CIRP Technical Discussion

Update on the development of CORSED:
Consolidated Sediment Transport Code

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CORSED: Consolidated Sediment Transport Code

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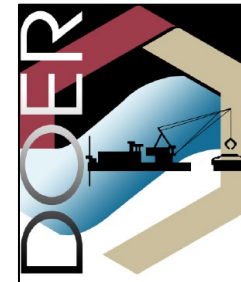Gaurav Savant, CHL

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Collaboration with Other Organizations

- **RSM**

- **DOER**

- **Office of Naval Research and USTRANSCOM**

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CORSED: Consolidated Sediment Transport Code

There is not one "best-practice" for sediment transport modeling. The methods selected for appropriate simulation of key sediment transport processes is heavily dependent on site conditions and is part of expert best-professional judgment.

Background: ERDC maintains multiple sediment transport codes, each with differing objectives, advantages and limitations

- SEDLIB
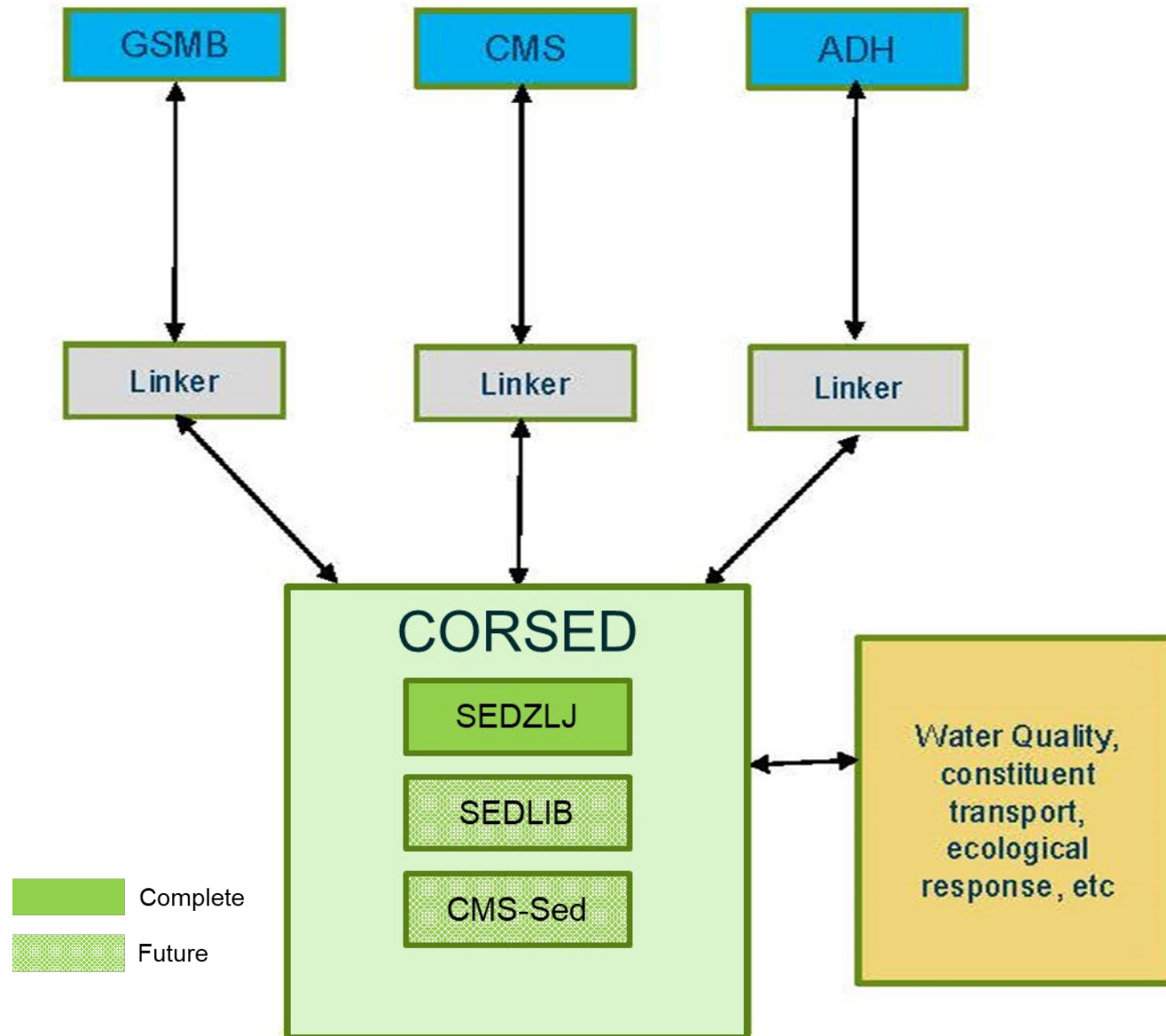- SEDZLJ
- CMS-SED
- Legacy codes, such as TABS

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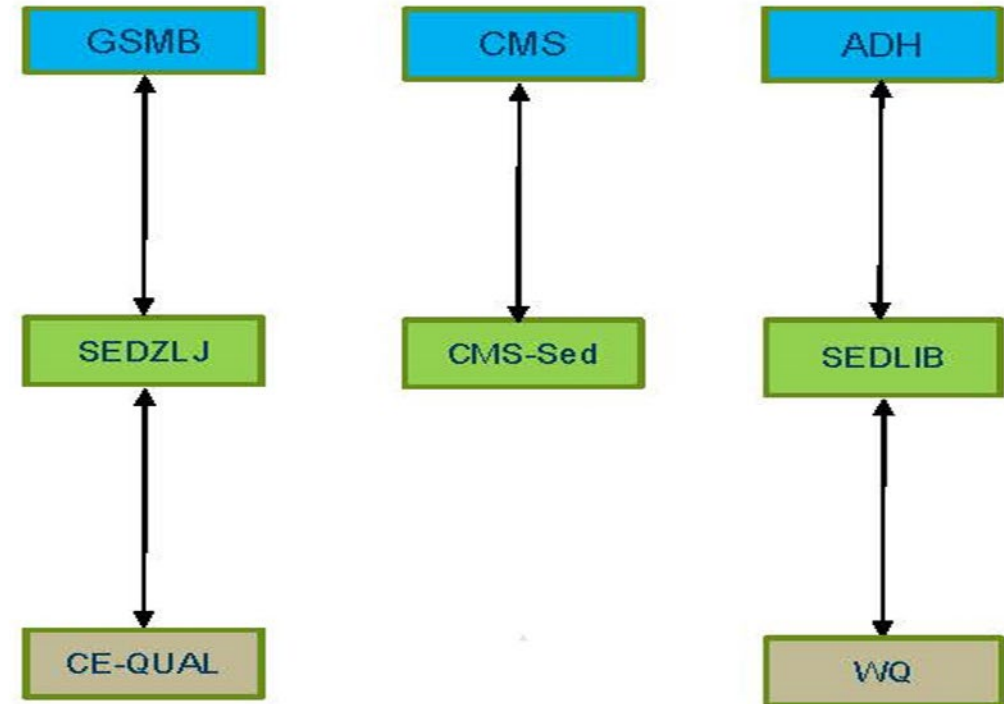
CORSED Development – Phase 1 FY18-22

OBJECTIVES

Develop a unified mixed sediment transport library (CORSED) that:

1) Will have the broad applicability required to address a wide range of sediment transport issues addressed by ERDC in creeks, rivers, reservoirs, harbors, estuaries, and coastal seas, and

2) Be linked to the following ERDC hydrodynamic and transport models: AdH, CMS, and GSMB. CORSED will include SEDLIB, the sediment transport library in AdH, and SEDZLJ, the sediment transport model in GSMB. CORSED will also include CMS-SED for 2-D applications.

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CORSED Development – Phase 2 FY23-25

OVERVIEW

- The CORSED concept of multiple established sediment transport codes in one library is unique.

- The library will provide a strong base for both application and R&D.

- CORSED will not become the dominant USACE code for sediment transport without well-planned technology transfer within ERDC and within the larger USACE.

- ERDC researchers must accept CORSED as advantageous for both application and R&D.

- District users and their contractors must see the advantages in applying CORSED instead of sediment transport codes coupled to specific hydrodynamic models, such as MIKE, Delft3D, or ROMS.

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CORSED Development – Phase 2 FY23-26

OBJECTIVES

- Develop linker codes for external hydrodynamic models

- Modify CORSED-v1 by extracting common tasks and processes

- Modify CORSED to function with a standardized interface (CORSED-v2) that includes linkage between SEDLIB and both GSMB and CMS, and between CMS-Sed and both AdH and GSMB

- Develop expert CORSED team – develop ERDC Tier 1 team

- Integrate CORSED into ERDC standard practice - develop ERDC Tier 2 team

- Support for District/contractor user base – support for Tier 3 team development

- Develop academia R&D community

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Phase 1 Tasks

1. Develop SEDZLJ-Lib-v1, link it to GSMB, and thoroughly test both SEDZLJ-Lib-v1 and the linkage to GSMB.
   a. Development completed in first two years.
   b. Verification completed in Year 3.

2. Develop and test the initial CORSED sediment transport library structure
   a. Development completed by end of Year 3.
   b. Testing completed by February 2021.
   c. Added to the CORSED GitLab.

3. Link SEDZLJ-Lib-v1 to CMS and to AdH.
   a. One component of CORSED
   b. Verification of the linkage between SEDZLJ-Lib-v1 and CMS is currently being performed.
   c. Verification of the linkage between SEDZLJ-Lib-v1 and AdH is currently being performed.

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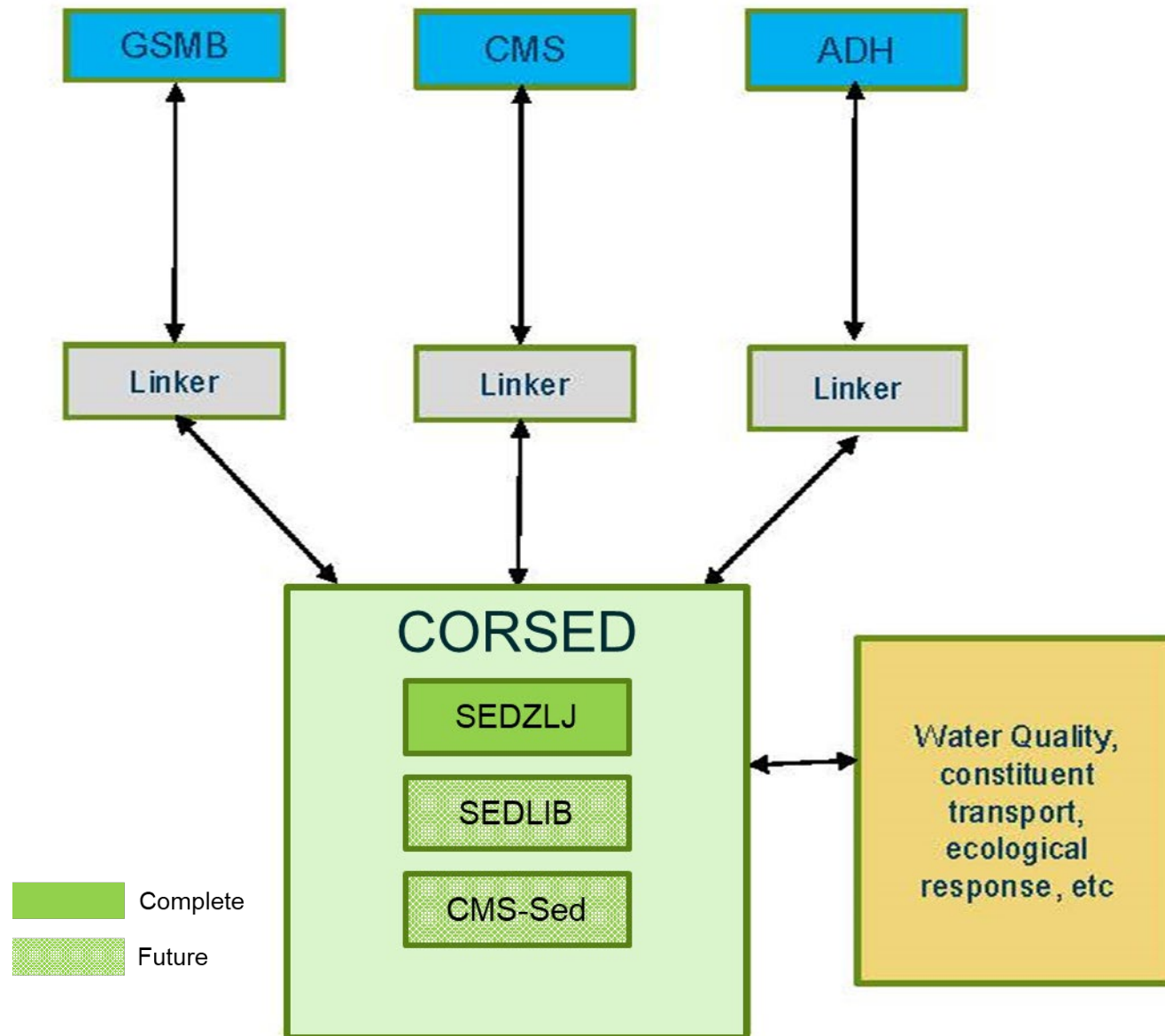
Phase 1 Tasks

4. Standardize I/O of SEDZLJ-Lib-v1, SEDLIB, and CMS-Sed
   - Establishment of a standard protocol for terminology and units for the input and output to CORSED. This standard protocol will be designed to be sufficiently generic and flexible to that it does not constrain the functionality of the various sediment submodules.
   - The standardization of I/O can be subdivided into two distinct classes.
     1) Internal I/O: this is the exchange of information between the Parent Code (e.g. GSMB, AdH, CMS) and CORSED.
     2) External I/O: this is the exchange between the user and the Parent Code: *i.e.*, the boundary condition information, and the output information.
   - Product: Technical Note to be submitted for review by the end of the FY.

Phase 1 Tasks

5. Validation of the CORSED - GSMB linkage

6. Validation of the CORSED - CMS linkage

7. Validation of the CORSED - AdH linkage

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Planned Products/Deliverables

Product Title: Linking the SEDZLJ Library to CMS

        Type: **TN**

        Status**:** Review is completed. The ERDC Editor Office is working on the publication

Product Title: AdH-CORSED Integration

        Type: **TN**

        Status: Author is responding to comments by the reviewers

Product Title: CORSED – Common Framework

        Type: **TN**

        Status: Comments by reviewers have been received

Product Title: Objectives and Implementation of CORSED as ERDC's multi-dimensional mixed sediment transport modeling system

        Type: **White Paper**

        Status: Completed and sent to the Program Directors of CIRP, DOER, and RSM for review.

Planned Products/Deliverables

Product Title: Library form of CORSED-SEDZLJ and validation at a test site

Type: **TN**

Status**:** Scheduled Completion Sep 2022

Product Title: Conceptual framework of SEDZLJ, SEDLIB, and CORSED

Type: **TN**

Status: Scheduled Completion Oct 2022

Product Title: CORSED, including all process routines

Type: **TR**

Status: Scheduled Completion Jun 2022

Product Title: CORSED User's Manual

Type: **Living online documentation**

Status: Scheduled Completion Sep 2022

Product Title: CORSED library implemented in ADH, GSMB, and CMS

Type: **Software**

Status: Scheduled Completion Sep 2022

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