COURSE SYLLABUS

SL 2

USAREUR-AF

COURSE SYLLABUS — SL 2: BUILDER

Maven Smart System (MSS) — USAREUR-AF

HEADQUARTERS
UNITED STATES ARMY EUROPE AND AFRICA
(USAREUR-AF)
Wiesbaden, Germany

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COURSE SYLLABUS — SL 2: BUILDER

MAVEN SMART SYSTEM (MSS) — USAREUR-AF

Field	Detail
Level	SL 2 (Builder — all staff)
Duration	5 days (40 hours)
Prerequisite	SL 1 complete (Go evaluation on file)
Audience	All staff assigned to build or maintain MSS data products
Format	Instructor-led lab + practical exercise
Location	MSS Training Environment

BLUF: SL 2 teaches you to build real, deployable data products — SITREP trackers, readiness dashboards, equipment status boards. After this course you can create Foundry projects, ingest data through Pipeline Builder, define Object Types and Link Types, configure Actions, and publish Workshop applications. By Day 5 you are building from memory, not following steps.

LEARNING OBJECTIVES

#	Objective
1	Create a Foundry project with correct naming, markings, and folder structure per USAREUR-AF C2DAO conventions
2	Ingest a file into Foundry; verify data quality (row count, type validation, null check)
3	Build a Pipeline Builder pipeline with filter, rename, type-cast, and calculated-column steps producing a clean typed output
4	Build a Pipeline Builder pipeline joining two datasets on a shared key with derived columns
5	Create an Object Type with typed properties, a Primary Key, and a display name expression

#	Objective
6	Create a Link Type connecting two Object Types with correct cardinality
7	Configure a Pipeline Builder Ontology write step that populates an Object Type from pipeline output
8	Configure an Action that writes to an Object Type property, with a parameter, description, and access-control rule
9	Build a Workshop application with table, filter, metric widget, and bar chart connected to live Ontology data
10	Connect an Action button to a Workshop widget; confirm execution and UI refresh
11	Manage project access: grant Viewer and Editor roles; confirm role behavior with a test account
12	Create a Foundry branch, make a change on the branch, and submit for data steward promotion with a complete description

PRE-COURSE CHECKLIST

Complete **5+ duty days before Day 1:**

- ☐ Request **Builder access** in the MSS Training Environment from your unit MSS Administrator (standard Viewer access from SL 1 is insufficient)
- ☐ Confirm CAC and PIV PIN work on the MSS-connected workstation
- ☐ Read TM-20, Chapter 1 (Introduction, Safety Summary, Prerequisite Review) — 20 min
- ☐ Read TM-20, Chapter 2 (Project Setup and Naming Conventions) — 15 min

Do not arrive without Builder access. You cannot complete any lab without it.

DAILY SCHEDULE

Day 1 — Project Fundamentals and File Ingestion

Time	Block	Method	Content
0800–0830	—	Brief	SL 2 overview; what you will build by Day 5; course standards and Go criteria

Time	Block	Method	Content
0830–1000	1	Lab	Project creation: naming conventions, classification markings, folder structure
1000–1015	—	Break	
1015–1100	2	Lab	File ingestion: upload a CSV; inspect schema, types, and row count
1100–1200	3	Lab	Dataset explorer: column profiling, null detection, type mismatches
1200–1300	—	Lunch	
1300–1500	4	Lab	Pipeline Builder orientation: canvas layout, step library, input/output dataset config
1500–1530	5	Discuss	C2DAO naming conventions: datasets, pipelines, Object Types
1530–1700	6	Lab	Individual practice: create a second project, ingest a provided dataset, confirm naming compliance

Evening reading: TM-20, Chapter 3 (Pipeline Builder — overview and filter/rename/cast sections).

Day 2 — Pipeline Builder: Clean and Transform

Time	Block	Method	Content
0800–0830	—	Review	Day 1 questions; confirm all trainees have projects and ingested data
0830–1030	7	Lab	Pipeline: filter step, rename step, CAST for type correction
1030–1045	—	Break	
1045–1200	8	Lab	Pipeline: calculated columns — string functions, conditional logic (`IF/CASE`), `COALESCE` for nulls
1200–1300	—	Lunch	

Time	Block	Method	Content
1300–1500	9	Lab	Pipeline: date and time functions — `DATEDIFF`, `DATE_TRUNC`, `CURRENT_DATE`; test with known-answer records
1500–1515	—	Break	
1515–1700	10	Lab	End-to-end pipeline practice: build a complete clean-and-transform pipeline from raw input to typed filtered output; run and verify

Evening reading: TM-20, Chapter 3 (join section); TM-20, Chapter 4 (Ontology Manager — property type guidance). Read the property type table before Day 3.

Day 3 — Pipeline Builder: Joins and Ontology Manager

Time	Block	Method	Content
0800–0830	—	Review	Day 2 questions; pipeline troubleshooting: error messages, schema mismatches
0830–1030	11	Lab	Pipeline: join step — inner/left join, key selection, handling duplicates post-join, output column selection
1030–1045	—	Break	
1045–1200	12	Lab	Pipeline: group-by aggregation; union step basics; output dataset configuration (overwrite vs. append mode)
1200–1300	—	Lunch	
—	—	**STOP**	**Before opening Ontology Manager:** Review TM-20, Chapter 4 property type table. Property types are immutable after Object Type creation — a wrong type requires deleting and rebuilding the Object Type. Verify your intended property types before creating anything.
1300–1500	13	Lab	Ontology Manager: create an Object Type — properties, types, Primary Key, display name expression
1500–1515	—	Break	
1515–1630	14	Lab	Ontology Manager: create a Link Type — connecting two Object Types, cardinality, directionality

Time	Block	Method	Content
1630–1700	15	Lab	Ontology practice: design a second Object Type from a provided scenario; verify naming compliance

Evening reading: TM-20, Chapter 3 (Ontology write step section); TM-20, Chapter 4 (Actions section); TM-20, Chapter 5 (Workshop — skim widget overview); TM-20, Chapter 8 (Builder Standards and Governance).

Day 4 — Ontology Write Step, Actions, and Workshop Applications

Time	Block	Method	Content
0800–0845	—	Review + Discuss	Day 3 questions; **access control model: Viewer vs. Editor roles** — what each can and cannot do; why a Viewer triggering an Action is a hard No-Go on the practical exercise
0845–0945	16	Lab	Pipeline: Ontology write step — connect Day 3 pipeline output to Object Type; configure property mapping; run and verify
0945–1000	—	Break	
1000–1130	17	Lab	Actions: create a basic Action — parameter, write rule, access restriction; test from Ontology Manager
1130–1145	—	Break	
1145–1300	18	Lab	Workshop orientation: canvas, widget library, Object Type binding — table widget with live data
1300–1400	—	Lunch	
1400–1530	19	Lab	Workshop: filter widget, metric widget, bar chart widget — layout and data source configuration
1530–1545	—	Break	
1545–1700	20	Lab	Workshop: connecting an Action button — trigger, confirmation prompt, post-action refresh

Evening reading: TM-20, Chapter 6 (Publishing/Access); TM-20, Chapter 7 (Governance — branching and promotion); TM-20, Chapter 9 (Troubleshooting and Common Errors).

Day 5 — Publishing, Governance, and Practical Exercise

Time	Block	Method	Content
0800–0900	21	Lab	Workshop: publishing — set visibility, grant Viewer access, confirm Viewer cannot edit
0900–1000	22	Lab	Branching: create a branch; make a change on the branch; verify the change is branch-only
1000–1015	—	Break	
1015–1100	23	Lab	Promotion workflow: write a promotion description; submit to data steward; respond to a rejection comment
1100–1200	24	Review	Full-stack review: trace raw file → pipeline → Object Type → Workshop → access control; identify gaps
1200–1300	—	Lunch	
1300–1700	25	**Eval**	**Practical exercise (evaluated)**

REQUIRED READING SUMMARY

When	Reading
Before Day 1	TM-20, Ch 1 (Intro/Safety/Prereq Review)
Before Day 1	TM-20, Ch 2 (Project Setup and Naming)
Day 1 evening	TM-20, Ch 3 (Pipeline Builder — overview, filter, rename, cast)
Day 2 evening	TM-20, Ch 3 (Pipeline — joins); TM-20, Ch 4 (Ontology — property types)
Day 3 evening	TM-20, Ch 4 (Actions); TM-20, Ch 5 (Workshop overview); TM-20, Ch 8 (Builder Standards and Governance)
Day 4 evening	TM-20, Ch 6 (Publishing/Access); TM-20, Ch 7 (Governance/Branching); TM-20, Ch 9 (Troubleshooting and Common Errors)

When	Reading
After training	TM-20, Chapters 5–9 — full reference read

PRACTICAL EXERCISE

Scenario: Your S4 officer needs an equipment readiness tracker. Provided files: an Excel spreadsheet of equipment IDs, units, and C-ratings; a CSV of unit identifiers and assigned locations.

#	Task
1	Create a Foundry project with correct naming, markings, and folder structure
2	Ingest both files; confirm row counts and types match source
3	Build a pipeline: validate, clean, type-cast, join on `unit_id`; output a clean equipment-with-location dataset
4	Create an `Equipment` Object Type with `equipment_id`, `unit`, `location`, `c_rating`, `last_updated` properties (correctly typed)
5	Create a `Unit` Object Type with `unit_id` and `unit_name`; create a Link Type from `Equipment` to `Unit`
6	Configure the pipeline with an Ontology write step that populates `Equipment` objects
7	Configure an `UpdateCRating` Action: parameter `new_c_rating` (String enum: C1/C2/C3/C4), write rule to `c_rating`, access restricted to Editor role
8	Build a Workshop application: table of all equipment, filter by `unit` and `c_rating`, metric widget showing count of C1 equipment, bar chart by C-rating
9	Connect `UpdateCRating` Action to a button; execute it and verify the table refreshes
10	Grant a test account Viewer access; confirm it cannot trigger the Action or modify data
11	Create a branch; change the application header text; submit a promotion request with a complete change description

Go standard: All 11 tasks completed without instructor assistance. Pipeline runs without error. Object count matches source row count. Workshop loads for Viewer-role test account with correct filtered data. Action executes and updates Object property. Branch and promotion request exist with complete description.

GO CRITERIA

Pipeline must run to completion. Workshop must load for a Viewer-role user with correctly filtered data. Action must execute and update the Object property. Branch must exist in Foundry with your change visible and the promotion description filled in.

Not Go: pipeline with unresolved errors; Action that errors on execution; Viewer test account that can modify data.

NO-GO REMEDIATION

Outcome	Action
No-Go — pipeline errors	Review TM-20, Chapter 3 (pipeline troubleshooting). Re-evaluation scheduled through unit training coordinator.
No-Go — Action errors on execution	Review TM-20, Chapter 4 (Actions). Verify write rule and parameter configuration. Re-evaluation required.
No-Go — Viewer account can modify data	Critical security finding. Review TM-20, Chapter 6 (access control). Must correct before any re-evaluation attempt. Report to unit data steward.
No-Go — missing promotion description	Review TM-20, Chapter 7. Same-day retry authorized at instructor discretion for this item only.

Full re-evaluation requires scheduling through the unit training coordinator. Same-day retry on isolated items is at instructor discretion only — not automatic. SL 2 qualification cannot be self-certified.

KEY TIPS

Risk	Guidance
Object Type property types	Read Chapter 4 property type guidance **before** Day 3 — property types are immutable after objects are created. Wrong type = delete and rebuild
Date functions	Test `DATEDIFF` and date arithmetic with known-answer records before moving on — one wrong type configuration fails all downstream date calculations silently

Risk	Guidance
Join step row count	Check row counts after every join — a join on inaccessible data silently returns 0 rows with no error
Branching timing	Create the branch **before** making changes — changes made on main are already in production
Viewer/Editor access	Viewer triggering the Action is a hard No-Go — fix it before the evaluator checks
Promotion description	The data steward will reject a submission without a description. Write: what changed, why, and downstream impact
Day 5 time	4 hours for 11 tasks. Build the full stack once on Day 4 evening. Trainees who build it twice pass clean

CONTINUATION

SL 2 completion qualifies personnel to advance to SL 3 (Advanced Builder). **All SL 4 tracks — both WFF (A–F) and Specialist (G–O) — require SL 3 completion before enrollment.** SL 3 is a hard prerequisite — no waivers — for every SL 4 track. Confirm completion with your unit training coordinator before registering.

Path	Track	Prerequisite	Who
Advanced Builder	SL 3	SL 2 (this course) — hard prerequisite, no waivers	All personnel proceeding to any SL 4 track
WFF — Intelligence	SL 4A	SL 3 (required)	G2/S2 staff, targeting officers, all-source analysts
WFF — Fires	SL 4B	SL 3 (required)	FSOs, FSEs, targeting officers, fires NCOs
WFF — Movement & Maneuver	SL 4C	SL 3 (required)	G3/S3 staff, operations officers, maneuver planners
WFF — Sustainment	SL 4D	SL 3 (required)	G4/S4 staff, logistics officers, supply chain managers
WFF — Protection	SL 4E	SL 3 (required)	FP officers, CBRN officers, provost marshal staff
WFF — Mission Command	SL 4F	SL 3 (required)	Battle captains, XOs, CDRs, MC-function staff

Path	Track	Prerequisite	Who
Specialist path	SL 4G–O (via SL 3)	SL 3 (required)	Data analysts, 17/25-series, ORSA, AI/ML, PM, KM, SWE

All SL 4 tracks — WFF (SL 4A–F) and Specialist (SL 4G–O) — require **SL 3** as a hard prerequisite. Specialist tracks (SL 4G–O) additionally require code-level preparation per their individual syllabi.

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