Model-Based Spectrum Management

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Proposed modeling constructs

- **Maximum power density**
- **Spectrum mask** ← **Can capture unique characteristics of spread spectrum systems**
- **Underlay mask** ←
- **Power map** ← **Can capture antenna effects**
- **Propagation map** ← **Can capture environmental effects**
- **Intermodulation masks** ← **Captures susceptibility to intermodulation**
- **Platform** ←
- **Location** ⎤
- **Start time** ⎬ **Enable greater resolution in spectrum management**
- **End time** ⎦
- **Minimum power density**
- **Protocol or policy** ← **Can capture behaviors that enable compatible reuse**

Not data about a system but used to build a model of spectrum use
Models are information!

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Combining constructs into models

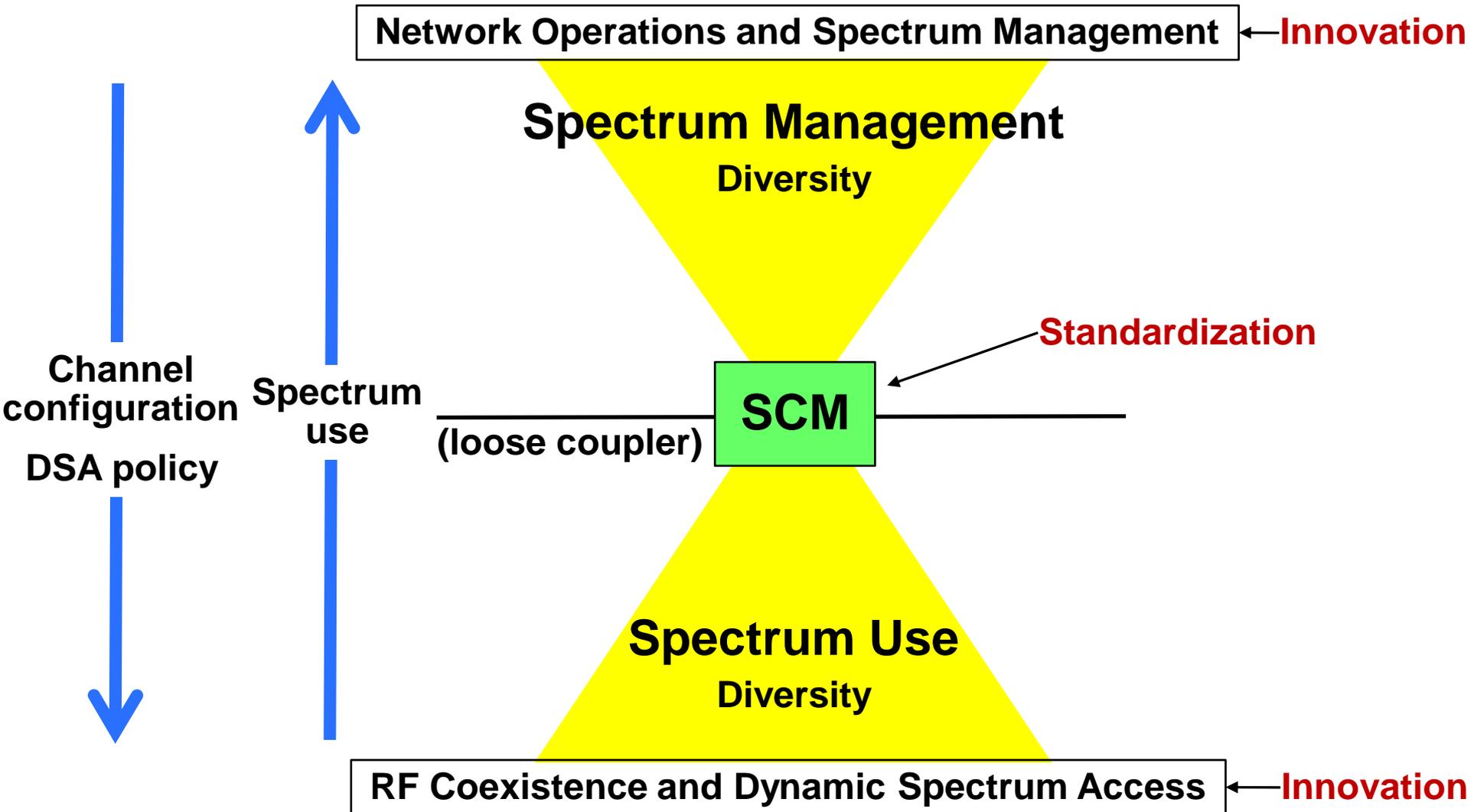**Modeling constructs are found in transmitter and receiver models and in system and collection headings**

Constructs define emissions

Constructs define interference

Collection
——————
——————
——————
——————
System_1
System_2
⋮
System_i
Transmitter_1
Transmitter_2
⋮
Transmitter_j
Recevier_1
Receiver_2
⋮
Receiver_k
End of Collection

System
——————
——————
——————
——————
Transmitter_1
Transmitter_2
⋮
Transmitter_n
Recevier_1
Receiver_2
⋮
Receiver_m
End of System

Transmitter
——————
——————
——————
——————

Receiver
——————
——————
——————
——————
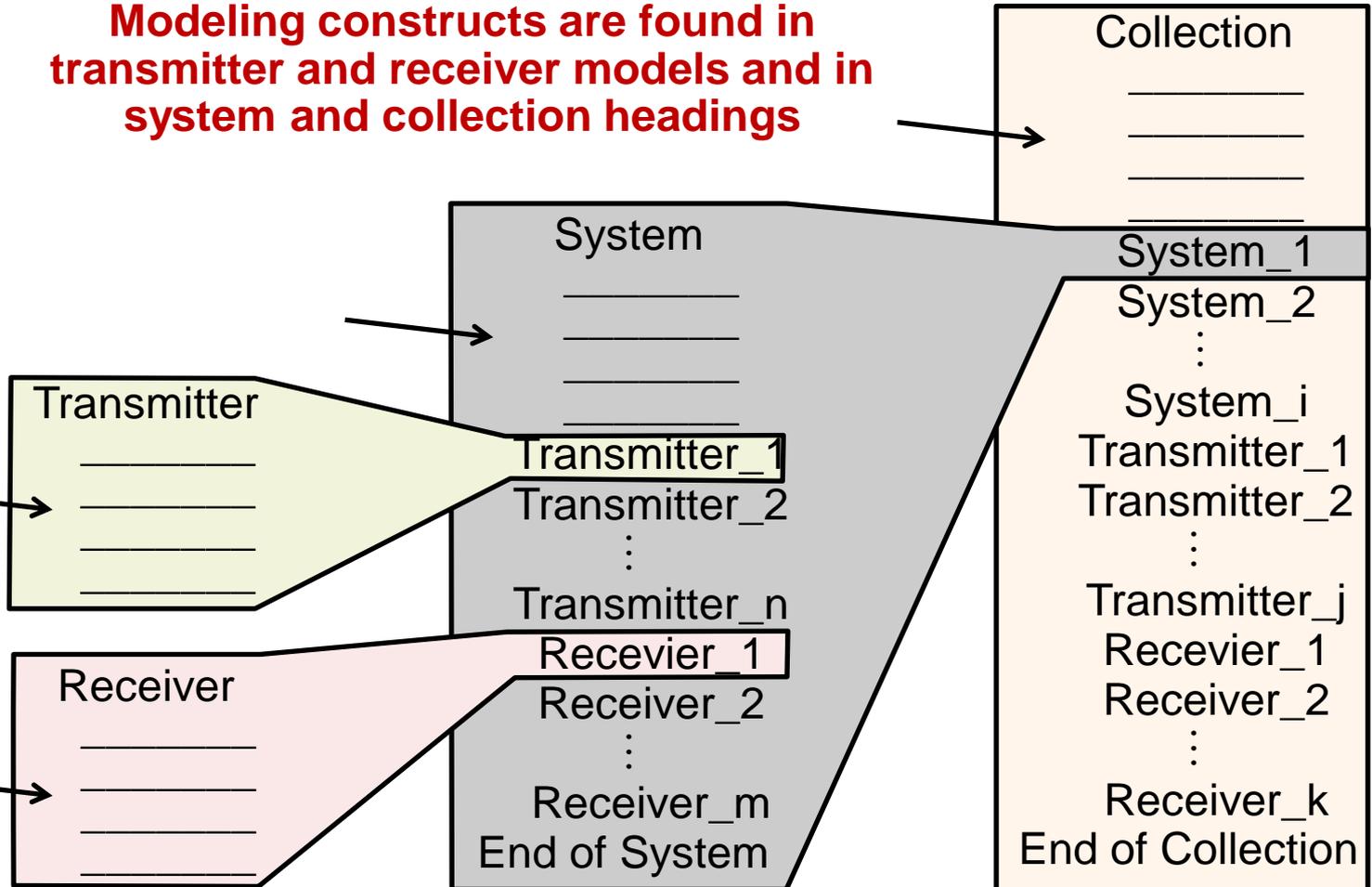
Proposal provides an XML schema for this type of model construction

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Spectrum Consumption Modeling as a Loose Coupler

Network Operations and Spectrum Management ← Innovation

Spectrum Management
Diversity

Channel configuration

DSA policy

Spectrum use

Standardization

SCM

(loose coupler)

Spectrum Use
Diversity

RF Coexistence and Dynamic Spectrum Access ← Innovation

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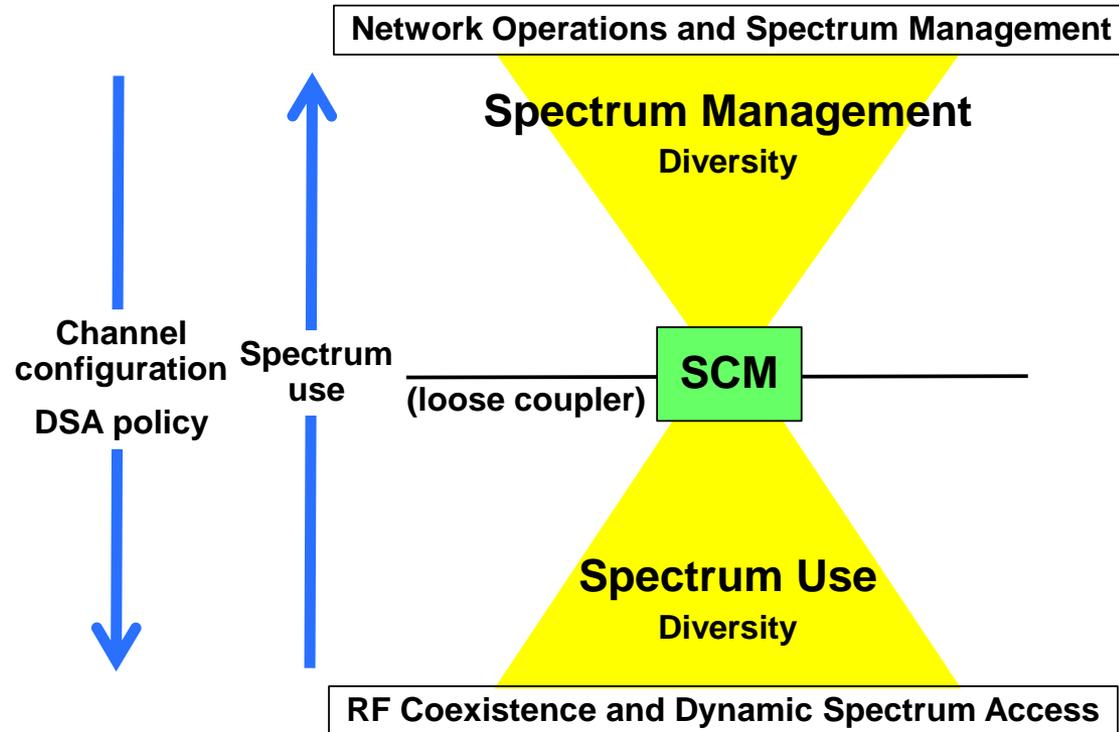
Model and Collection Functions

- **System Model**
  - Constructs in heading define the boundaries of system operation
  - Lists transmitter and receiver models with more limiting constructs
- **Collective Consumption Listing**
  - Constructs in heading define the limits to which the collection is complete
  - Lists systems, transmitters and receivers of spectrum consumers that consume spectrum within the limits of the collection
- **Spectrum Authorization Listings**
  - Constructs in the heading define the limits of the overall authorization
  - The lists of system, transmitter, and receiver models identify available spectrum
- **Spectrum Constraint Listings**
  - Constructs in the heading define the limits of the collection of constraints
  - The lists of system, transmitter, and receiver models identify existing uses of spectrum that have precedence

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