

# Using Simulation To Evaluate Funding Models For SDI Implementation

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## Problem Definition

We need to implement SDIs to improve the dissemination of SI



## Problem Definition Cont'd

But how are we going to fund the implementation of these components



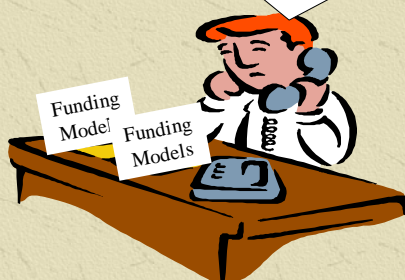
## Problem Definition Cont'd

We can create funding models for the implementation of these SDIs



## Problem Definition Cont'd

So many models! How do I select the most appropriate models for my Environment?



## Presentation Outline

- ✦ Funding Models
- ✦ Model Evaluation Techniques
- ✦ System Dynamics Simulation Modelling
- ✦ The Application of SDSM to SDI Funding
- ✦ Building The Simulation Models
- ✦ Example of SDS Models
- ✦ Analysis
- ✦ Conclusion

## Introduction to SDI Funding Models

- ✦ Required: Structured long-term funding of the implementation and maintenance of SDIs
- ✦ Funding Models were designed based on:
  - ◆ Classification of an SDI
  - ◆ The levels of an SDI and
  - ◆ The government structure operating within the implementation environment



## Introduction to SDI Funding Models

- ✦ Twenty different taxa of funding models were designed for SDI implementation and maintenance



## Model Evaluation Techniques

1. Testing of the models in real life situation
2. "Business as Usual" versus target approach
3. Computer Simulation Modelling



## Model Evaluation Techniques Cont'd

- ✦ The problems with the application of the first two techniques are:
  - ◆ The **results** can only be determined after implementation
  - ◆ They are **Time consuming**
  - ◆ **Costly** when compared to the simulation technique



## Simulation Modelling

- ✦ Selected over the others because of the following features:
  - ◆ Ability to include the qualitative components of the environment
  - ◆ Facilitate the evaluation of complex systems that do not have explicit mathematical solutions
  - ◆ Supported by a variety of software packages



## Simulation Modelling Cont'd

- ◆ Supports the translation of the model into a computer-based environment
- ◆ Can be modified to evaluate both changes in the variables as well as changes to the overall structure of the model



## System Dynamics Simulation Modelling

- ✦ System Dynamics Simulation Modelling (SDSM)
- ✦ A simulation technique that integrates both qualitative and quantitative variables
- ✦ Uses feedback loops and time delay techniques to model complex non-linear systems

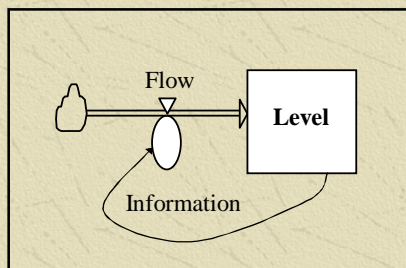


## SDSM Cont'd


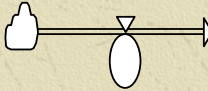


- ✦ Feedback Loop
  - Fundamental building blocks of SDSM
  - Uses flows and levels to represent the dynamics of the system
  - Decision variable (flow) controls an action that is integrated into the system to generate a system level
  - Information pertaining to the level is then fed back to the decision variable which is in turn used to control the flows



## Feedback Loop



## Symbols used in SDSM

- ✦ Level 
- ✦ Flow 
- ✦ Auxiliary Variable 
- ✦ Constant 



## Model Evaluation Using SDSM

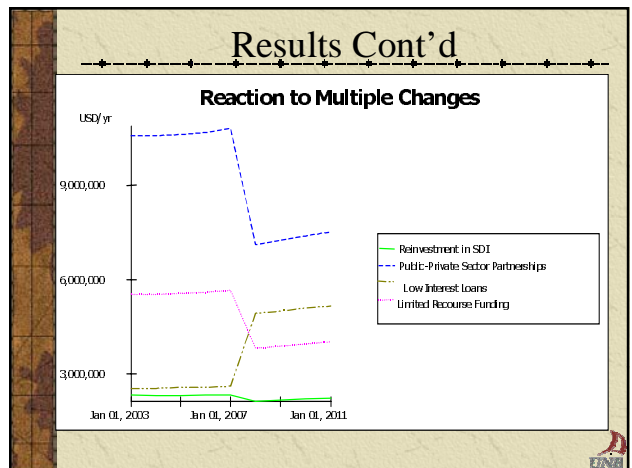
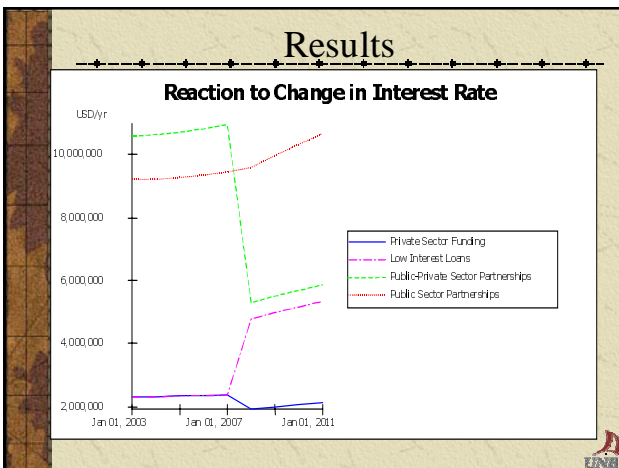
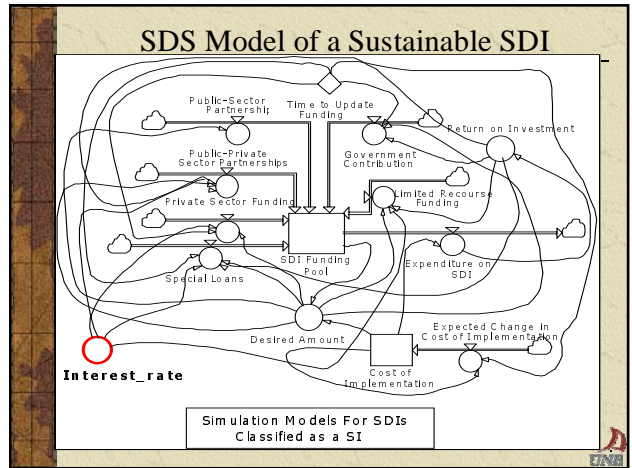
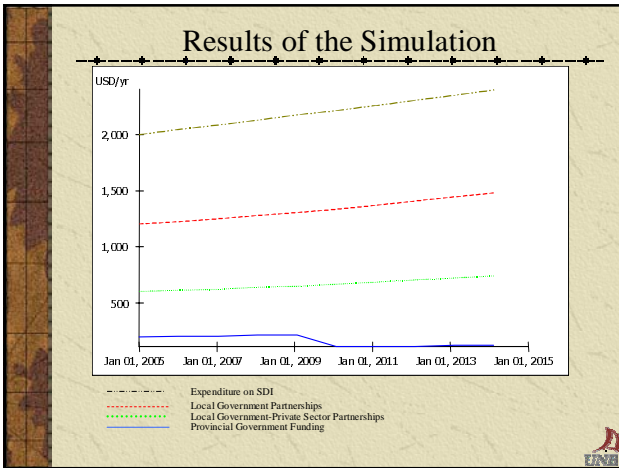
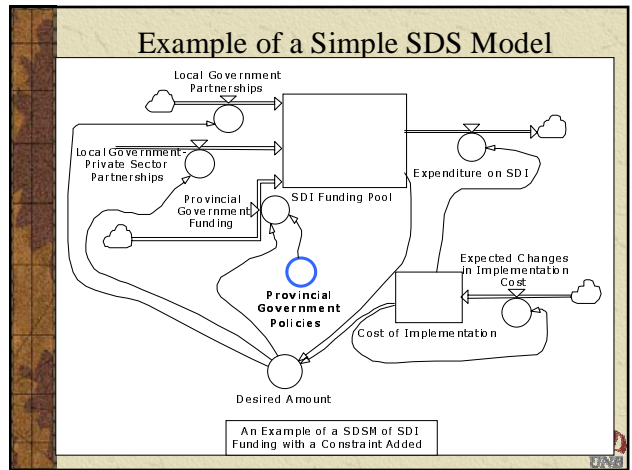
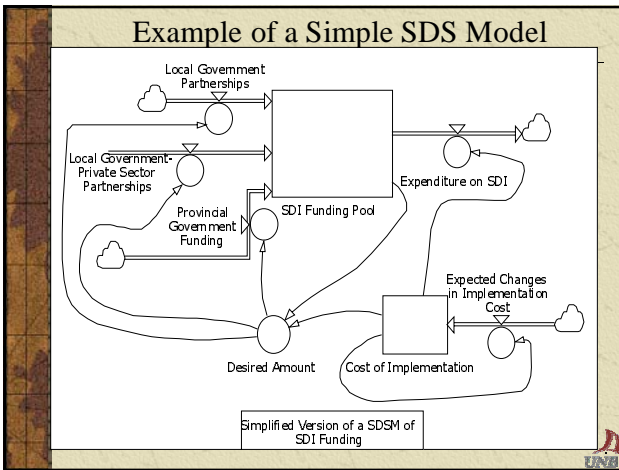
- ✦ What is expected from the evaluation?
  - An indication of the performance of the model(s)
    - Over time and under specific conditions
  - Graphic illustration of the performance
  - The sensitivity of the models to changes
  - The possible integration of the models



## Building the Simulation Models

- ✦ PowerSim Software
- ✦ Coding of the Knowledge
  - Knowledge of the funding models
  - Knowledge of the environment
- ✦ Verification and Validation
  - Are the simulation models built and implemented correctly?
  - Are the models valid representation?





## Analysis of the Application of SDSM

- ✦ SDSM facilitate the following:
  - ◆ Tracking the behaviour of the models over time
  - ◆ Analysis of the performance of the model(s)
  - ◆ Analysis of the implementation environment



## Analysis Cont'd

- ◆ The prediction of the model(s) to changes
- ◆ The determination of the best possible integration of the models
- ◆ The visualisation of the performance of the models



## Conclusion

- ✦ SDSM can assist program coordinators in the selection of funding models
- ✦ Further research is necessary to realise the full potential of the application of SDSM to SDI



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