InterSpread Plus (ISP) Training Course

14-16 August 2022 (Post-ISVEE)

Course Leaders: Dr Robert Sanson, Dr Pascale Aubry, Mark Stern (Programmer**)**

Overview and Objectives: InterSpread Plus (ISP) is a software system for building spatially explicit, mechanistic simulation models of the spread of infectious diseases or pests. It was originally developed for foot-and-mouth disease (FMD) as part of Dr Robert Sanson's PhD study at Massey University, New Zealand between 1990-93. Since then, it has been used by a wide range of government epidemiologists, academics and researchers to model and evaluate control options for a wide range of diseases and pests, including Classical swine fever (Dutch CSF outbreak, 1997), Southern saltmarsh mosquito (New Zealand), Blue-tongue virus (BTV), Equine influenza and more recently, African swine fever (ASF). It was used extensively by DEFRA during the UK 2001 FMD epidemic and provided insights into how the disease was spreading in various parts of the country. It has recently been updated with the ability to specify animal-level within-herd SIR / SEIR or more complex state transition models, which then drives the between location transmission mechanisms and integrates with the disease or pest detection surveillance and control processes.

This 3-day course will cover all of the key components of ISP and attendees will progressively build a disease spread model during the course.

Background and skills required: No previous modelling experience is required.

Hardware / software requirements: Attendees will be expected to bring a Windows laptop to the course, as ISP currently only runs under the Windows operating system. The ISP software installation package and course notes will be provided on a USB stick to all attendees. Other suggested software to pre-install includes: a text editor (e.g. Notepad, Notepad2, Notepad++), statistical analysis software such as R, and a mapping program such as QGIS.

This course has been presented before at a Simulation Modelling Symposium held at the University of Calgary in December 2012 (~20 participants), and at the Canadian Food Inspection Agency, Ottawa from November 29 – December 2 (12 participants).

Duration: 3 days, from 14-16 August 2022 (post-ISVEE)

Location: Centre of Veterinary Epidemiological Research, Charlottetown

Number of participants: 10 – 20

Working language: English, but one of the course leaders is Dr Pascale Aubry who is a fluent French speaker, so will be able to explain things in French if need be.

On-line participation: On-line participation will not be catered for.

Course schedule:

Day	Time	Activity/Contents	Details
1	8:30-10:00	Lecture: Intro to Models	Types and uses of models
		Lecture: Data needs for models	Denominator data, movement patterns, epidemiological parameters, controls
	10:00-10:30	Bio break	
	10:30-12:00	Lecture: Overview of ISP	Core features, integration between the within-farm & between-farm models
		Lecture: Types of inputs to ISP	Spatial data, distributions, look-up tables, time-period triggers etc.
	12:00-13:00	Lunch break	
	13:00-14:30	Lecture: Analysing outputs	Summarising, graphs, maps (R, QGIS)
		Lecture: Within-farm states	States, Beta transmission coefficients, durations
	14:30-15:00	Bio break	
	15:00-16:30	Exercise 1: Build a simple within-farm SEIR model	Set up SEIR model, run some simulations and generate some graphs
2	8:30-10:00	Lecture: Between farm transmission (Pt 1)	Animal movements, network files, other movement types
		Lecture: Between farm transmission (Pt 2)	Local spread, airborne spread
	10:00-10:30	Bio break	
	10:30-12:00	Exercise 2: Extending the model with between farm transmission	Movements, local spread
	12:00-13:00	Lunch break	
	13:00-14:30	Lecture: ISP Controls	Zones, tracing, surveillance, depopulation, movement controls
		Lecture: Human resources	Concepts, spatial vs. aspatial, output reports
	14:30-15:00	Bio break	
	15:00-16:30	Exercise 3: Extend the model with controls	Add surveillance, detection, depopulation
3	8:30-10:00	Lecture: Vaccination	Time to immunity, effects on susceptibility, transmission, and detection, types of vaccination zones
	10:00-10:30	Bio break	
	10:30-12:00	Exercise 4: Add vaccination	Compare outputs with and without vaccination
	12:00-13:00	Lunch break	
	13:00-14:30	Lecture: Advanced topics	Workflows for running multiple model configurations; running ISP from the command line; Editing the control file with a text editor etc.
	14:30-15:00	Bio break	
	15:00-16:30	Presentation of CFIA ASF Model	A full-featured African Swine Fever model
		Presentation of NZSM FMD model	A full-featured FMD model

Bios:

Dr Robert Sanson graduated as a veterinarian from Massey University in 1982 and became a Member of the Australian and New Zealand College of Veterinary Scientists in Epidemiology in 1988. He completed his PhD in Veterinary Epidemiology at Massey University in 1993, in the field of using decision support systems in the management of animal disease emergencies. As part of his PhD thesis, he designed the original version of InterSpread, a stochastic spatial disease spread model, which has since been used in a number of countries around the world to model foot-and-mouth disease (FMD) and other infectious diseases, including during the 2001 FMD epidemic in the United Kingdom.

Since that time, Robert has been involved in modelling many different disease and pest agents, including *Varroa* in honey bees, Southern salt-marsh mosquitoes, and *Styela clava*, an invasive marine pest. He has provided advice to a number of international organisations including the FAO and OIE, and has provided biosecurity and modelling assistance to several countries, including the USA, Canada, UK and Mongolia. He works for AsureQuality Ltd as an epidemiologist, providing FMD modelling services under contract to the New Zealand Ministry for Primary Industries, as well as conducting research and developing innovative solutions on issues affecting New Zealand's primary sector industries.

Dre Pascale Aubry holds a D.M.V. and M.Sc. in veterinary epidemiology from the Université de Montréal. She also completed an Internship and Residency in Ambulatory and Production Medicine at Cornell University in 2002. After practicing large animal medicine for one year in New York and Pennsylvania, she became assistant professor of Ambulatory and Preventive Medicine at the Université de Montréal in 2003.

Since 2009, she has been a Risk Assessor and Science Advisor for the Canadian Food Inspection Agency. She has been involved in a variety of files such as avian influenza, porcine epidemic diarrhea, bovine tuberculosis, scrapie, classical swine fever and animal traceability. She has provided advice and collaborated with other federal departments such as Statistics Canada, Fisheries and Ocean, as well as the OIE. More recently, she has been leading the development of an African Swine fever model for Canada, in collaboration with provincial and industry partners.

Mark Stern graduated with BSc in Computer Science from Massey University in 1989, having worked as a Statistical Technician and Software Developer for the then New Zealand Ministry of Agriculture and Fisheries. In 1990 Mark joined the Epidemiology Department of Massey University to work on various pieces of epidemiological software including the original version of InterSpread, models for TB and BSE, and modelling the 2001 UK FMD outbreak. Mark was also responsible for the design and coding of InterSpread Plus – a disease generic version of the original InterSpread.

In 2002 Mark moved to Switzerland to design and develop Kodavet – a national veterinary information system and continued to work on enhancements to InterSpread Plus. He now works as a freelance software developer, mainly in the field of disease modelling and animal health systems, and continues to be the primary coder of InterSpread Plus.