Problem Formulation
There is a need for a unified integrated infrastructure (cyber-infrastructure) to monitor, collect, process and render array sensor-based information, in an automated and timely manner, for the assessment and proper management of Earth's geophysical, environmental and ecological issues such as:
- Landslides, deforestation, etc.
- River dynamics: watersheds, flashfloods, etc.
- Soil moisture: wetlands, land use, etc.
- Water pollution: pathogens, solid waste, etc.

Conceptual Model
![Fig. 1. Conceptual Model of WALSAIP](image1)

Theoretical Formulation
This work deals with the development of a Java-based environment for the treatment of remote-sensing imaging information on a cyber-infrastructure.

Especial attention is given to the development of a computational signal algebra framework for the modeling and simulation of digital image interferometry processing applications.

Correlated digital interferometry (CDI) for imaging radars deals with the use of signal correlation techniques to process the phase information of digital image representations of microwave imaging signals.

Take advantage of compile scripting languages, such as MATLAB®, into highly optimized machine code (i.e. C, Java) [4].

Initial Target Area
![Fig. 2. Jobos Bay Reserve](image2)

Type of sources of data:
- In-situ sensors
- Aero-transported sensors
- Space borne sensors

Java-based Environment
J-CID (Java Computational Image Developer) provides a set of operators for Image Processing according to the constraints imposed by the Signal Algebra of complex-valued images.

Some of the operators invoke methods from the Java Advanced Imaging API which supports a simple programming model to manipulate images. Also it is used the Java Image I/O API which provides "a pluggable architecture for working with images stored in files and accessed across the network."

A partial list of the implemented operators is:
- Point Operators
  - Absolute value, Clamp, Color Convert
  - Arithmetic Operators
  - Addition, Substraction, Multiplication, Division
  - Spatial Operators
  - Crop, Resizing, Rotation and Flipping
  - Convolution Operators
  - Sharpening, Blurring, Embossing, Edge Detection
  - Filtering Operators
  - Low-pass, High-pass, Laplacian, Gaussian, 2-D Fourier Transform
  - Cyclic and Complex Operators
  - Cyclic Convolution, Cyclic Correlation, Conjugate, Phase, Hadamard Product and Shifting.

J-CID has the option of allowing end-users to add their own customized algorithms as encapsulated operators.

References