

ALBERTA ENVIRONMENT AND SUSTAINABLE RESOURCE DEVELOPMENT ENVIRONMENTAL MODELLING WORKSHOP 2013

07:15	08:15	Networking Breakfast/Registration (In front of the Maple Leaf Room)		
08:15	08:40	Welcoming & Opening Remarks	Heather von Hauff	AESRD
08:40	09:00	Opening Keynote Address - CMO Introduction	Anil Gupta	AESRD
Session 1			Chair: Ben Arril	
09:00	09:20	The Use of Mechanistic Models for Water Quality Management	Tim Wool	USEPA
09:20	09:40	Modelling Coupled Natural/Human Systems for Environmental Resource Management	Danielle Marceau	U. of Calgary
09:40	10:00	Application of Lagrangian Modelling In Urban Areas	Richard Leduc	AirMet Science Inc.
10:00	10:20	Networking & Refreshment Break		
10:20	10:40	Water Resources Management Using Coupled Models in Alberta and the U.S.	Andrew Parker	Tetra Tech Inc.
10:40	11:00	The Art of Water Management Modelling; Applying Science to Inform Value Based Decisions	Dan Sheer	Hydrologics
11:00	11:30	A Vision of Enterprise Spatial System for Supporting Environmental Modelling	Chiadih Chang	AESRD
Panel Discussion I (11:30 ~ 12:15)				
12:15	13:15	Lunch		
Session 2			Chair: Sunny Cho	
13:15	13:35	Simulating Hydrological Behavior under Environmental Change in Alberta	Stefan Kienzle	U. of Lethbridge
13:35	13:55	Linking Air Quality and Watershed Models	Krish Vijayaraghavan	ENVIRON
13:55	14:15	Southern Region Modelling Initiatives	Tom Tang & Kent Berg	AESRD
14:15	14:35	Networking & Refreshment Break		
14:35	14:55	Discovering the Possible: Tools for Collaborative Learning and Improved Outcomes	David Hill	U. of Lethbridge
14:55	15:15	The Importance of Modelling for Bringing Biodiversity into Land-use Planning	Hugh Norris	AESRD
15:15	15:35	Conjunctive Optimization of Demand and Supply in Integrated River Basin Management Models	Nesa Ilich	Optimal Solutions Ltd
Panel Discussion II (15:35 ~ 16:05)				
16:05	17:30	Poster Viewing / Cash Bar (Aurora Room)		
17:30	19:00	Networking - Mixer & Dinner (Key Presentation over Dinner – Prof. John Pomeroy, U. of Saskatchewan) Multi-scale Modelling Of Mountain, Forest and Prairie Basin Hydrology in Alberta Using the Cold Regions Hydrological Model		

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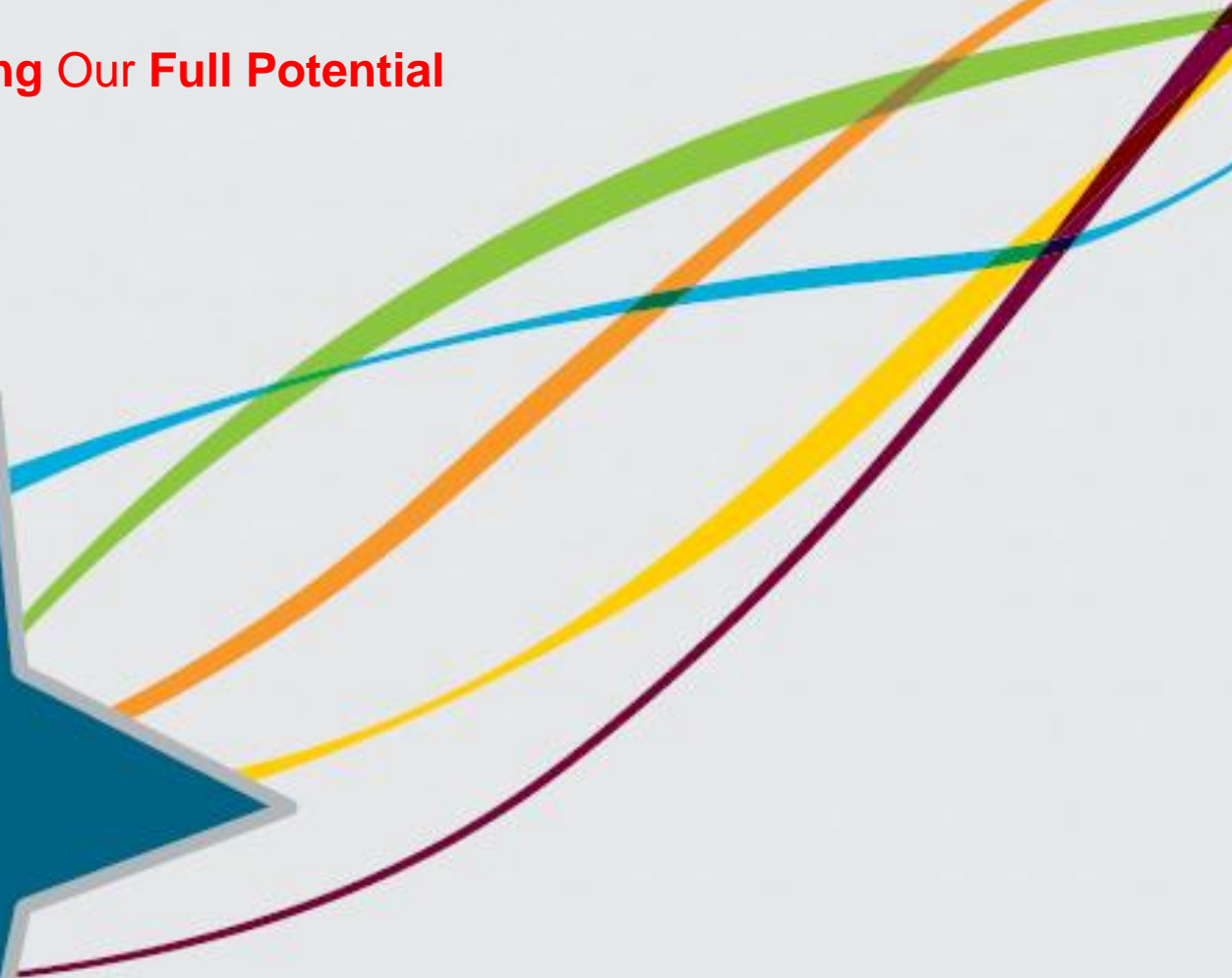
07:15	08:15	Networking Breakfast /Registration (In front of the Maple Leaf Room)		
08:15	08:30	Opening & Keynote Address	Bob Barraclough	ADM, Monitoring Agency
Session 3			Chair: Chiadiah Chang	
08:30	08:50	A Quick Look at Current Air Quality Modelling Being Undertaken By AESRD in the Context of Cumulative Effects Management	Sunny Cho & David Lyder	AESRD
08:50	09:10	Prototyping A Tool for Integrating Regional CEMS Data, Information and Quantifying Effects	Robert Magai	AESRD
09:10	09:30	Numerical Modelling In Support Of Provincial Groundwater Inventory Program (PGIP)	Amandeep Singh	Energy Resources Conservation Board
09:30	09:50	Air Quality Modelling For Multimedia Assessments and Associated Challenges	Mervyn Davies	Stantec
09:50	10:10	Networking & Refreshment Break		
10:10	10:30	Cumulative Effects Modelling in the South Athabasca Oil Sands Area	Sarah Depoe	AESRD
10:30	10:50	Groundwater Flow Model Development for Cumulative Effects Management within the Athabasca Oil Sands	Margaret Scott	WorleyParsons Canada Ltd.
Panel Discussion III (10:50 ~ 11:20)				
Small Group Discussion (11:20 ~ 12:15)				
12:15	13:15	Lunch & Talk Presentation(Starting at 12:50)	Edwin Welles	Deltares USA Inc.
Session 4			Chair: Werner Herrera	
13:15	13:35	EFDC_DS/EFDC Explorer Modelling System - Use and Applications for Alberta	Paul Craig	DSI
13:35	13:55	An Overview of Evaluations to Support Contaminant Load Management for the North Saskatchewan River	Darcy McDonald	AESRD
13:55	14:15	Simulating the Responses of Ecological Indicators to Past, Current and Future Land Use with ALCES, ALCES Mapper and Web-Based ALCES	Brad Stelfox	ALCES Group
14:15	14:35	Networking & Refreshment Break		
14:35	14:55	Integrated Watershed Hydrology Modelling Using MIKE SHE: Recent Advances to Support Cold Climate Hydrology and Integrated Land-Use Planning	Patrick Delaney	DHI
14:55	15:15	Modelling For Climate Variability	David Sauchyn	U. of Regina
15:15	15:35	Impacts of Climate and Vegetation Changes on Streamflow and Water Balance on Headwater Stream in Southern Alberta	Vinod Mahat	U of Alberta/Foothills Research Institute
Panel Discussion IV (15:35 ~ 16:10)				
Conference Wrap-up (16:10 ~ 16:20)				
<ul style="list-style-type: none"> • Summary of recommendations & actions from the outcomes of the conference, identification of issues and challenges 				
16:20	ADJOURN			

Day 1 - Keynote Speech

Anil Gupta – Central Modelling Office

ESRD - Central Modelling Office

Reaching Our Full Potential



Integrated Environmental Modelling

Anil Gupta, Ph.D., P.Eng.

Manager, Central Modeling Office

Policy Division

Environment and Sustainable Resource Development

Outline

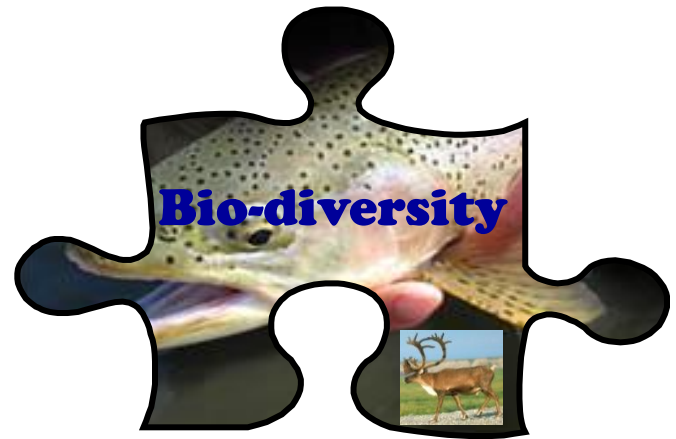
Integrated Modelling

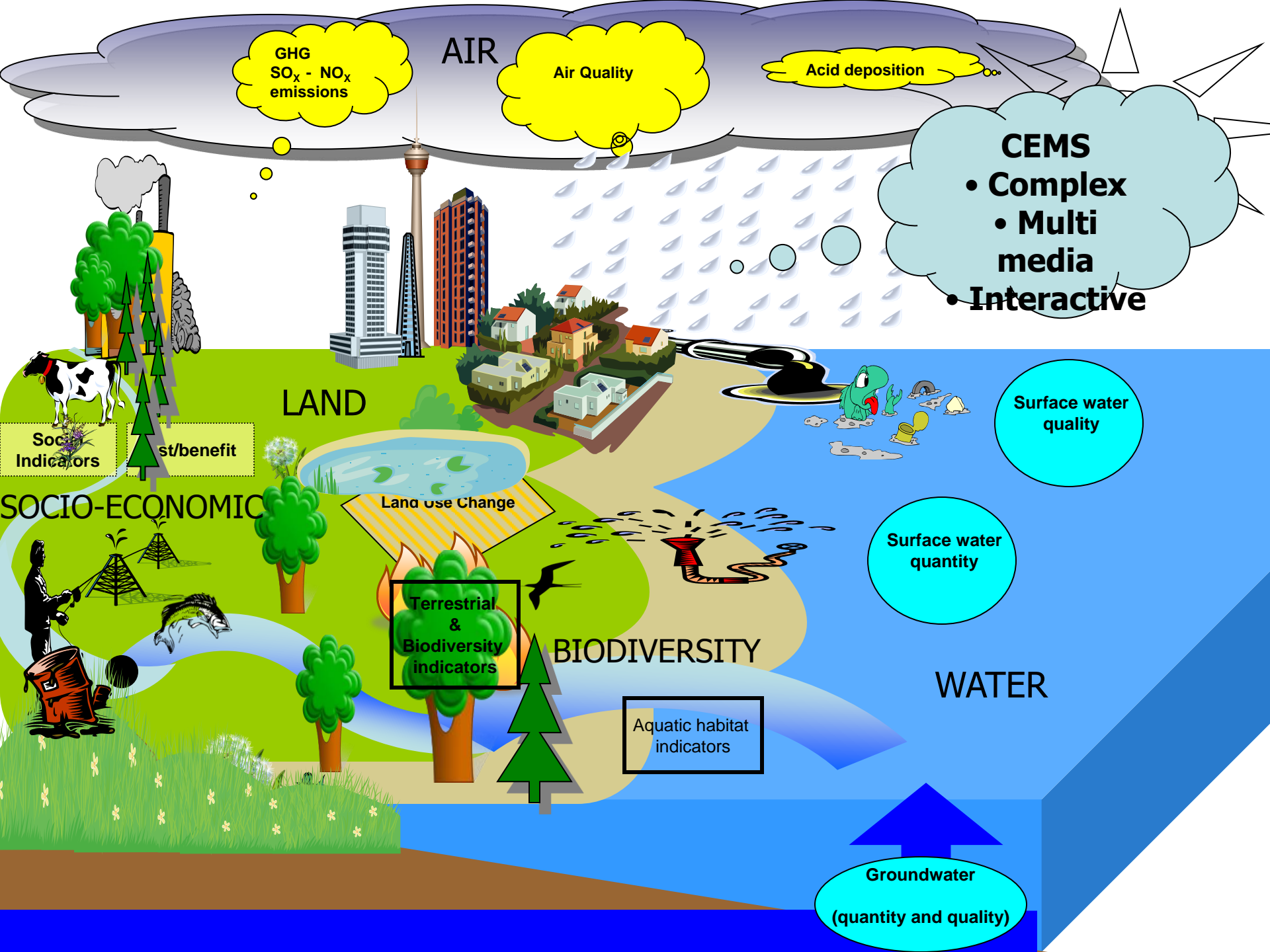
- Integrated modelling – what does it mean?
- Integration efforts – some examples
- What else is being done to address?

Central Modelling Office/ESRD/GOA

- ESRD Modelling Context
- Why do we model? – a regulatory perspective.
- Current modelling practices in ESRD
- Challenges and opportunities
- CMO structure and role in supporting/enhancing modelling in ESRD

Environment

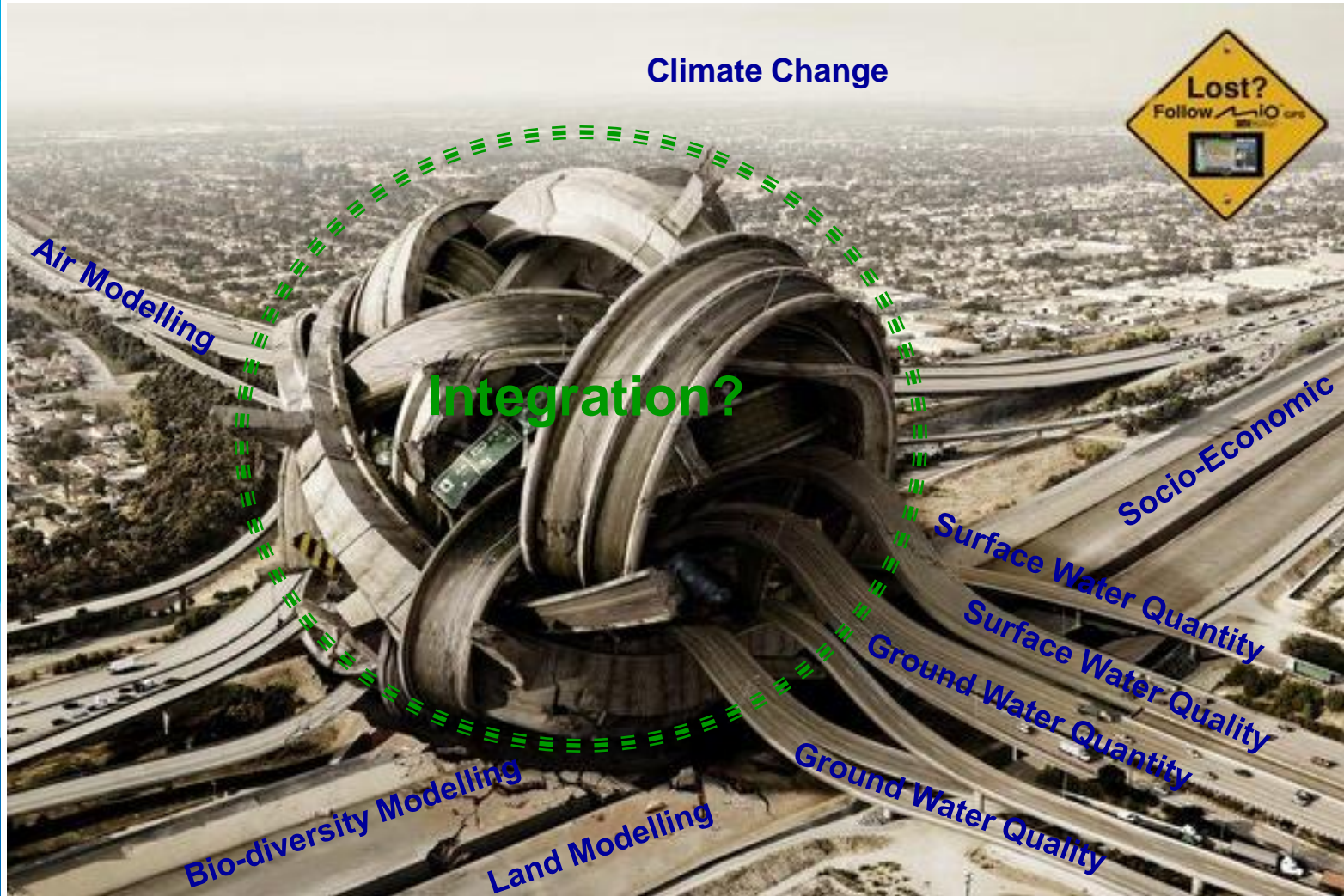




- In past - modelling efforts were either sector based or media specific (e.g., land, air, water and biodiversity).

They lacked the ability to consider how these landscape components interact with each other.

The Problem



- CEMS Approach – ESRD/GOA is moving towards Cumulative Effect Management (CEM).

One of the critical aspect to moving toward CEM is to create an **integrated, versatile multi-media environmental modelling system**, which can also encompass climate change adaptation to support policy and decision making. (plus linkages with, **socio-economics and energy** side of modelling).

The Solution

**Integrated
Modelling
System**



What does it mean by IEM?

Integrated environmental modeling, often requires to integrate (spatial) data and computational models from a variety of disciplines (e.g., related to physical, biotic, social, and economic environments) and at different scales, to understand and to solve complex societal problems that arise from the interaction of humans and environment, and to contribute in this way to establishing the foundation of sustainable development, to inform policy and to support decision-making.

(Rothman, 1997, Parker, 2002)

•Parker, P., et al., Progress in Integrated Assessment and Modelling. *Environmental Modelling & Software*, 3(17): 209–217, 2002.

•Rothman, Dale S., Robinson, John B., Growing Pains: A Conceptual Framework for Considering Integrated Assessments. *Environmental Monitoring and Assessment*, 46(1): 23–43, 1997.

- No single agency or model has the capability to address complex interdisciplinary environmental issues (e.g., cumulative effects management, climate change, etc.)
- Collaborative approaches are required to pool resources and provide consistent direction, while allowing flexibility to address different issues.

(Integrated) Environmental Modelling – Models & Modelers

A collaborative teamwork



- Integration efforts – some examples

ESRD/GOA Modelling Context

Increased reliance on models (modelling) to support CEMS, LUF-regional plans, evaluation & reporting, operations (approval & compliance), emergency management and other ESRD strategies including policy development and environmental monitoring.

- Why do we do modelling? (regulatory perspective)

- is a proven way of providing decision support to performance-driven, outcome based processes.
 - To diagnose and examine causes and precursor conditions of events that have taken place
 - To forecast outcomes and future events
- Modelling informs policy (MIP)
- Modelling compliments monitoring (MCM)
- Modelling ~ a proven tool for evaluation and reporting

Modelling use in ESRD

- Policy – development and analysis (what if)
- Regulatory decision making (approval, licensing etc.)
- Implementation applications (enforcement, compliance etc)
- Emergency management
- Routine operations – water supply, dam operations, effluent discharge, emissions,
- Planning
- Monitoring (compliments)
- Cumulative effects (of multiple projects/activities and/or across various media)
- Performance indicator – identify, triggers/limits
- E&R - Performance evaluation of management practices
- Predictions – short term and long term

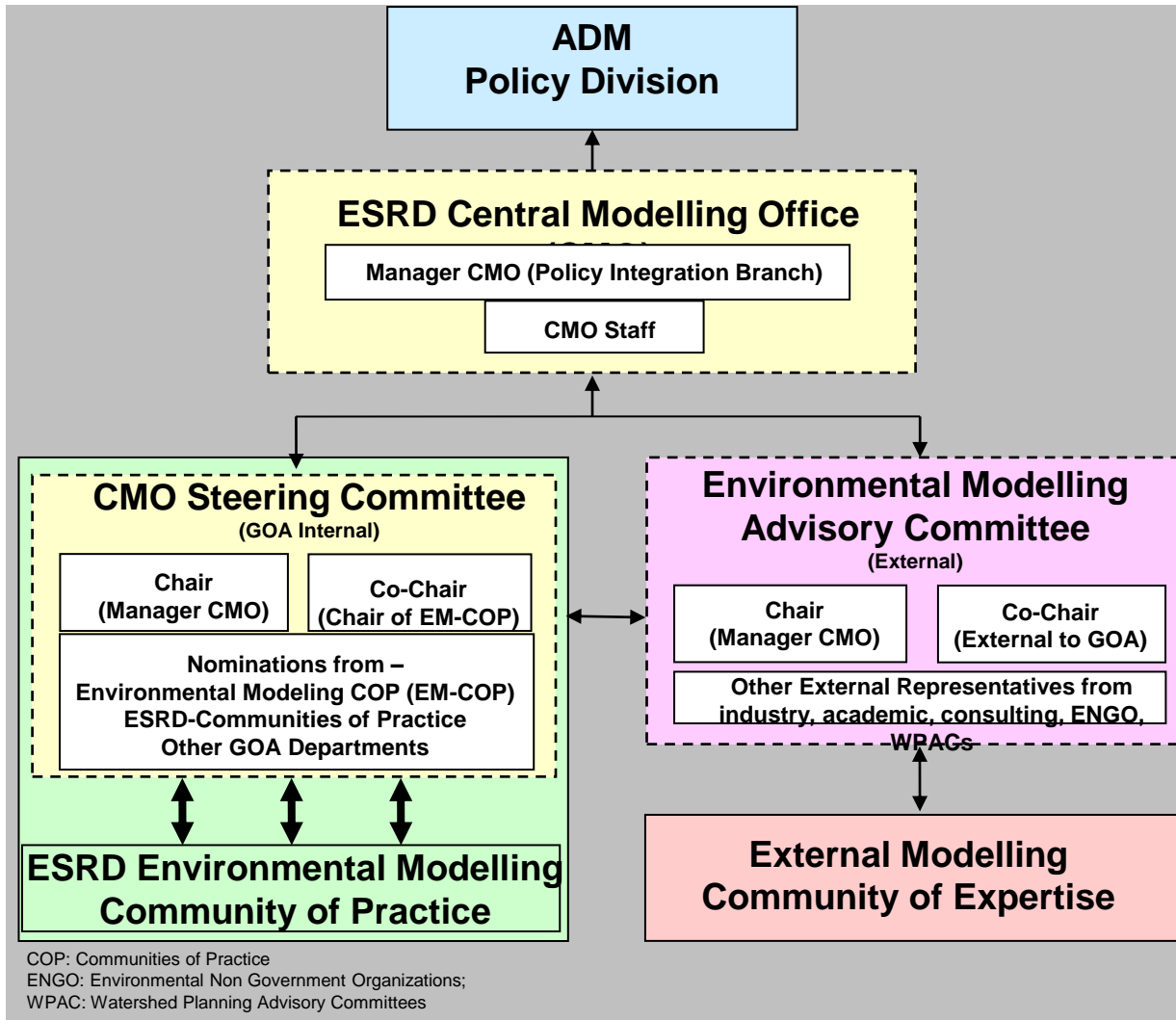
ESRD Modelling Capacity

- Land Use Modeler
- Surface Water Modelers/Hydrologist
- Water Allocation Modelers
- Water Quality Modeler/Limnologists
- GW Modelers/Hydrogeologists – quantity & quality
- Air Quality Modelers
- Riparian Modelers
- Bio-diversity Modelers
- Forest Management
- Forest Fire
- Wildlife

Opportunities
brings
Challenges



CMO Structure



Pro-active
Approach

-
- Coordination (**oversight, guidance and support**)
 - Provide **assurance** to stakeholders (internal & external) that ESRD modelling adheres to standard guidelines and criteria and is done in a cumulative effects based manner with acceptable **science rigour, credibility and transparency** that is sustainable in the long term.
 - Promote a cumulative effects based approach to modelling where strategic/regional and multi-media modelling efforts are integrated to best achieve environmental management objectives.
 - Assess departmental **modelling needs, funding priorities and resourcing needs and champion those needs** on behalf of ESRD modelling community.
 - Promote collaboration and information exchange between model developers and users.
 - Promote Integration of **socio-economic, energy and climate change modelling with environmental modelling**.

What is being done by CMO?

- Alberta Modelling Guidelines – best modelling practices (BMP), standards, criteria, protocols...
- Evaluation of Modelling Tools
- Modelling Expert System
- Modeling Toolbox
- Centralized Modelling Repository
- Modelling Capacity - Computing Centre – high end hardware, software & version mgt
- Centralized Modeling Data Warehouse
- Annual/Bi-annual Environmental Modelling Workshops
- CMO - Steering Committee (GOA wide – internal): [Charter](#)
- CMO - Environmental Modelling Advisory Committee (External – include all sectors)
- Integrating socio-economic, energy and climate change modelling
- Modelling Center of Excellence

Strategic / Spatial Integration

(Vertical Integration)

Enablers

- communication
- collaboration

Model Integration

Strategic Modelling (RSA)

- energy flow / development scenarios
- policy cost / benefit
- climate change / GHG emission scenarios
- human health risk
- others

Regional / Operational Modelling

Water

Surface Water

- quality / quantity
- Infrastructure/storage feasibility
- scenario / policy assessment
- Risk assessment (License approvals/transfers)
- EIA decision support
- others

Groundwater

- impact studies
- infrastructure / storage
- SW/GW interaction
- EOR support
- others

Air

- regional plan support (airsheds)
- NOx/Sox
- acid deposition
- PM & Ozone (target loads/ management framework/ emission caps)
- AAAQ
- evacuation zones
- others

Land & Biodiversity

- climate change / reclamation
- biodiversity risk
- Acid Deposition Management Framework support
- others

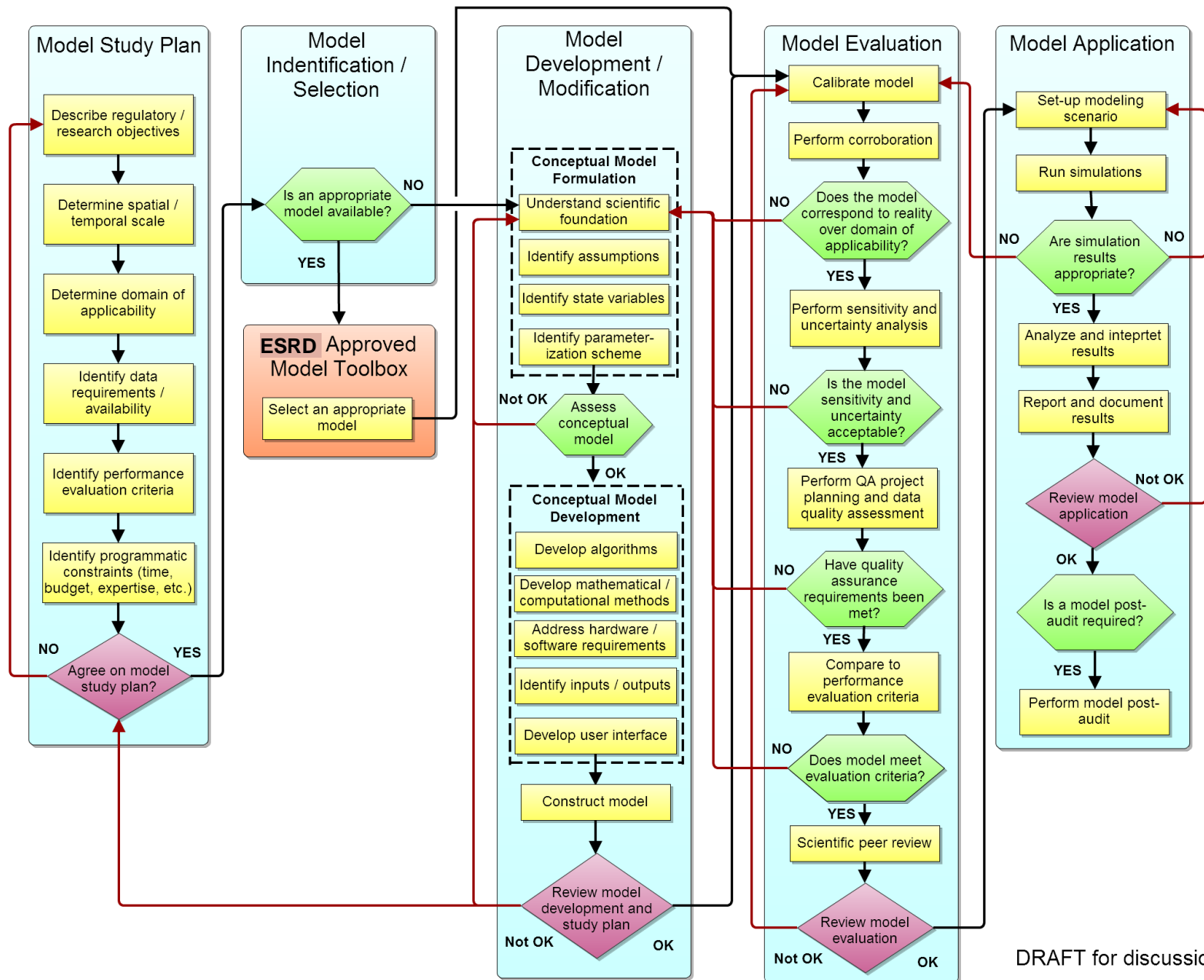
Multimedia Integration

(Horizontal Integration)

Enablers

- research
- expert network
- collaboration
- common data

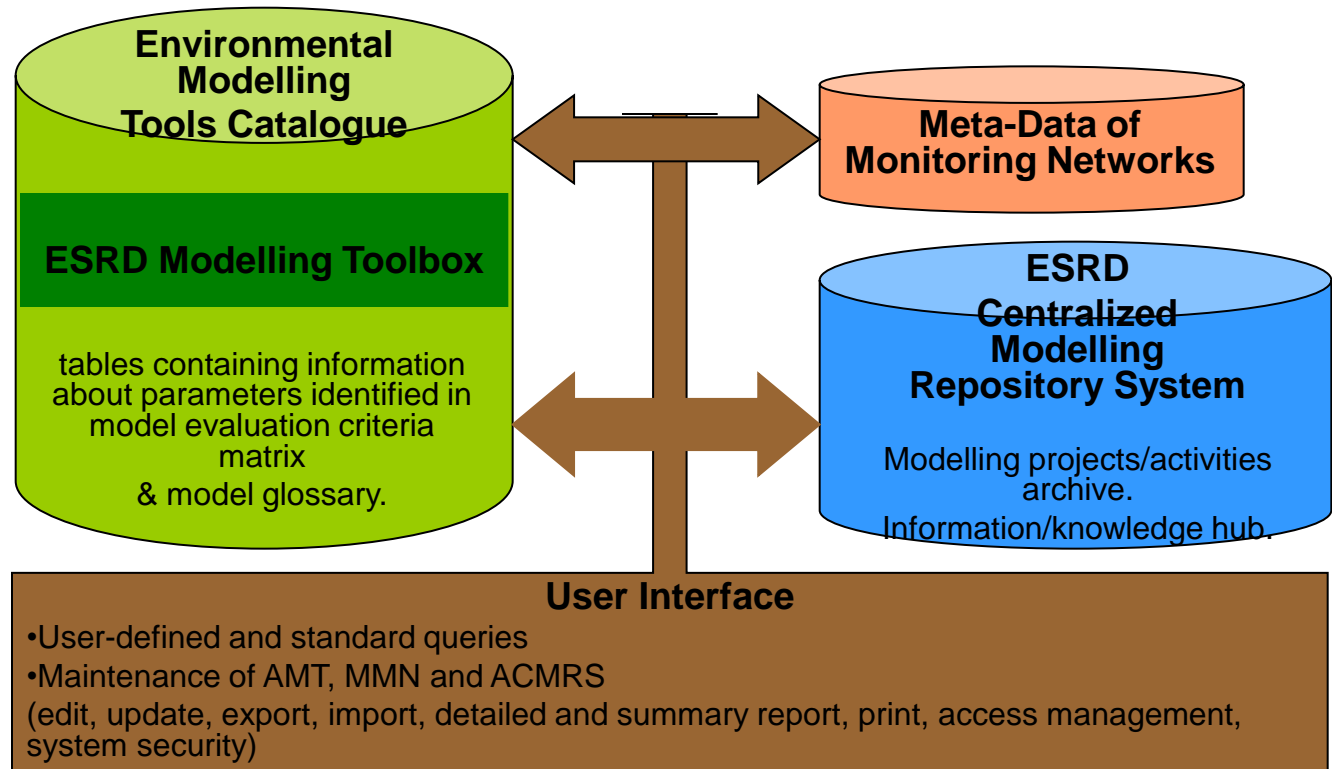
ESRD Modelling Process



DRAFT for discussion

•ESRD Modelling Expert System (EMES)

•Concept Diagram



TETRA TECH



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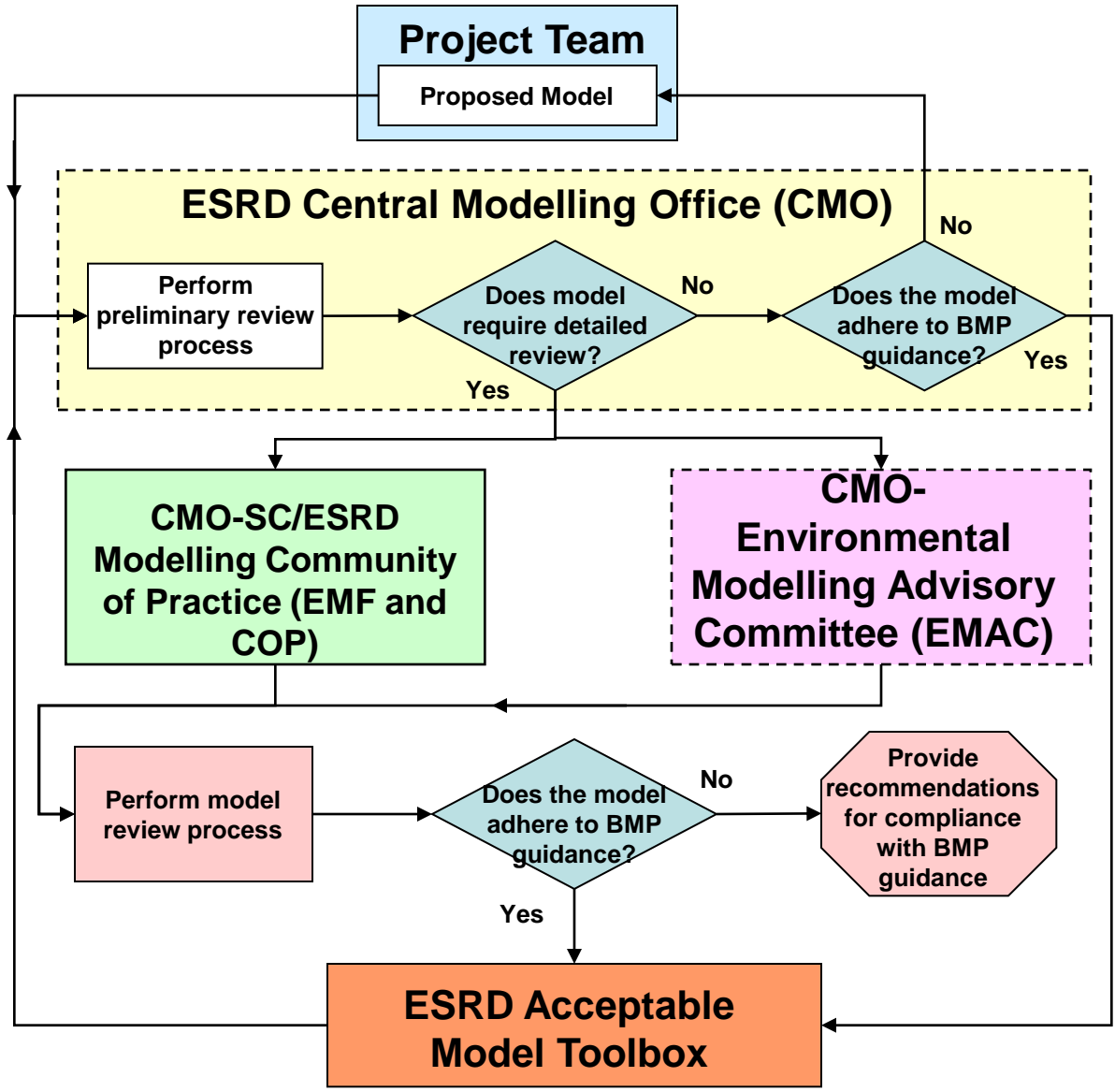
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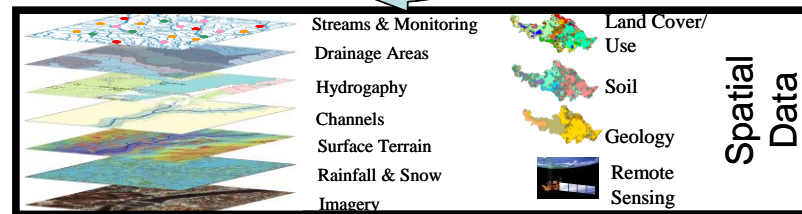
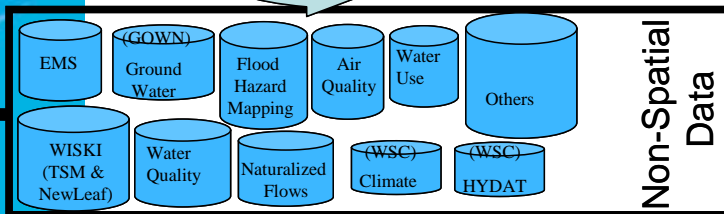
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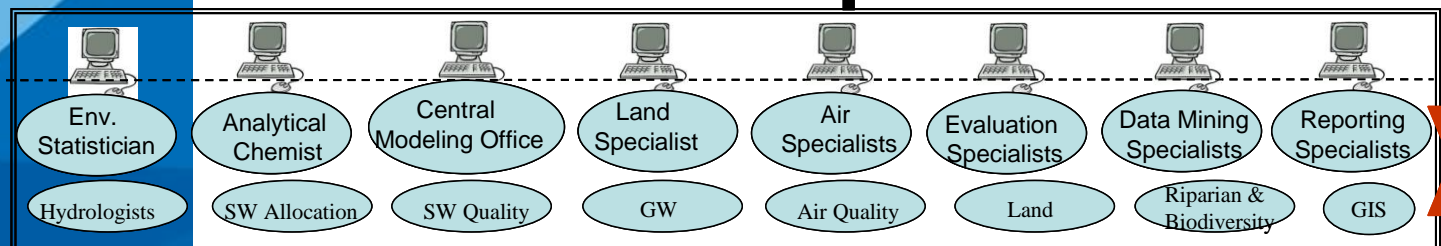
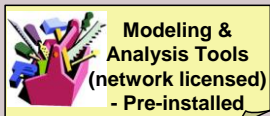
Centralized Science and Modeling Computing Centre – Concept Diagram

Albert
DRAFT

GOA/AEW Network



Dedicated Network



AEW Communities – Scientists, Modelers, Data Analysts, Data Evaluators, GIS Users etc.

generate Information & Knowledge

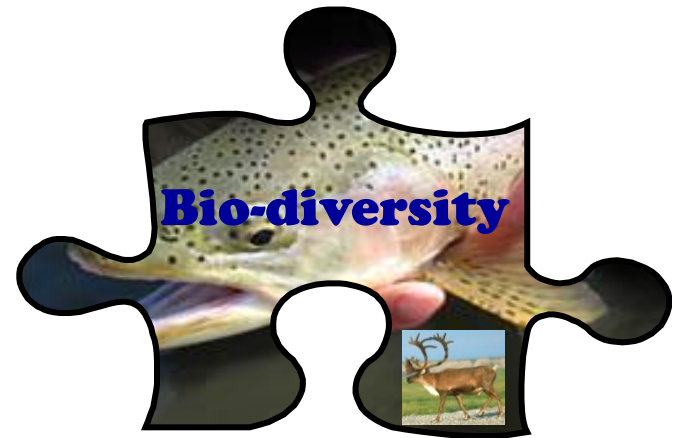
Monitoring Group

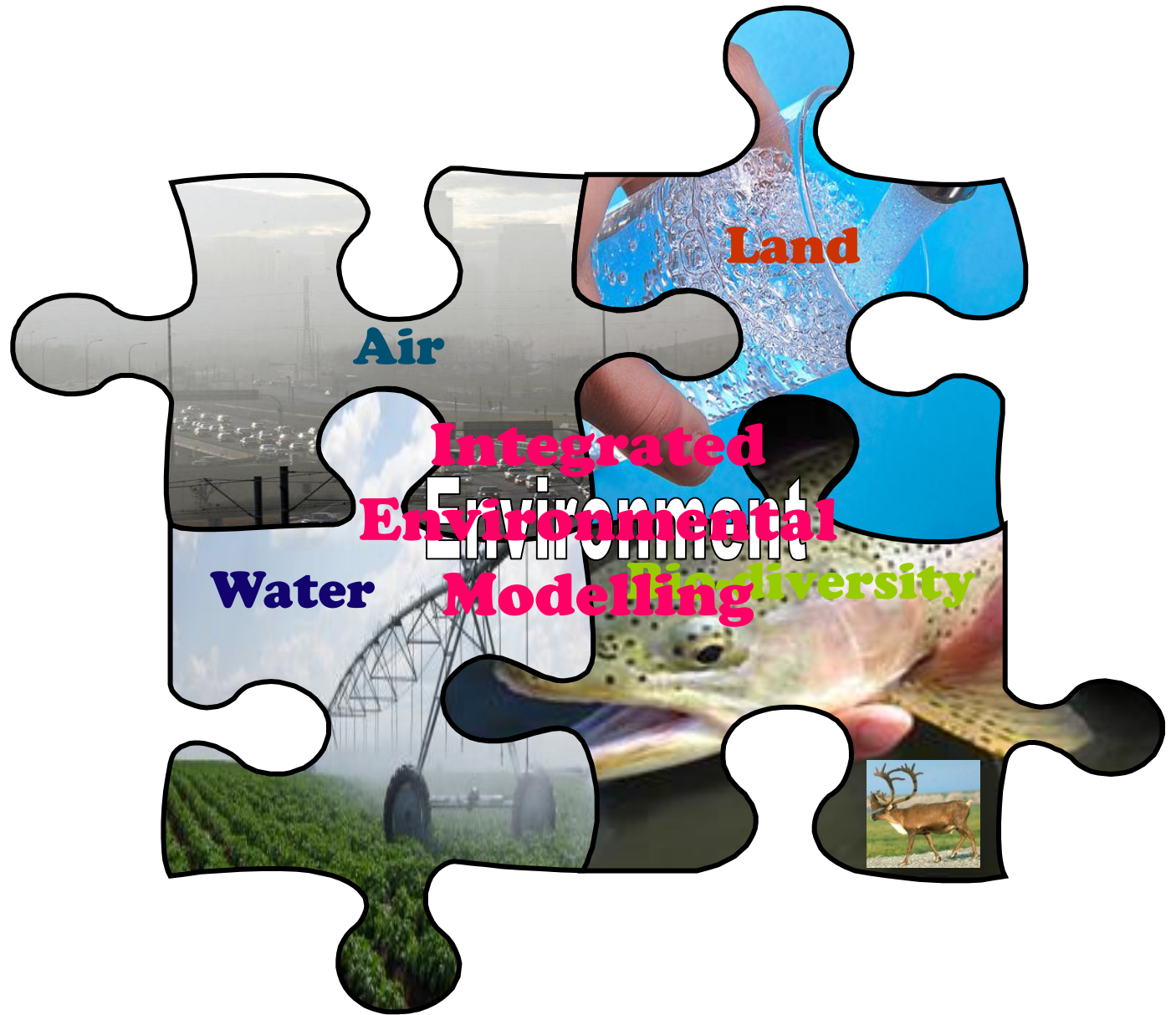
Data Management Group

Centralized Science & Modeling Computing Centre



Environment







Once upon a time, a student once went to his teacher.

He asked his teacher a question: "Sir, is there any good in talking a lot?"

The teacher replied: "Toads and frogs croak night and day, but no one pays any attention to them.

But the cock crows at a certain time of night and wakes up everyone."

The teacher smiled at his student and said,

"This proves that no good is achieved by talking a lot.

What is important is to say the right thing at the right time.

This is the right time. **Timing can not be better!**

The province is implementing CEMS to continue the economic development while safe guarding the environment.

Modelling, indeed plays a significant role:

- In policy development
- In implementation of CEMS through Regional Plans (LUF)

Modelling Integration:

- Horizontal (across media)
- Vertical (geospatial scale)
- Social dimension
- Economics
- Energy development
- Climate Change

What is the ultimate GOAL?

What is being done?

Why?

How is being done?

Are we on right track?

If we keep on doing what we are doing >> will this take us to where we want to be?

Do we need to change/adjust or align the things?

Enhanced Collaboration? What does it mean? How?

Develop a road map!

Workshop provides opportunity to showcase current practices and expand your understanding related to other media modelling.

I see this is the group that will **Walk the Talk**.

I have full confidence that together we can take the challenge!

The End

Alberta Land-use Framework Regions

