

INTRODUCTION TO MODELLING

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Models are
mechanisms
for communication



Agenda

Course Objectives

Basic concepts

Benefits of Modelling

Course Objective

Look

Look at what a model is and what the process of modelling is about

Discuss about

Discuss about techniques that are applicable to a wide range of systems

Focus on

Focus on diagramming techniques that are commonly used in describing 'systems' such as business processes, manufacturing processes and software development

Practice

Practice modelling task that are commonly used in software engineering



What is Modelling?

- **Modelling** is about building representations of things in the 'real world' and allowing ideas to be investigated; it is central to all activities in the process for building or creating an artefact of some form or other

<http://www.open.edu>

Models

Model is a way of expressing a particular view of an identifiable system of some kind

Models are:

One model, one understanding

A means of understanding the problems involved in building something;

An aid to communication between those involved in the project, especially between the requirements analyst (a development role) and the user, as part of some deliverable;

A component of the methods used in development activities such as the analysis of the requirements for an artefact and the design of the artefact.

Models

A model is an
abstraction

- Concentrate on the essentials of a (complex) problem by keeping out non-essential details

A model is an
simplification

- Only the properties of the world relevant to the job in hand are represented

Example



Quỳnh Lưu District, Nghe An

Alike and Different



www.google.com.vn

Model in Research

Models of a problem situation are only an approximate representation of that situation

The real world situation will have a complexity that tends to reduce your chances of achieving an exact representation

Researcher need to find some way of achieving an acceptable balance between accuracy and manageability

There will be a number of practical considerations that result in some compromise

Several different models are built, each one representing different aspects (views) of the real world

Bad Model

Model is so complex



Simplifying assumptions
are not made explicit

Principle to build Model



Model is not so complex that its author (or other team members) can use it



All simplifying assumptions, and their consequences, are made explicit



Any of these assumptions may need to be justified

Too much detail in a model can only be a distraction
It would be hard to use such a model as an aid to communication



Models are subject to change

At the very least they require some form of testing so that a model can maintain its correspondence with reality



Kinds of Model

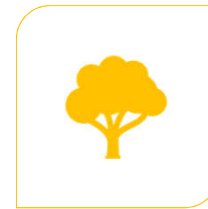
Static models, which describe a set of elements and any relationships that exist between them

Dynamic models, which describe the behavior of one or more elements over time

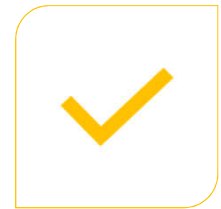
Model in to developing software



A MODEL REFERS TO THE
MACHINE (WHAT THE
SOFTWARE DOES WHEN IT
EXECUTES ON A COMPUTER),
WHICH EMBODIES A
SIMULATION OF THE REAL THING



IT IS A DESCRIPTION OF A
DOMAIN (THAT PART OF REALITY
THAT YOU ARE INTERESTED IN)



A MODEL AND THE DOMAIN ARE
DIFFERENT SO HE DRAWS
ATTENTION TO THE DIFFERENCE
BETWEEN A DESCRIPTION THAT
IS TRUE IN BOTH THE MACHINE
AND THE DOMAIN, A
DESCRIPTION THAT IS TRUE ONLY
OF THE DOMAIN, AND ANOTHER
DESCRIPTION THAT IS TRUE ONLY
OF THE MACHINE

Michael Jackson's *Software Requirements and Specifications*

Applications of modeling



Creating models of weather systems, simulating behavior based on available data to generate [predictive](#) information for forecasts. A hurricane forecast model, for example, is designed to predict a given storm's track and intensity, as well as related events such as storm surges.



Simulating the effect of severe weather events like hurricanes and storm surges on infrastructure to guide the design of more resilient systems.



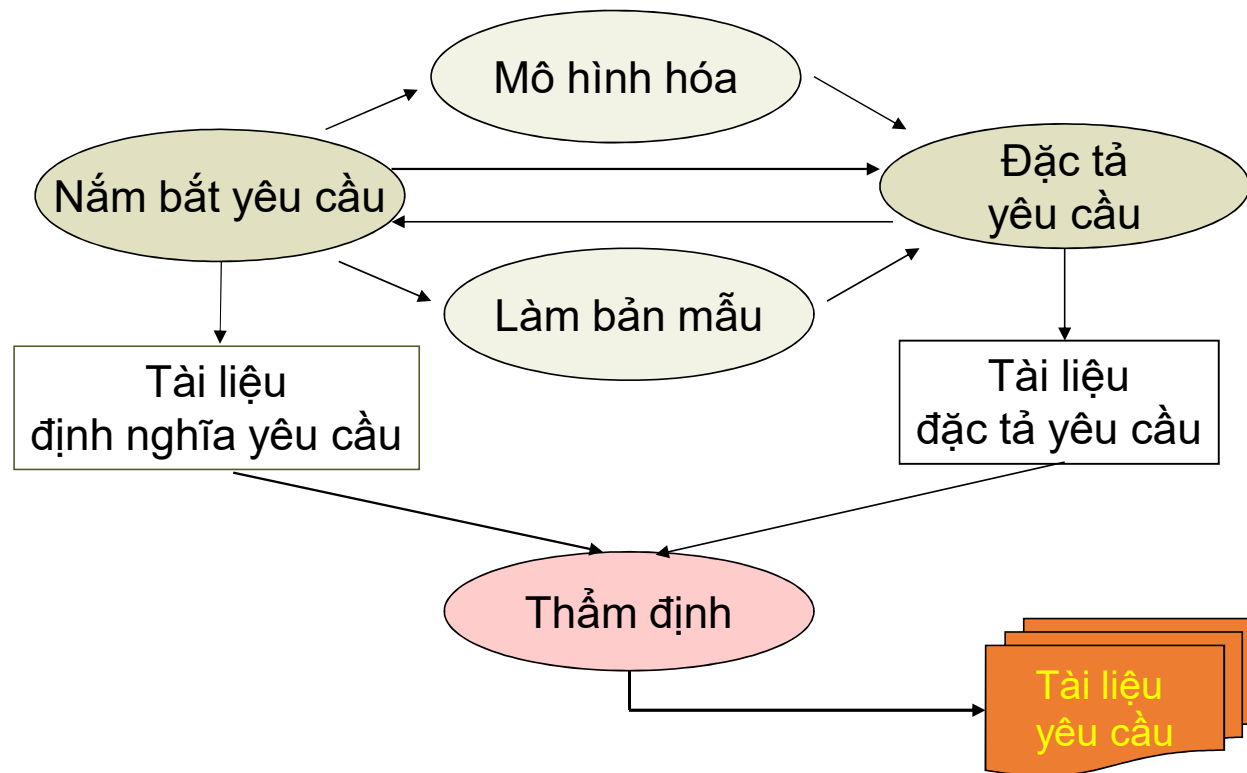
Creating a program to model a social situation and observing the behavior of individuals in the simulation when the program runs. [Social simulations](#) can be used to yield predictive data about how things happen in real-world environments, such as how social norms develop.



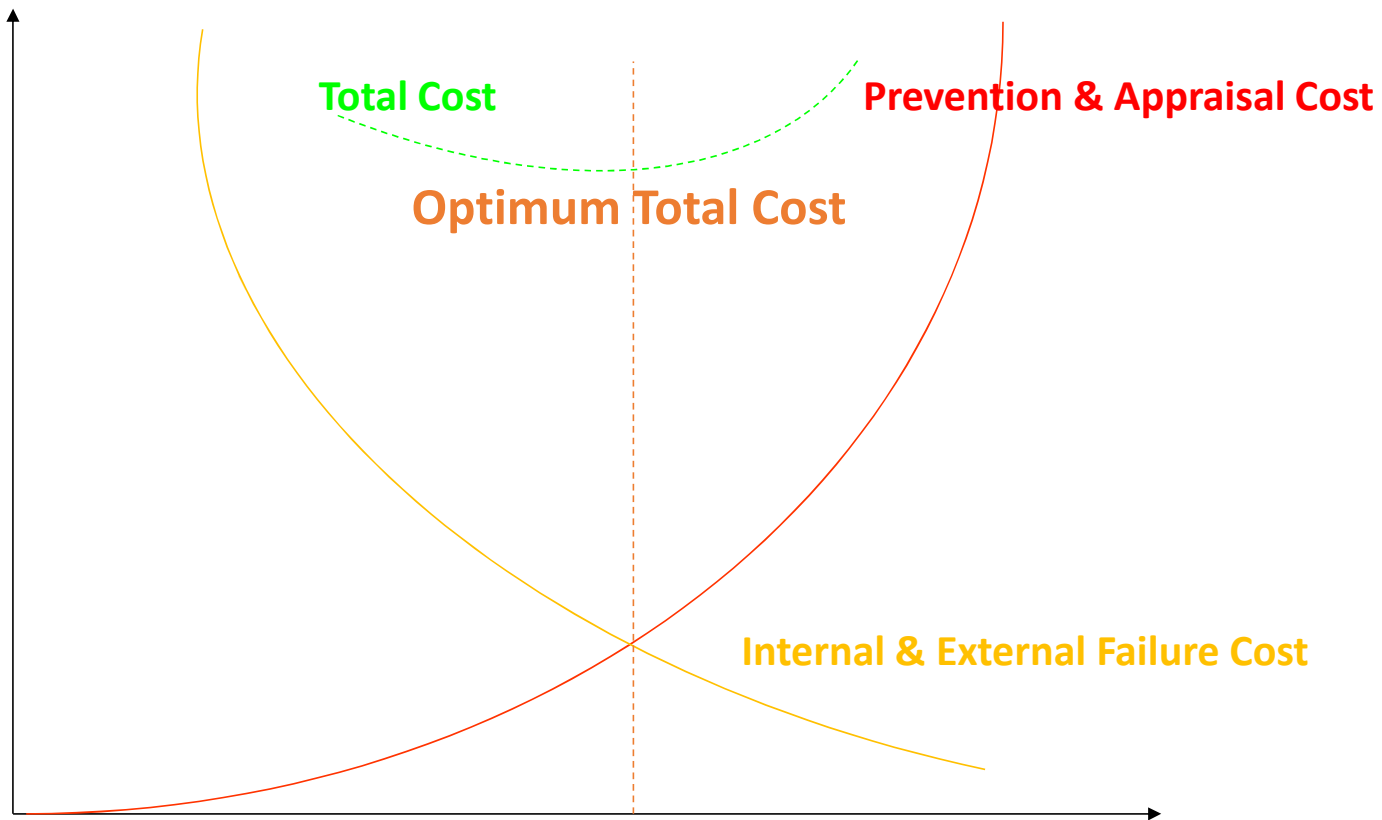
Simulating how a physical change to a system will affect its performance. For example, NASA has explored [drone](#) aerodynamics with logical models simulating air pressures and currents around the rotors. That information could potentially be used to develop designs that reduce turbulence, which would make the vehicles quieter in operation.

<https://whatis.techtarget.com/definition/modeling-and-simulation-MS>

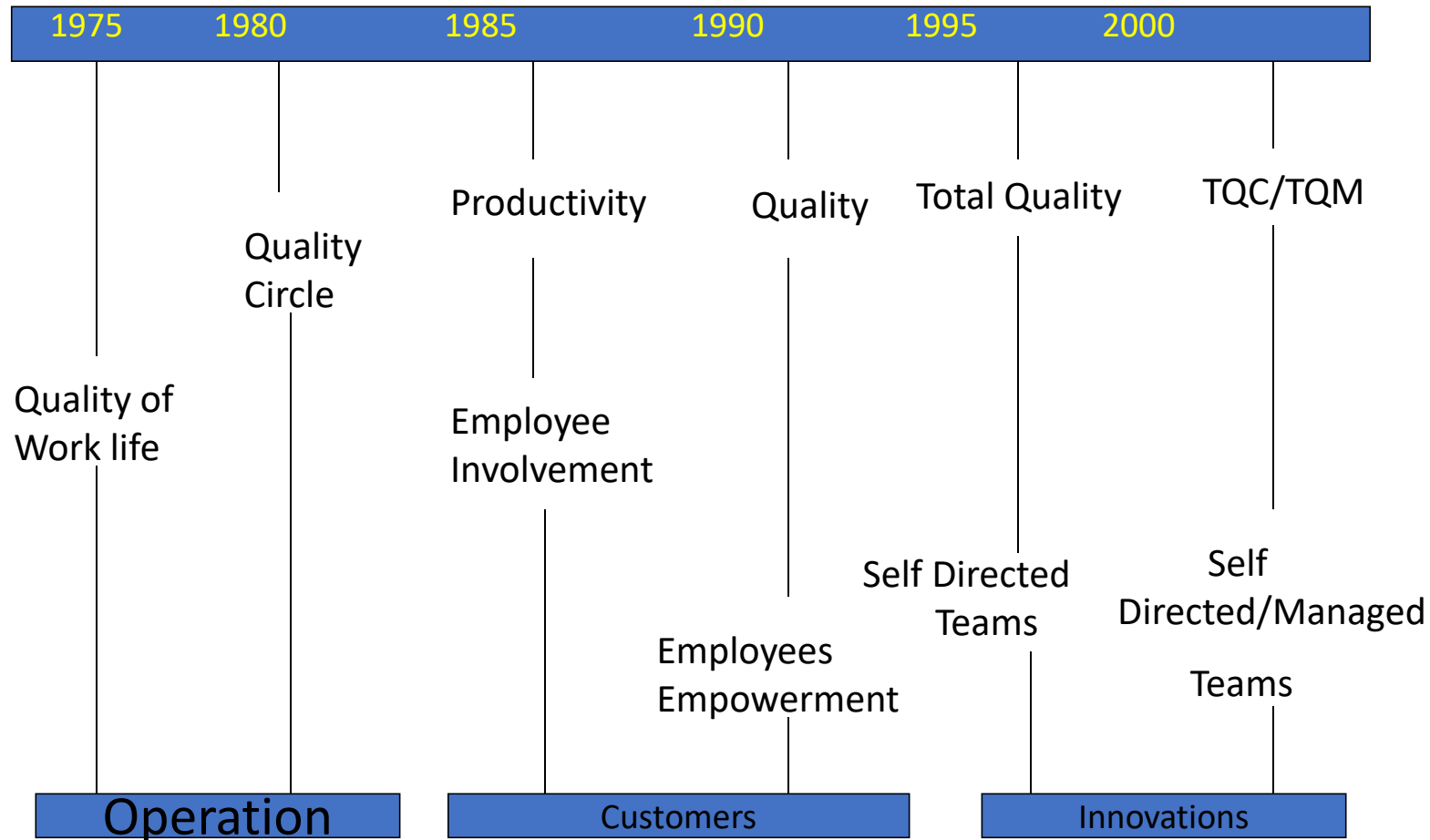
Requirement Engineering



Economics of Quality of Conformance



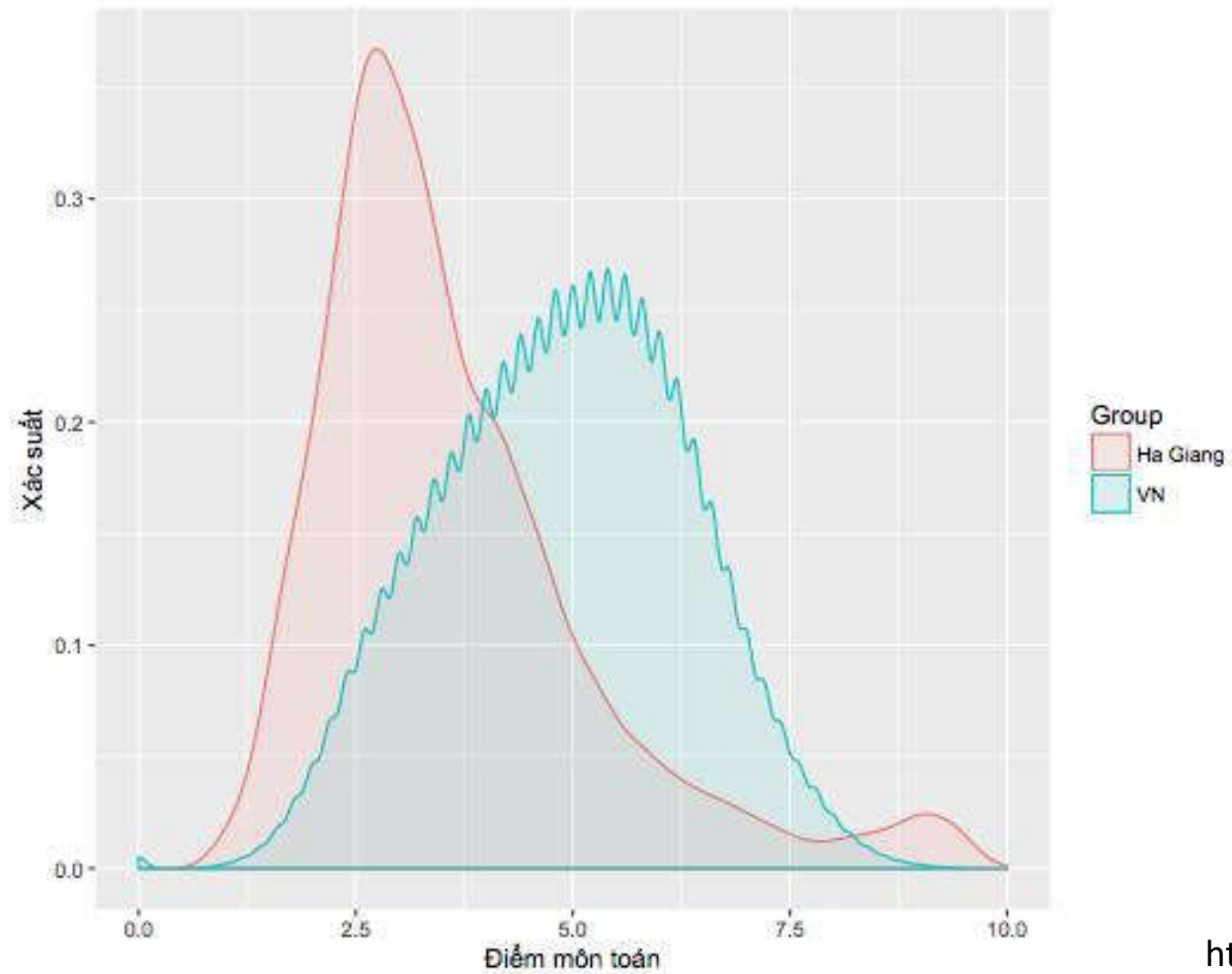
Evolution of quality – Means & Focus



Quality Assurance & Control

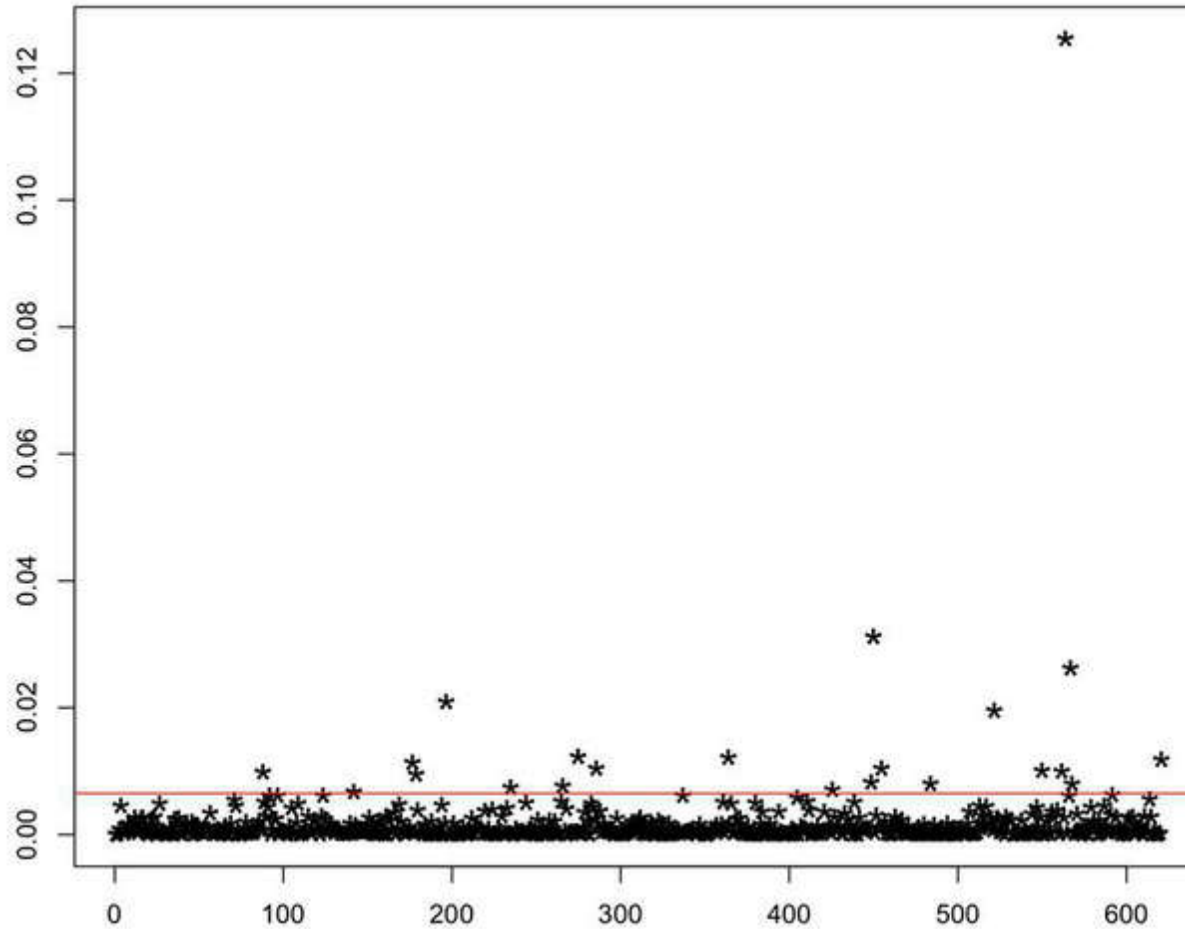


Hà Giang Province' Math



<https://dantri.com.vn>

Math and Others



Modelling Methods

