

KP Deployment of SNOMED-CT as the Foundation for Enterprise Wide Clinical Data



KAISER PERMANENTE
HEALTH+CONNECT

Today's Topics

- Introduction to Kaiser Permanente
- Introduction to the Convergent Medical Terminology (CMT) Project
- Architecture of CMT Tooling

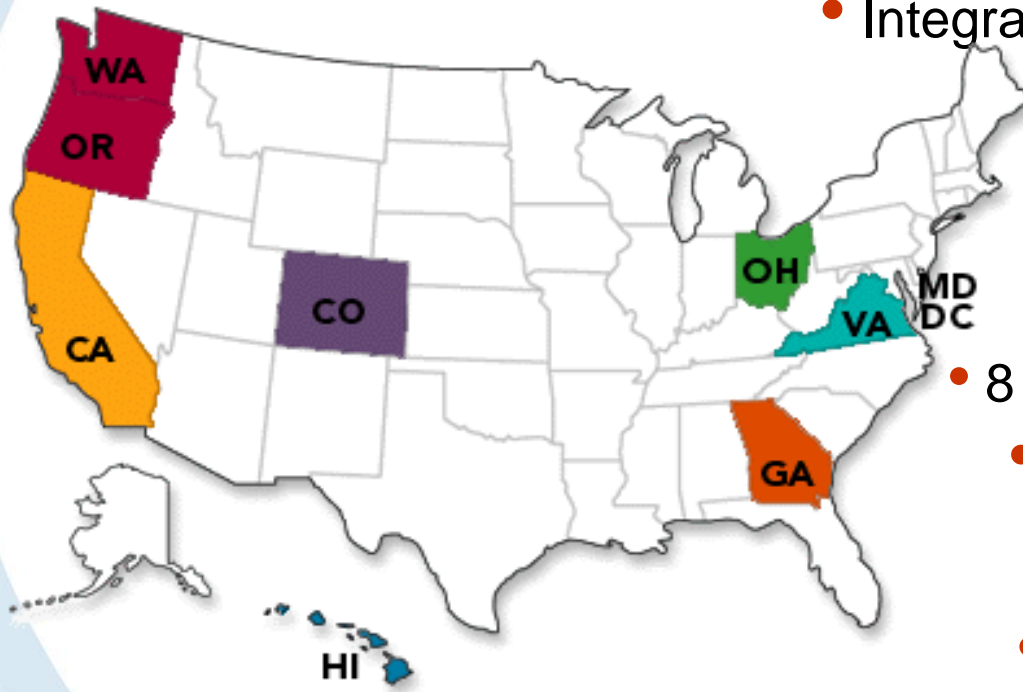
Take Home Messages

- KP is deploying SNOMED-CT as the foundation for all clinical data needs of the enterprise, not simply as just as one of many data resources
- KP is using the IHTSDO workbench as the foundation for enterprise terminology tooling
- The SNOMED-CT standardized extension mechanisms, history mechanisms and the IHTSDO workbench, enable enterprise terminology management

KP Commitment to SNOMED-CT

- The KP Donation of the CMT project content & resources to the IHTSDO and the US National Library of Medicine exemplify KP's confidence in—and commitment to—SNOMED-CT as the standard foundation for clinical data representation and data analysis
- KP will continue to donate workbench improvements, content extensions and reference extensions to the IHTSDO and US National Library of Medicine

About Kaiser Permanente



- Nation's largest nonprofit health plan
- Integrated health care delivery system
 - 8.7 million members
 - 14,000 physicians
 - 165,000 employees
- 8 regions serving 9 states & D.C.
 - 36 hospitals & medical centers
 - 431 medical offices
 - *\$44.2 billion annual revenues

* 2010 revenues

Kaiser Permanente's Mission

To provide affordable, quality health care services and to improve the health of our members and the communities we serve

EHR History in Kaiser Permanente 1970-1989

- **1970s:** Morris Collen, MD, pioneers the use of computers in recording and sorting clinical data in real time at the San Francisco Medical Center. The focus is physical examination and laboratory screening
- **1970-1980s:** Regions independently automate demographic, appointments, pharmacy, laboratory and other ancillary systems
- **Late 1980s:** Regions experiment with clinical systems development and deployment without wide success

EHR History in Kaiser Permanente 1990s

- **Early 1990s:** Several regions develop operations data stores, notably NCAL (CIPS), Ohio (MARS) and Mid-Atlantic (PACE) with various forms of real time data views and entry
- **Mid 1990s:** Northwest deploys EpicCare to all MDs and RNS, Colorado deploys CIS (joint development with IBM) to all MDs and RNs. California deploys (Oceania's) WAVE. These are the first three products not internally developed

KP Health Connect

- **2003:** KP HealthConnect development began
- **2009:** KP HealthConnect deployment complete

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Introduction to Convergent Medical Terminology



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What is Convergent Medical Terminology (CMT)?

- CMT is KP's Enterprise Terminology System that is designed to “converge” disparate terminology sources into a single central terminology platform, and includes several components:
 - » End user terminology
 - » Standard terminology
 - » Administrative codes
 - » Query and Decision support
 - » Request and Release process
- Terminology used in KP HealthConnect (the KP Electronic Health Record)

What is CMT? (continued)

- Also known as “Interface Terminology” – connecting the human readable form to machine readable form
- End User terms are mapped to the standard terminologies and have the specific attributes the application needs
- End Users use/see the terms that are *familiar* to them, and the application uses the codes and attributes it needs

CMT Terminology Model – OLD “Concept” Based

Modelers create Terms

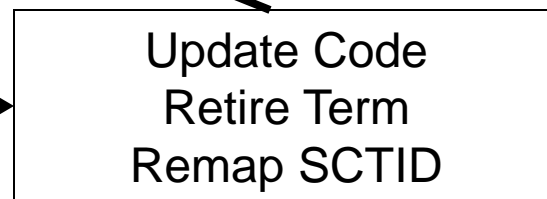
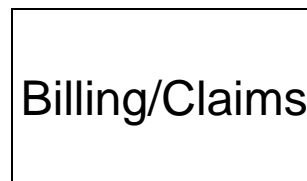
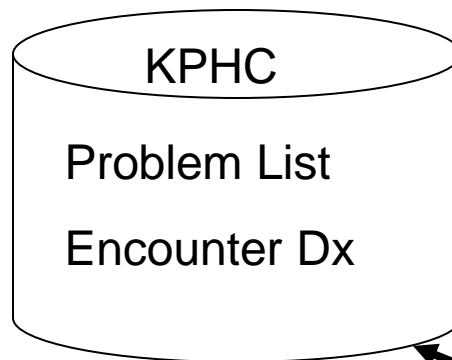
Community ID	Display Name
12020657	ADHD
12132215	ADHD, combined
12126589	ADHD, hyperactive impulsive
12020656	ADHD, inattentive
12123907	Alzheimers dementia, early onset, w delirium
12135929	Alzheimers dementia, early onset, w delusions
12147273	Alzheimers dementia, early onset, w depressed mood

Coders map to codes

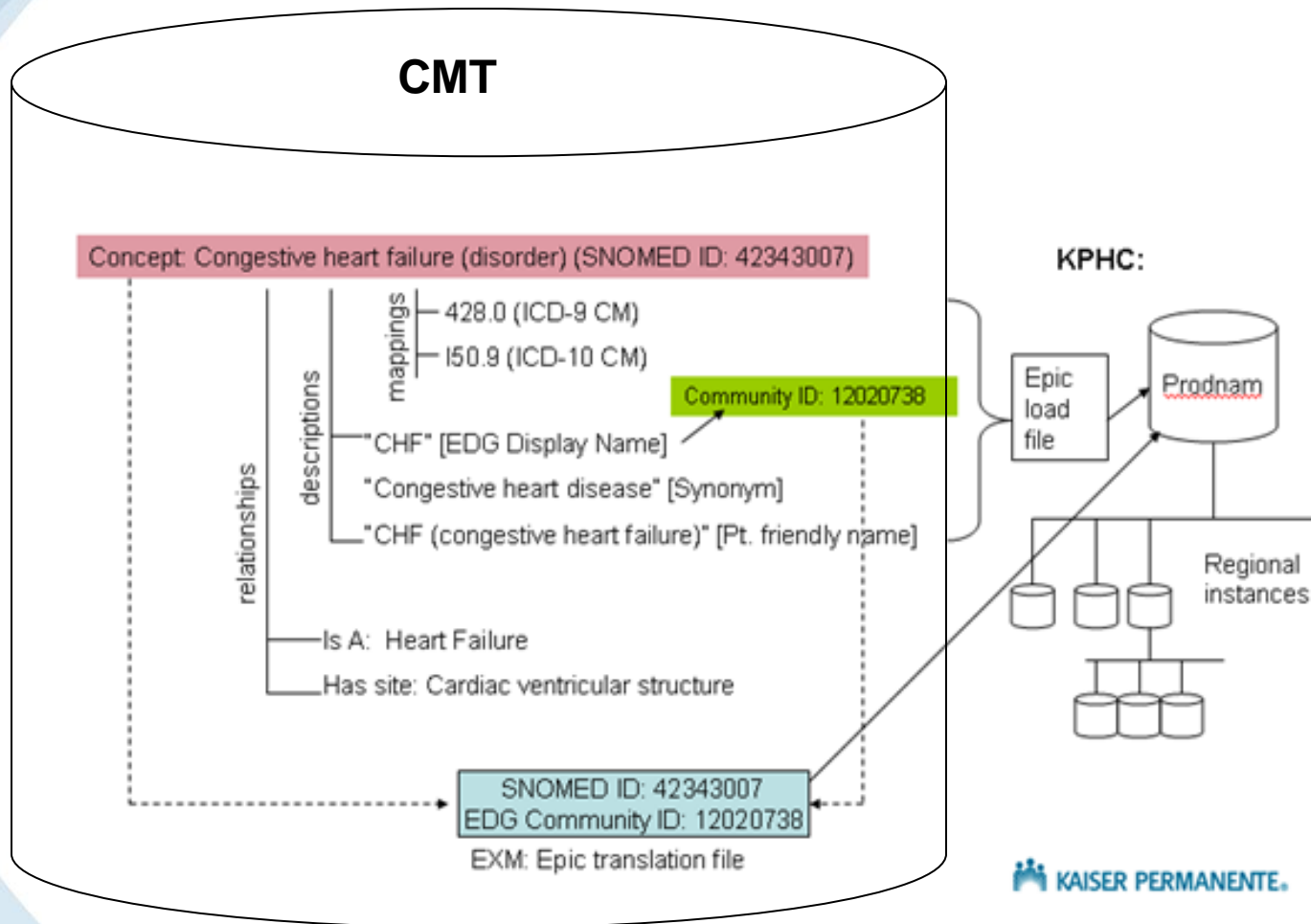
Community ID	Display Name	ICD9-CM
12020657	ADHD	314.01
12132215	ADHD, combined	314.01
12126589	ADHD, hyperactive impulsive	314.01
12020656	ADHD, inattentive	314.00
12123907	Alzheimers dementia, early onset, w delirium	331.0/294.10/293.0
12135929	Alzheimers dementia, early onset, w delusions	331.0/294.10/293.81
12147273	Alzheimers dementia, early onset, w depressed mood	331.0/294.11

Map to SNOMED CT

SCTID	Community ID	Display Name
406506008	12020657	ADHD
31177006	12132215	ADHD, combined
7461003	12126589	ADHD, hyperactive impulsive
35253001	12020656	ADHD, inattentive
65096006	12123907	Alzheimers dementia, early onset, w delirium
54502004	12135929	Alzheimers dementia, early onset, w delusions
10532003	12147273	Alzheimers dementia, early onset, w depressed mood



CMT Terminology Model – NEW “Concept” Based



End User Terminology Component

- Protects end users from changes in Standard terminology or coding schemes

Examples:

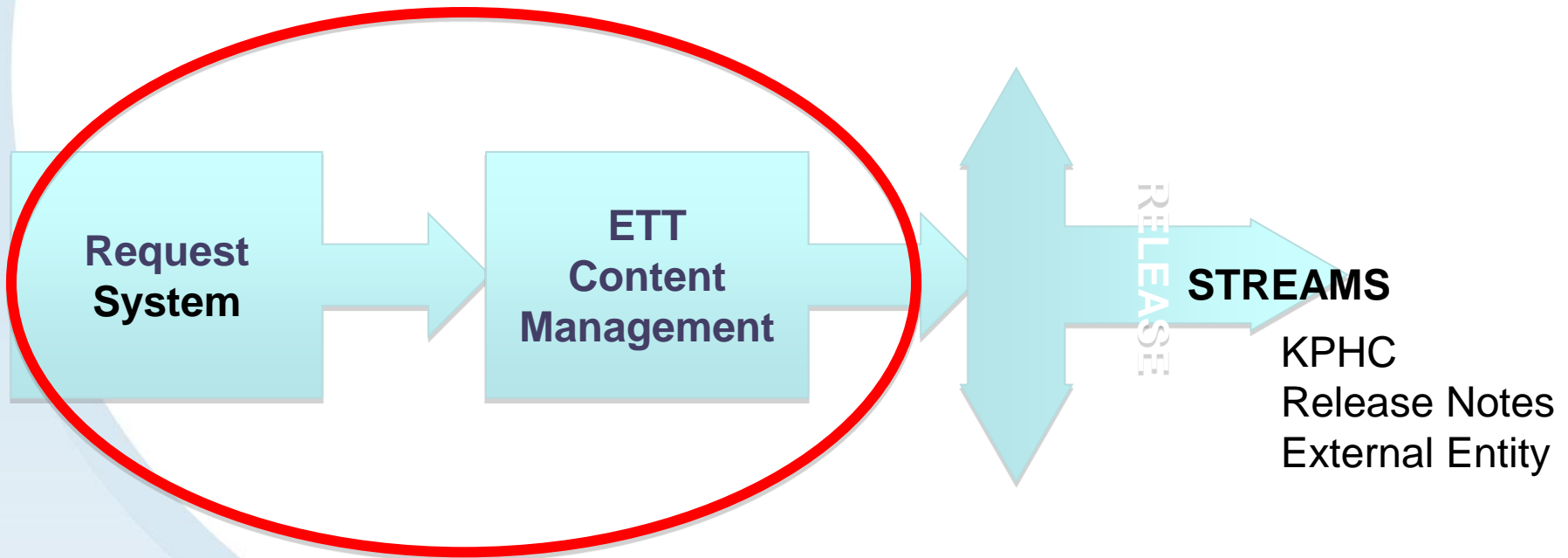
- Majority of the diagnosis terms currently being used do not have to be changed or deleted because of transition from ICD9 to ICD10
- When LOINC names change, there is no need to change the Result display name that end users are seeing
- When SNOMED descriptions change, there is no need to change the display names end users see

End User Terminology Component (continued)

- With CMT, certain MasterFile and category list content is standardized across the enterprise, all eight KP regions
- IntraConnect is used to define the build levels and tracking levels of each MasterFile and category lists
- Provides the ability to allow localization while keeping certain data standard across the enterprise
- Focuses on end user usability
 - Neither ICD9 or SNOMED can be used out of box as end user terminology, their purpose is not end user usability
 - KP CMT's "End User Terminology" is a bi-product of actual user experience, and continues to improve

CMT Components & Content all in ETT

- 2014-2015- All components and content developed and maintained by CMT will take place in ETT



Why did KP adopt IHTSDO Workbench?

- Too many disparate tools to “complete” the job
 - Costly
 - Inefficient
 - Lack of visibility
- Interface/end user terminology management not integrated well with the “Reference” terminology
 - Confusion about the term meaning
 - Duplicate work

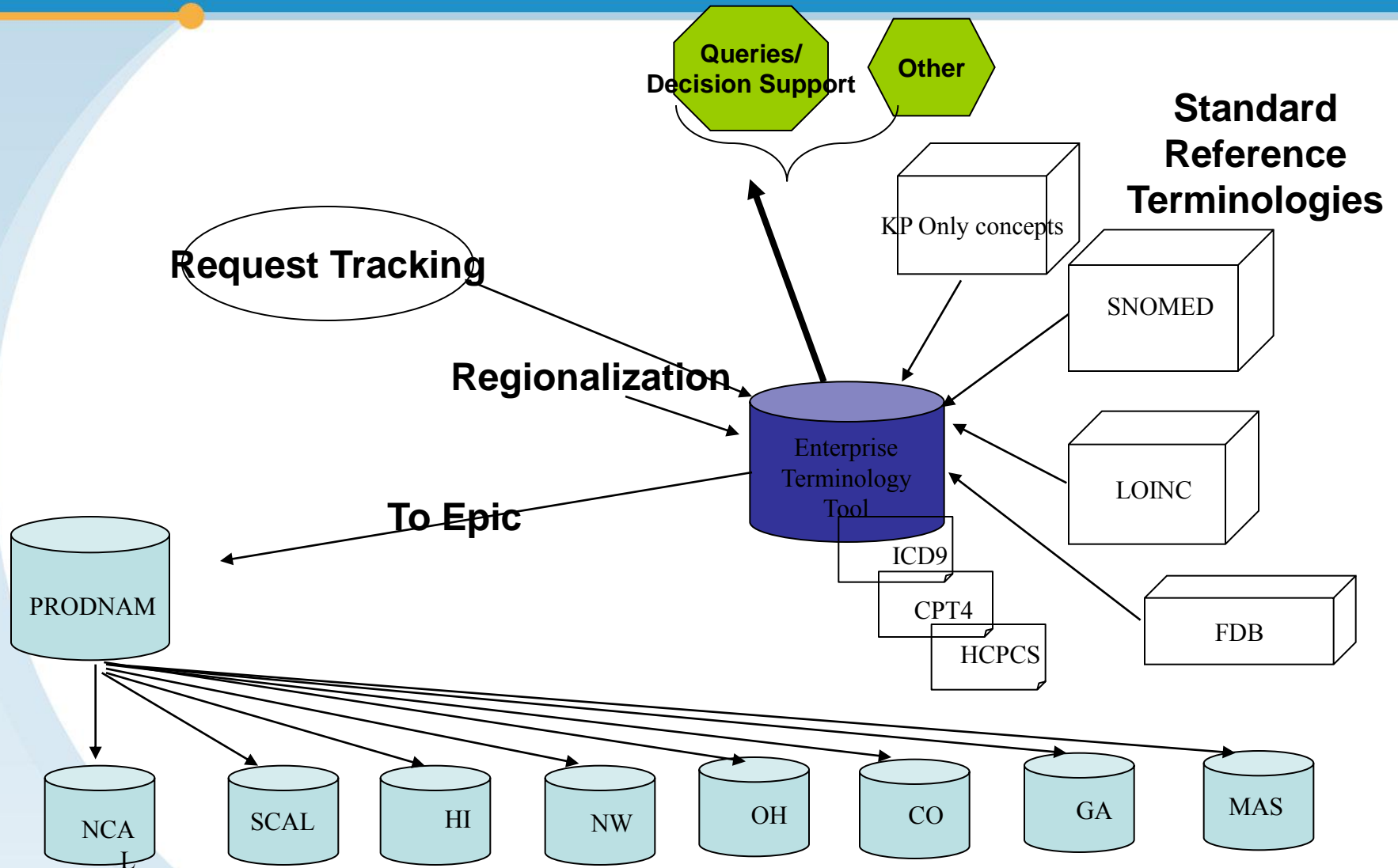
Why did KP adopt IHTSDO Workbench? (continued)

- No ability to model a new concept as a logical extension of SNOMED CT
- No ability to integrate/converge multiple terminologies into a single platform
- Collaborate on terminology development more efficiently within and outside of organization
- Classifier – formal ontology allows inheritance and inferencing

Roadmap forward with IHTSDO Workbench

- KP Roadmap
 - Pilot now completed: Proved KP can extend IHTSDO Workbench to support KP CMT terminology model (including Reference + Interface attributes) and KP operations
 - Sunset all KP legacy tools/databases and operationalize all MasterFiles and category lists CMT maintains by 2014
 - Creates a truly “Convergent” CMT

CMT Future Direction



CMT Donation

- Formal agreement to donate CMT content and Tool to IHTSDO and NLM (February 2011)
- *Content* component
 - CMT SNOMED CT Extensions: Kaiser Permanente modeled SNOMED CT concepts including Fully Specified Name (FSN), Patient Facing Name (PF), Synonym, Relationships (defining)
 - CMT derivatives: Kaiser Permanente derivatives to SNOMED CT or non-SNOMED CT terminology including KP Clinician Display Names, KP Patient Display Names, KP mappings to ICD9-CM, ICD 10-CM, CPT4, LOINC, etc.
- *Tool* component
 - All enhancements KP makes to IHTSDO Workbench
 - KP operation specific, i.e. “extracting into Epic load file format”

Enterprise Terminology Tool (ETT)

- In 2009, the International Health Terminology Standards Development Organization (IHTSDO) released the initial version of “Terminology Workbench”
- Kaiser Permanente piloted the initial version in late 2009
- KP implementation and migration path started in 2010
- KP enhanced IHTSDO Workbench = ETT
- First go live in September 2011 (Diagnosis/Problem domain)
- Migration of all legacy tools/databases to ETT by 2014

Why is KP Donating?

- Accelerate the growth of a distributed international network of terminology developers, who will work together to ensure that SNOMED CT and other standard vocabularies are more quickly updated and enriched with clinician and patient facing terminology
 - With this “Network effect”, the more contributors, the more each individual contributor can benefit
- This collaborative approach will enhance the usability of CMT with more adaptable interface terminology for different use cases and enhance SNOMED CT & other standard terminologies, more practical & useful

Why is KP Donating? (continued)

- Over time, this distributed and collaborative approach will reduce the level of terminology development effort required by any single institution, vendor, or country
 - saving time and reducing costs for all participating organizations
 - another example of the network effect
- Accelerate the adoption of SNOMED CT and other standard terminologies, and lower the barrier of entry and achieve Meaningful Use standards
- Three key problems in semantic interoperability of terminology sets in healthcare today
 1. Coherence and coordination of provider-based terminologies
 2. Coherence and coordination of consumer-based terminologies
 3. Coherence and coordination of provider-based terminologies with consumer based terminologies

How will the Donation Manifest?

- Content Deliverable

- KP sends to IHTSDO and NLM at the same time

- Format: spreadsheet format and RF1 (later also in RF2)

RF1 and RF2 are the formats in which SNOMED CT is released

- Two description types are added in RF1 “Description” table to represent KP Clinician Display Name and KP Patient Display Name
- Cross Map tables include KP ICD 9-CM/ICD 10-CM mappings (direct, one to one mapping)

- IHTSDO evaluates for “International Fit”

- Anything rejected by IHTSDO, NLM evaluates for “US Fit”

How will the Donation Manifest? (continued)

- Tool Deliverable
 - Enhancements that are “international fit” will become part of future IHTSDO Workbench versions
 - Enhancements that are “US fit” may be released as US version of Workbench (details pending)

How will the Donation Manifest? (continued)

- For public, content to be available in three ways
 - Via U.S. Library of Medicine's UTS (UMLS Terminology Services) download site - <https://uts.nlm.nih.gov/home.htm>
 - Via International SNOMED CT release for those accepted by IHTSDO
 - Via U.S. SNOMED CT Extension release for those accepted by NLM

How will the Donation Manifest? (continued)

- Content and Tool delivered separately
- Content delivered every 2-3 months
 - First focus on Problem List subsets, including SNOMED CT Extensions modeled by KP
 - KP clinician and patient display names mapped to SNOMED CT concepts
 - Mappings to ICD-9 CM codes and ICD-10 CM codes
 - Top 2500 initially, then by Specialty
 - Cardiology, Mental Health, Neurology, Musculoskeletal, Ophthalmology, Oncology, Endocrinology, Infectious diseases, OB/Gyn, Injuries, Orthopedics, etc.

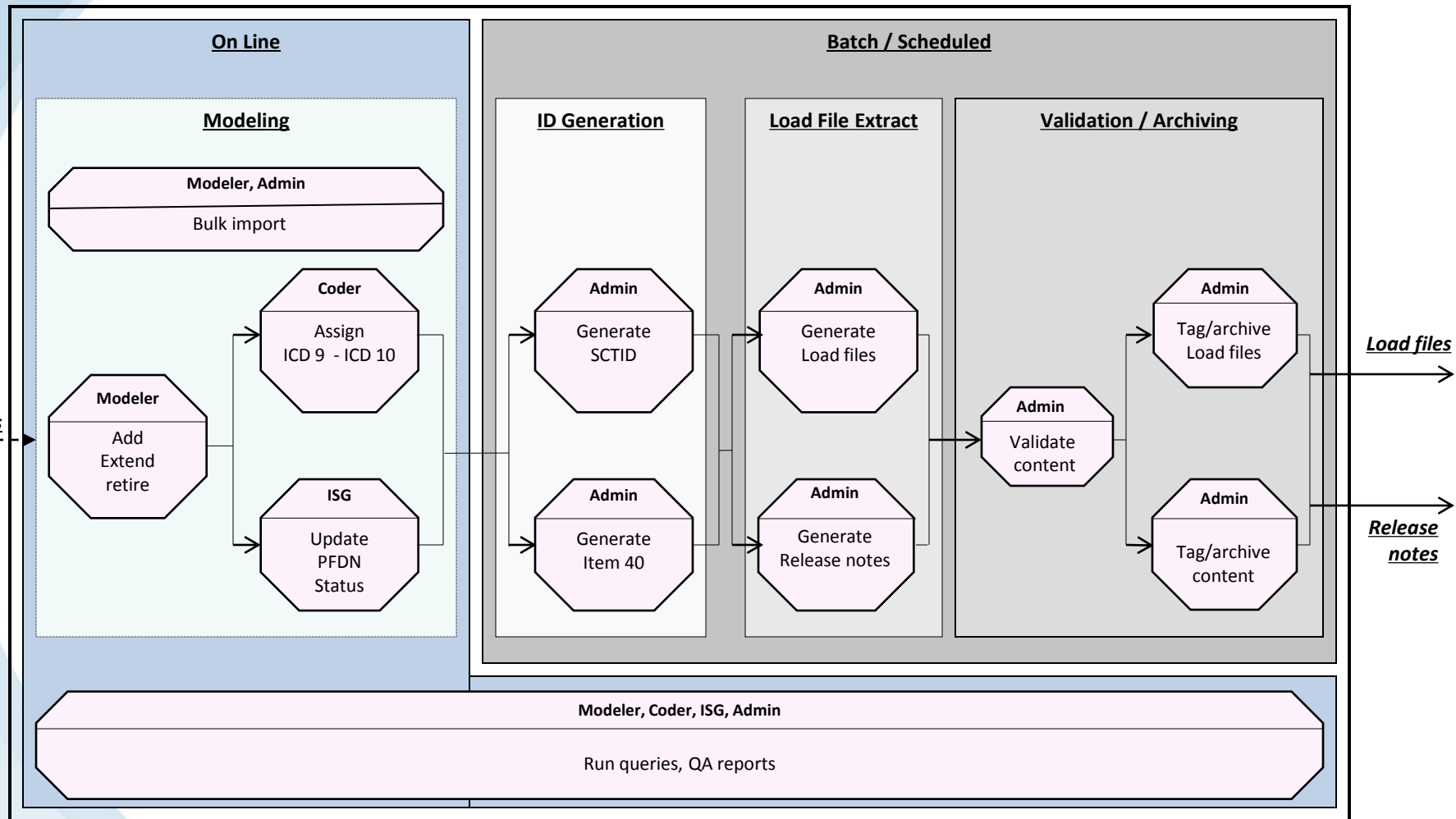
2011 Deliveries

- Delivered to date:
 - Top 2500 Problem List subset
 - Cardiology Problem List subset**
 - Mental Health Problem List subset**
 - Neurology Problem List subset**
 - Musculoskeletal Problem List subset**
- Delivery on target:
 - Ophthalmology – Nov 5th-
- **all with ICD9-CM/ICD10-CM Map

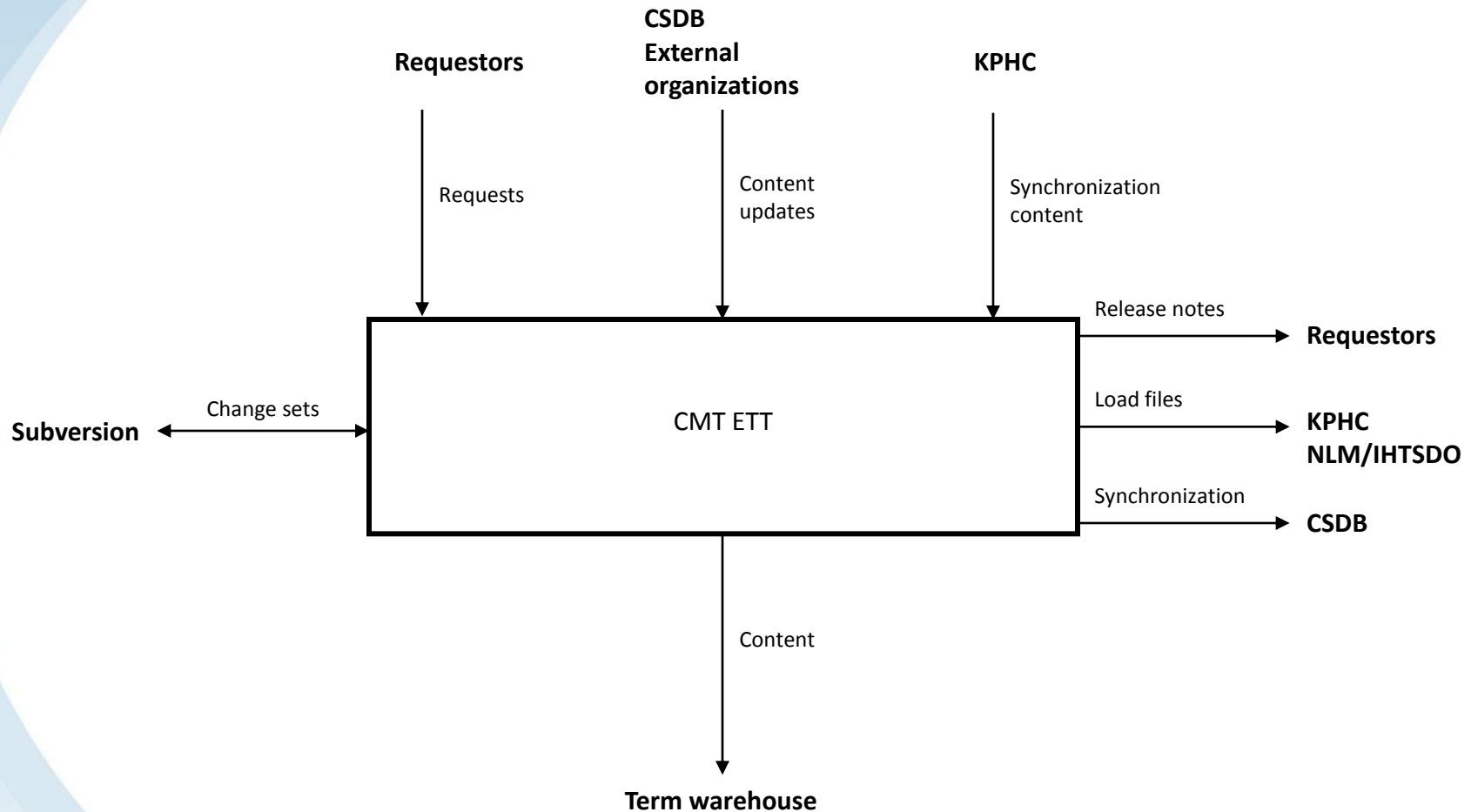
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- Introduction to CMT project
- CMT tooling and environments

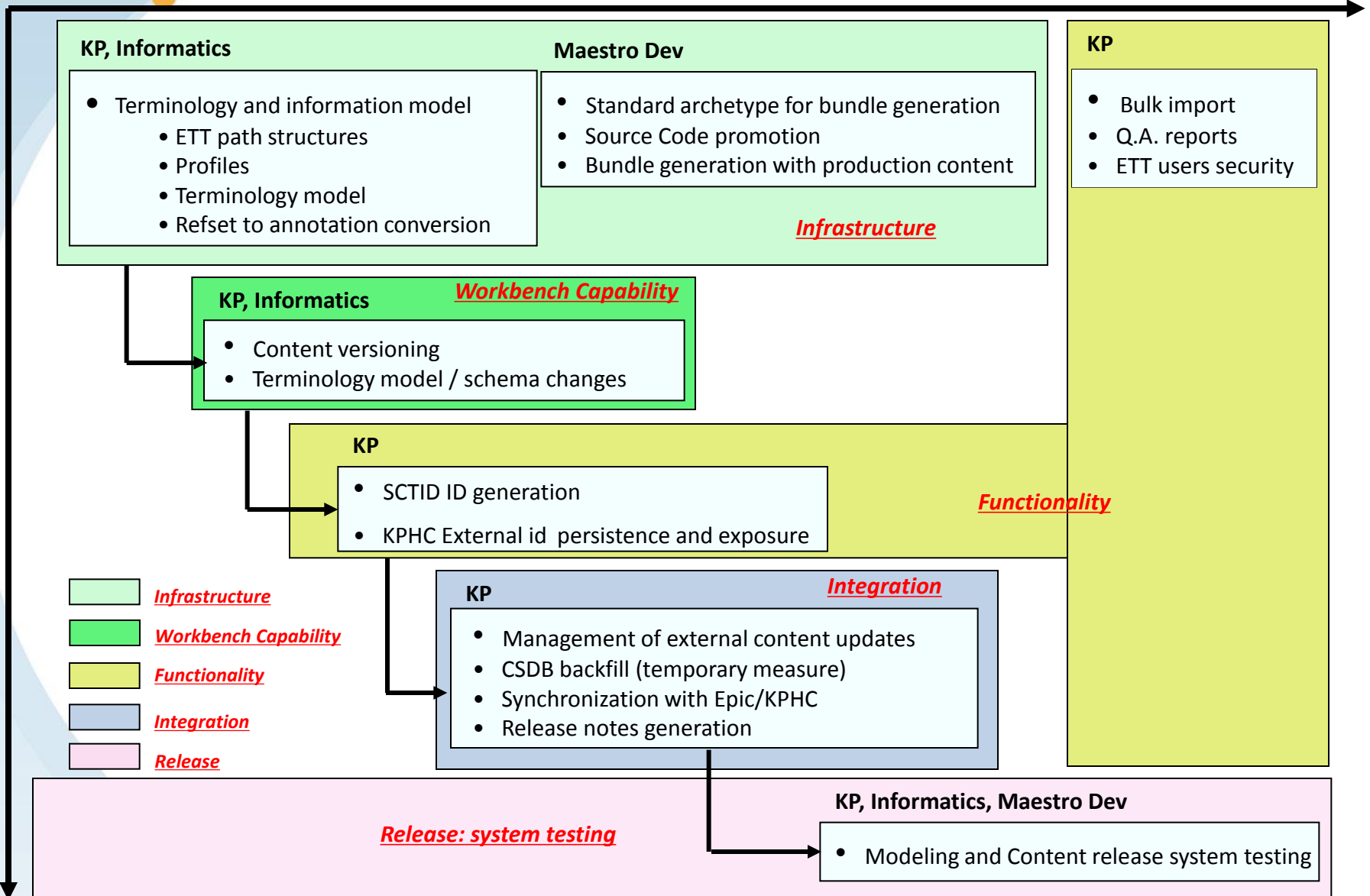
CMT ETT - Scope



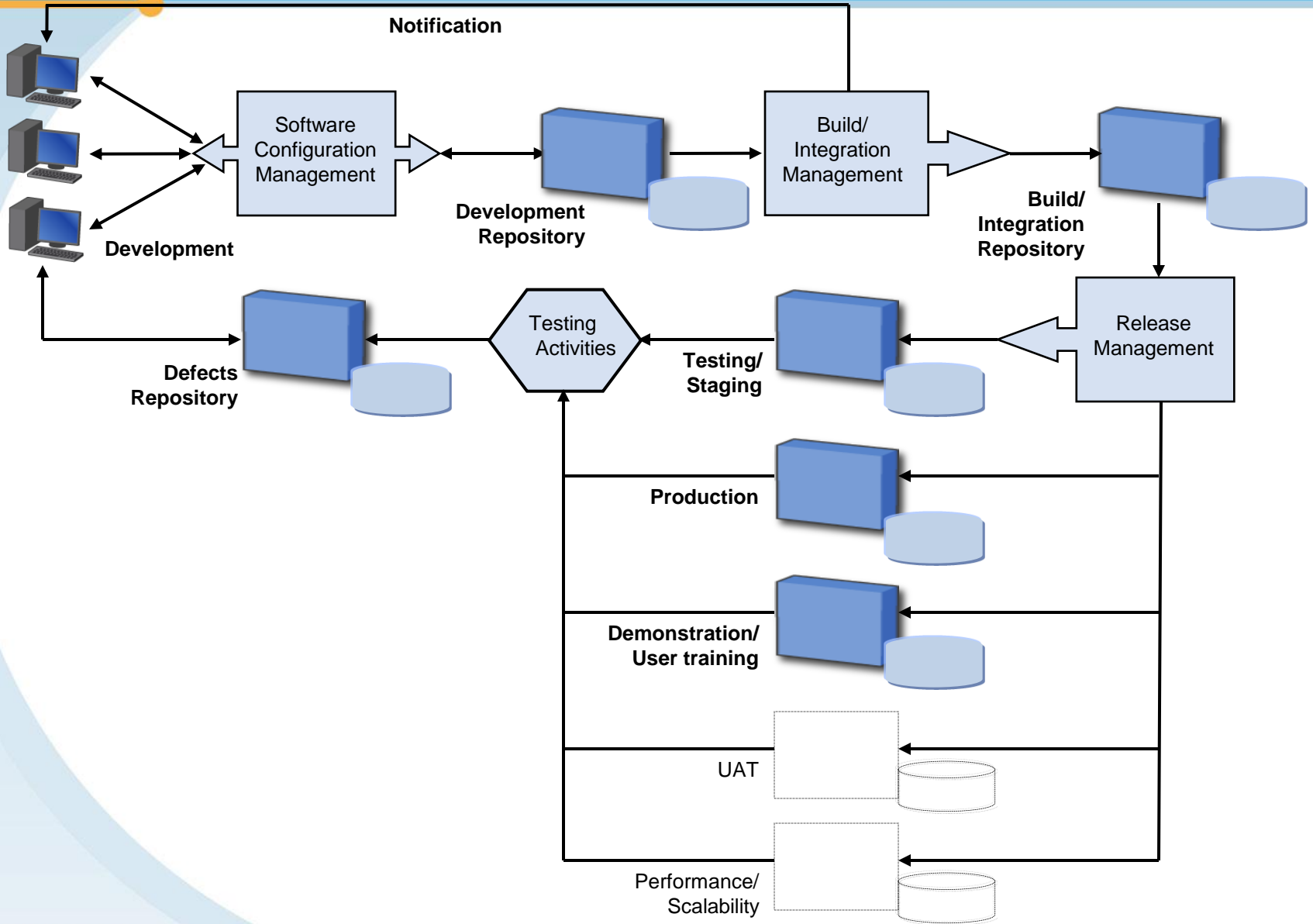
CMT ETT - Integration Context



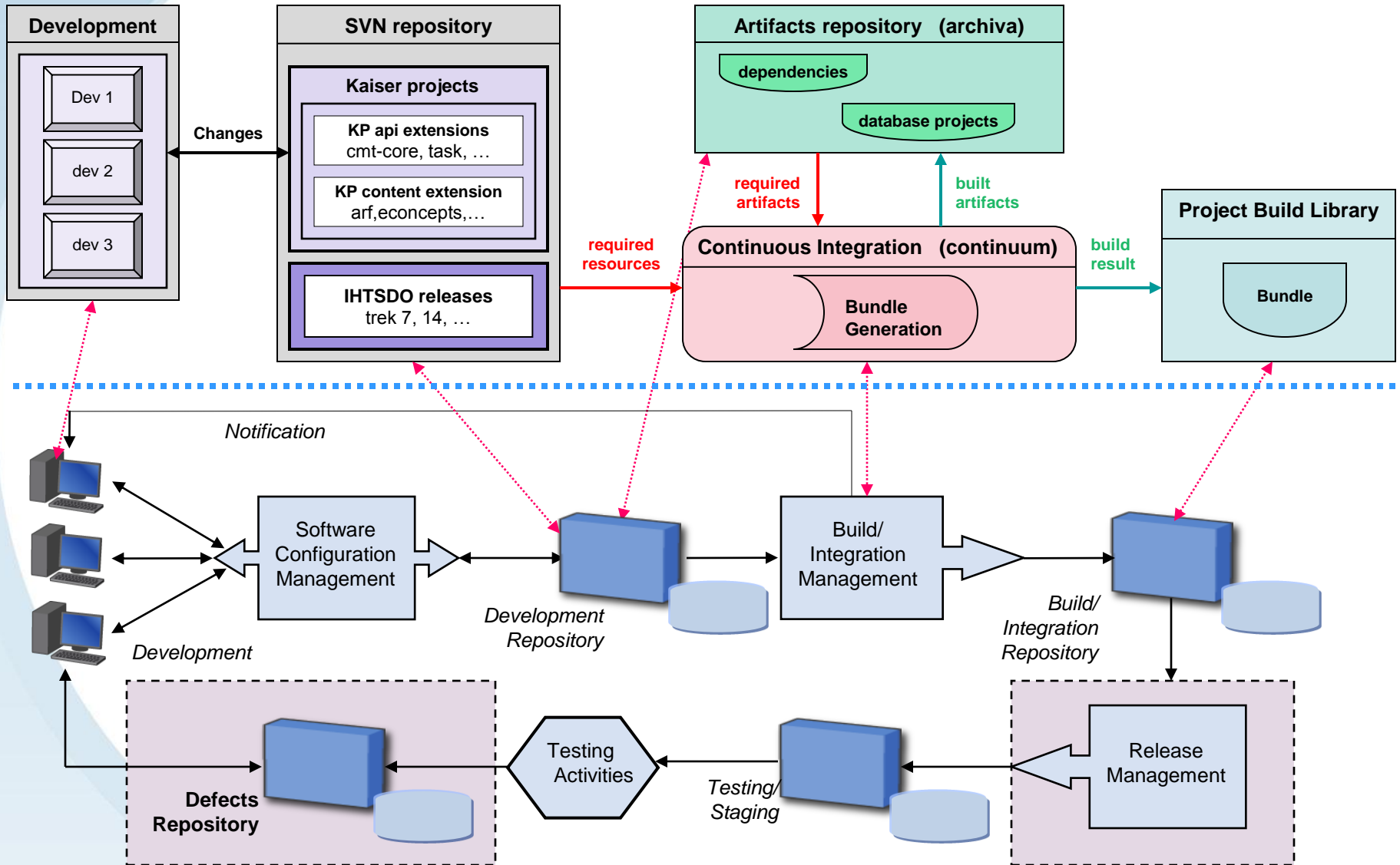
CMT ETT - Development Road Map



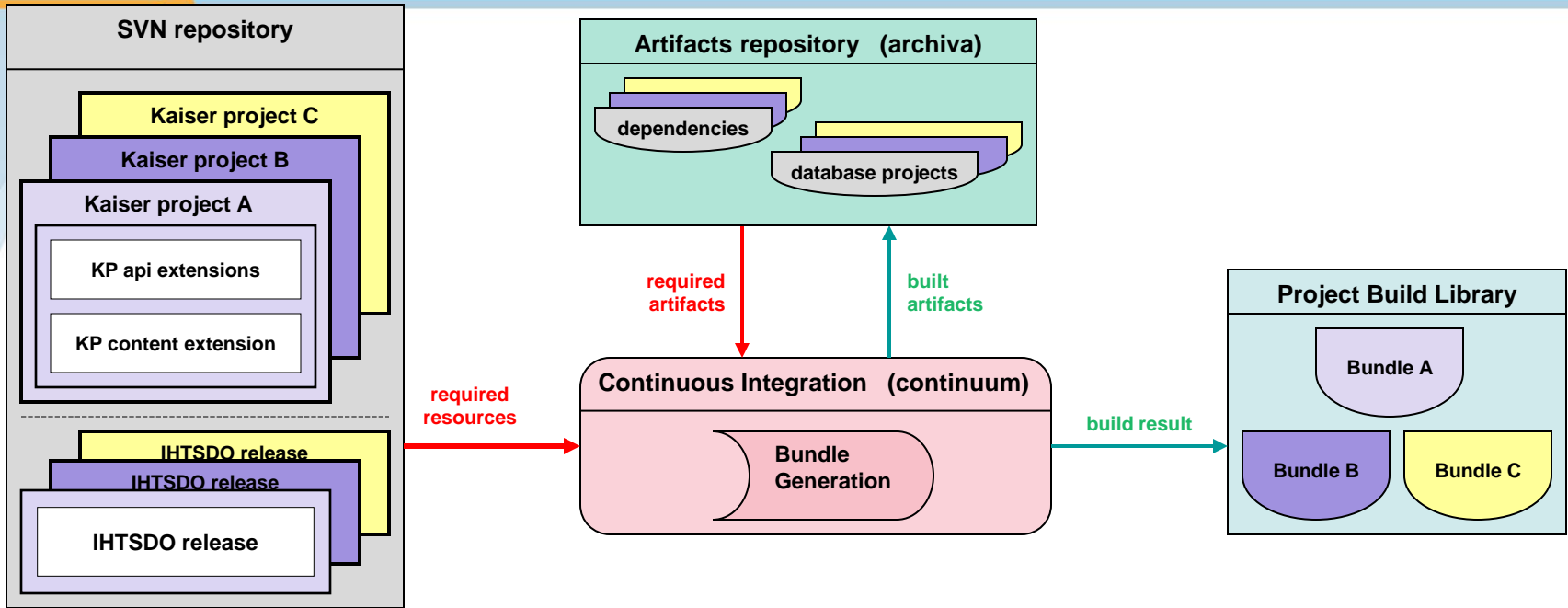
CMT ETT - Development Environments



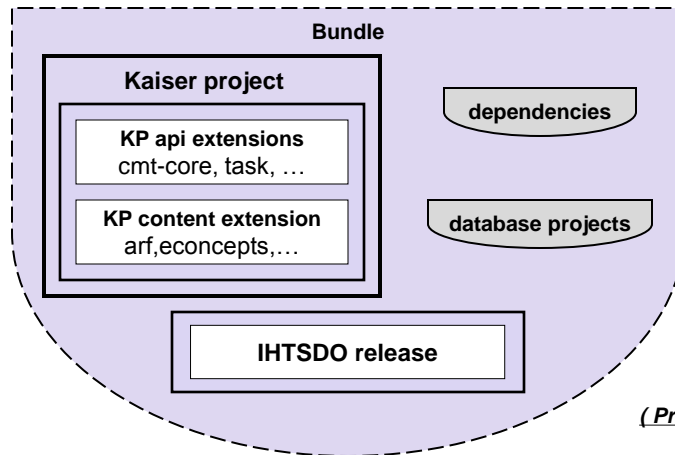
CMT ETT – Bundle Generation and Stages



CMT ETT – Bundle Components

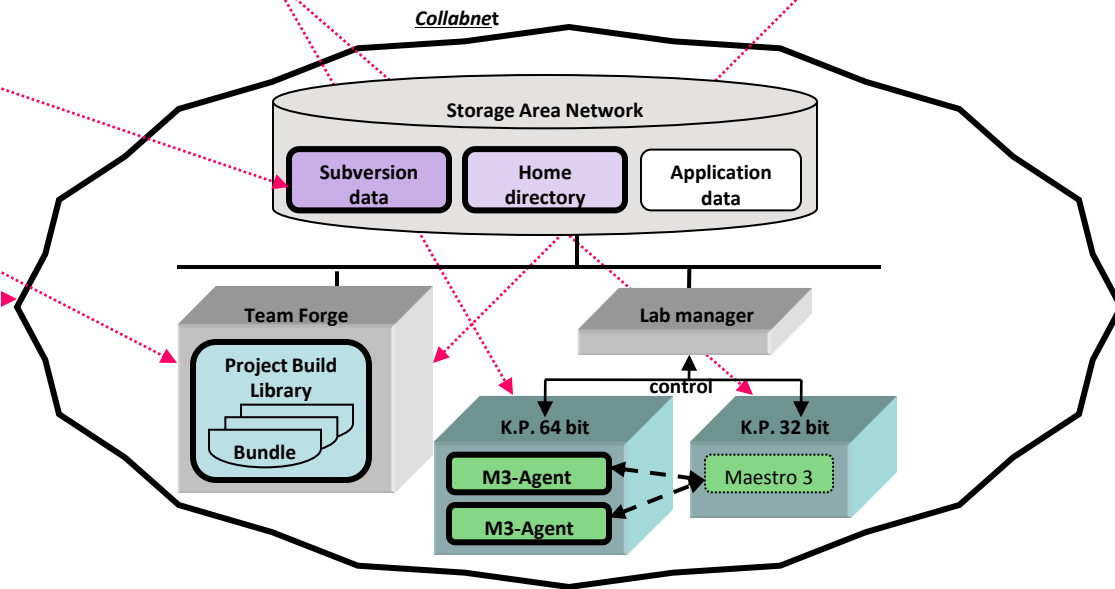
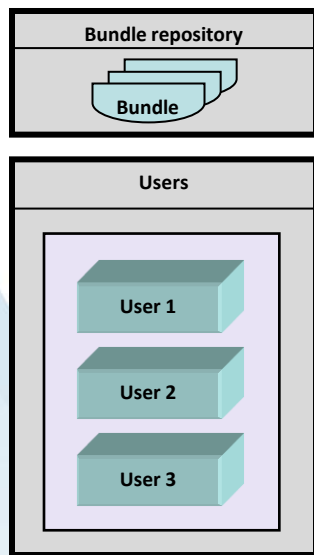
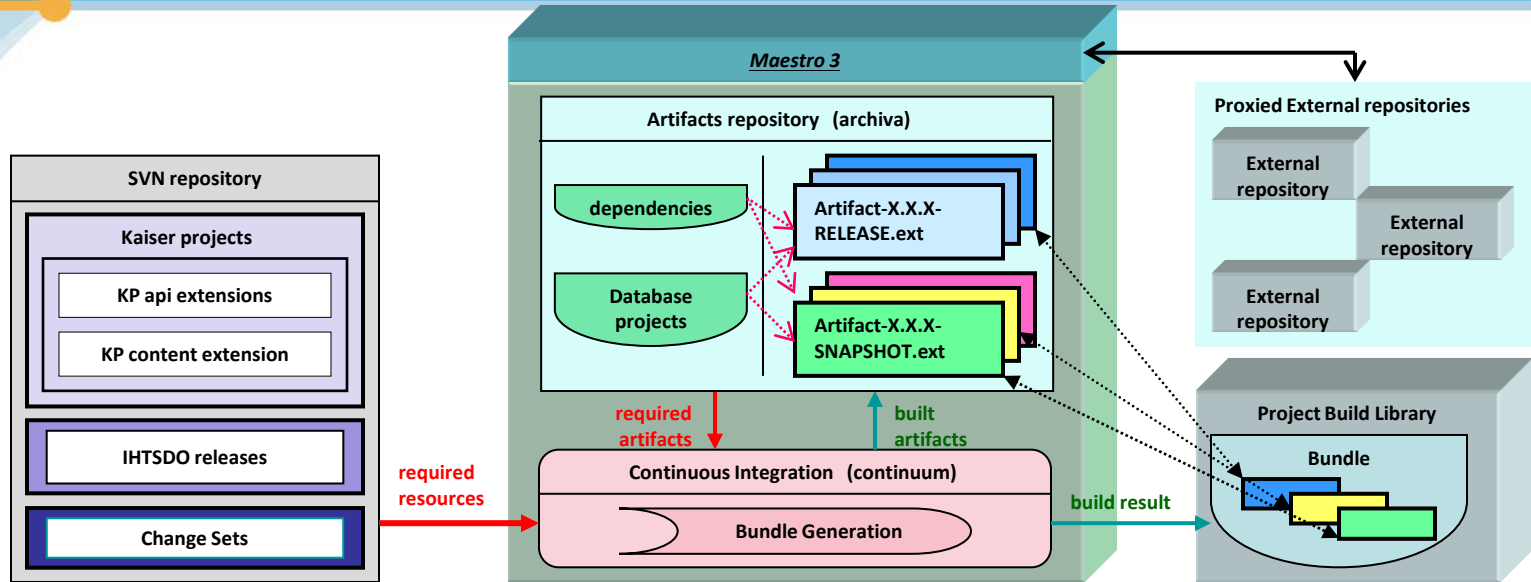


components to build a bundle

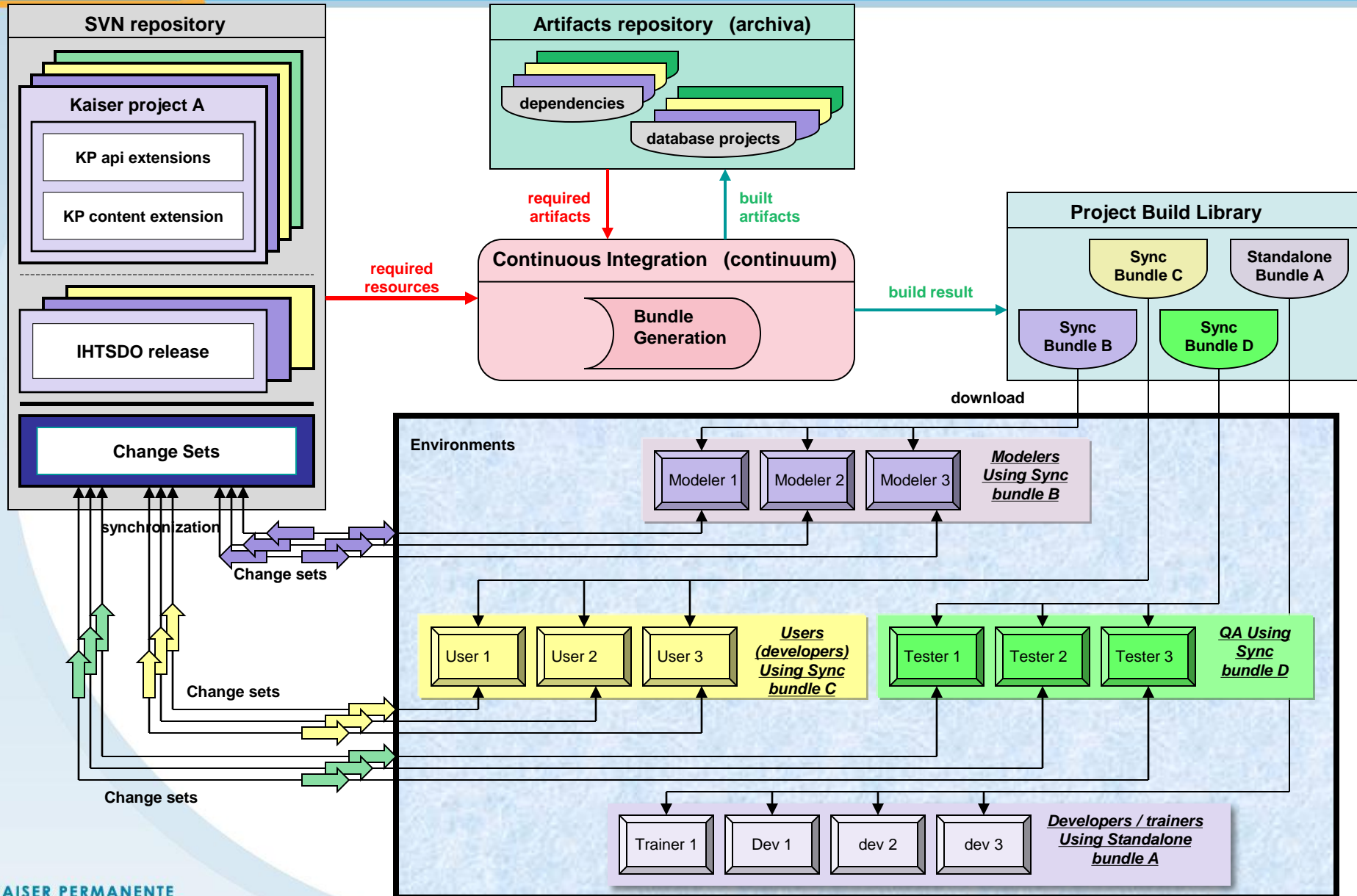


(Profiles and Queues not illustrated)

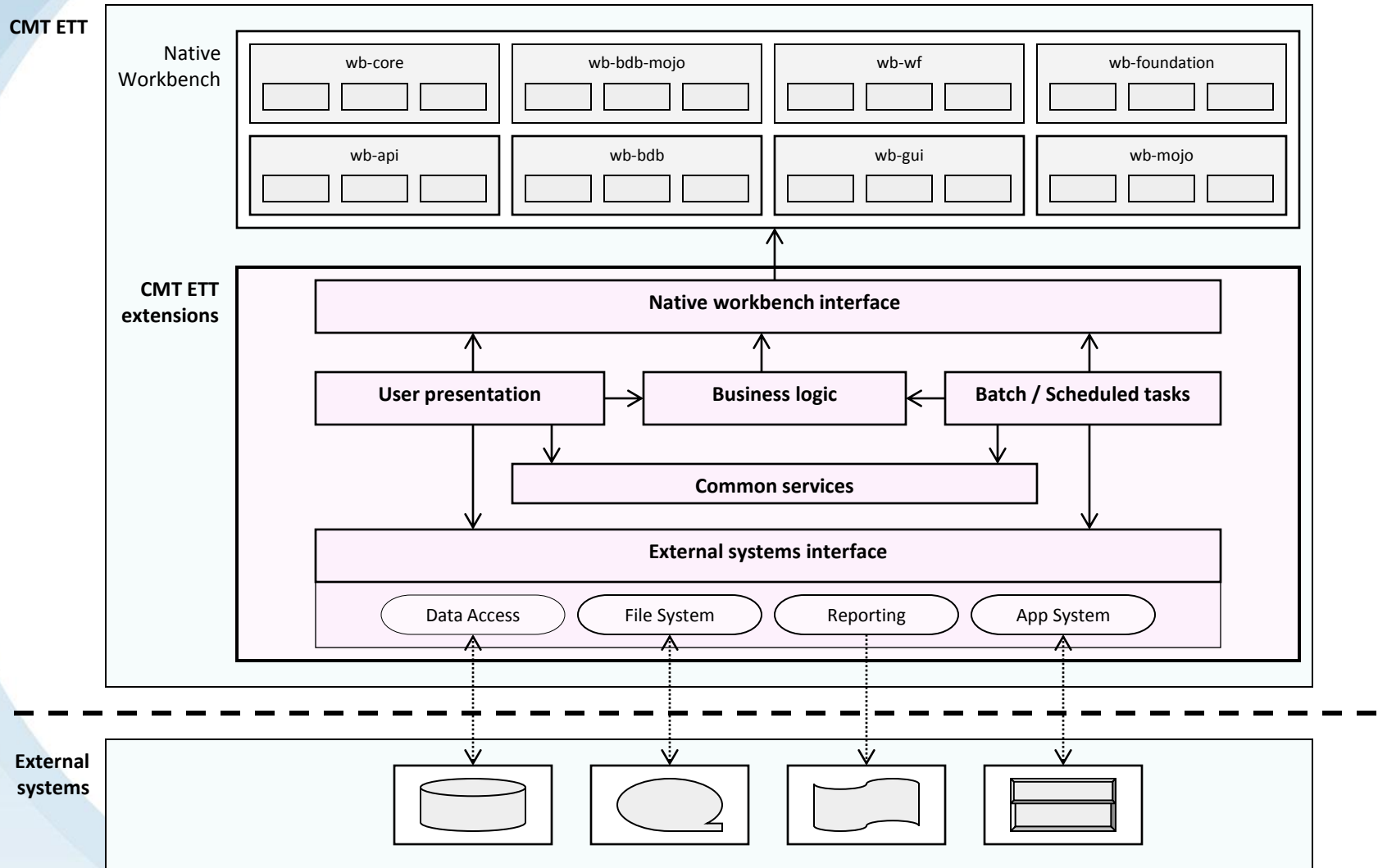
CMT ETT - Bundle Components - CollabNet



CMT ETT – Bundle Generation and Usage



CMT ETT – Layered Architecture



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