype simulator



**Behavioural Statements**

**Mathematical Formalisation**

**System Simulation**

**Manager-System Interface**

- Web based graphical user interface
  - Simulation functionality
  - UK Estuary typology



**Behavioural Statements**

**Mathematical Formalisation**

**System Simulation**

**Manager-System Interface**

**Management Questions**

**Pilot Testing**

- **Definition of Key Management Questions**
  - Consultation / Review of Legislation
- **Pilot Testing of Prototype Simulator**
  - Thames and Teign Estuaries



# Project Delivery

- Development of UK estuary typology;
- Framework for estuary behavioural statements;
- Means to promote systems based knowledge and understanding;
- Web-based graphical user interface;
- Open source Matlab code for academic community;
- Demonstration of potential of approach.



# Structure of Presentations

- The Prototype Simulator: Web-based Interface. (Kevin Morris)
- The Systems-Based Approach. (Alun Williams)
- Simulation Rationale. (Jon French)
- Pilot Testing. (Richard Whitehouse)
- Capabilities and Limitations. (Ian Townend)
- Discussion



# Structure of Presentations

<b>10.55</b>	<b>The EstSim Project: Introduction</b>	<b>Alun Williams, ABPmer</b>
<b>11.10</b>	<b>The Prototype Simulator: Web Based Interface</b>	<b>Kevin Morris, Discovery Software</b>
<b>11.30</b>	<b>The Systems Based Approach</b>	<b>Alun Williams, ABPmer</b>
<b>11.45</b>	<b>Simulation Rationale</b>	<b>Jon French, UCL</b>
<b>12.10</b>	<b>Teign Estuary</b>	<b>Richard Whitehouse, HRW</b>
<b>12.25</b>	<b>Capabilities and Limitations</b>	<b>Ian Townend, HRW</b>
<b>12.35</b>	<b>Summary and Discussion</b>	<b>All</b>

