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Lethality, Survivability, Mobility and
Sustainment for America's Army

TACOM-ARDEC (R)

CLOSE COMBAT ARMAMENTS CENTER



3-DIMENSIONAL SOLID MODEL TECHNICAL DATA PACKAGES (3D/TDP)

http://w3.pica.army.mil/esd/tacom_3d.htm

Dave Collum - DSN 782-2601

- email CollumD@ria.army.mil

Bob Nicewanner – DSN 782-8246

- email NicewannerR@ria.army.mil

Tank-automotive & Armaments Command

Committed to Excellence



Purpose

- ✦ To explain plans to establish a 3-dimensional solid model based technical data system 3D/TDP
- ✦ To demonstrate the capabilities and benefits of a 3D/TDP system



Current Situation

- * Technical data packages are raster images of 2-dimensional line drawings
- * Drawings are maintained with 2-D CAD and converted to raster
- * Designing using 3-dimensional solid modeling now commonplace throughout industry and TACOM

Typical Solid Models In ARDEC

- * M203 grenade launcher (dimensions, blank receiver)
- * M9 pistol (exploded view, flythrough, stress analysis, automated RPSTL, QAP, SPI)
- * Welding shelter (flythrough, measurements, BOM, MPEG, mass & center of gravity)
- * Buttstock (rapid prototype, automated drawings, parametric, reduced ALT/PLT, email, online 3/D TDP, design upgrades)



Solid Modeling Features

- ✦ Build virtual parts and assemblies in the computer
- ✦ Analysis capabilities (stress analysis, interference, tolerance stack-up, NC tooling design, etc.)
- ✦ Automated generation and update of line drawings
- ✦ Parametric design
- ✦ Automated bill of material
- ✦ Rapid prototyping



3-D/TDP Benefits

- * Faster and better manufacturing (reduced ALT & PLT)
- * Faster design upgrades
- * Improved logistics support
- * Improved interface
- * Better and faster engineering analysis
- * Reduced TDP interpretation errors



Our Goals

- ✦ Develop a system in which the 3-D solid model constitutes the technical data package. This involves:
 - Standards
 - Security
 - Training
 - data management
 - CM practices
- ✦ Make the 3-D/TDPs available via internet to all TACOM customers



TACOM Implementation Of 3-D TDP

- ✦ TACOM 3-D standards drafted
- ✦ Pro/INTRALINK and TACOM standards training started July 00
- ✦ Pro/INTRALINK PDM & file server has been established at Picatinny and Rock Island
- ✦ M9 bayonet will be the first item config managed



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Status Update

- ✦ ARDEC tasked by a customer to convert M9 bayonet to complete 3D tech data (ECD 30 Sep 00).
- ✦ Small arms parts IPT to recommend all small arms be converted for demo project of 3-D tech data capabilities.

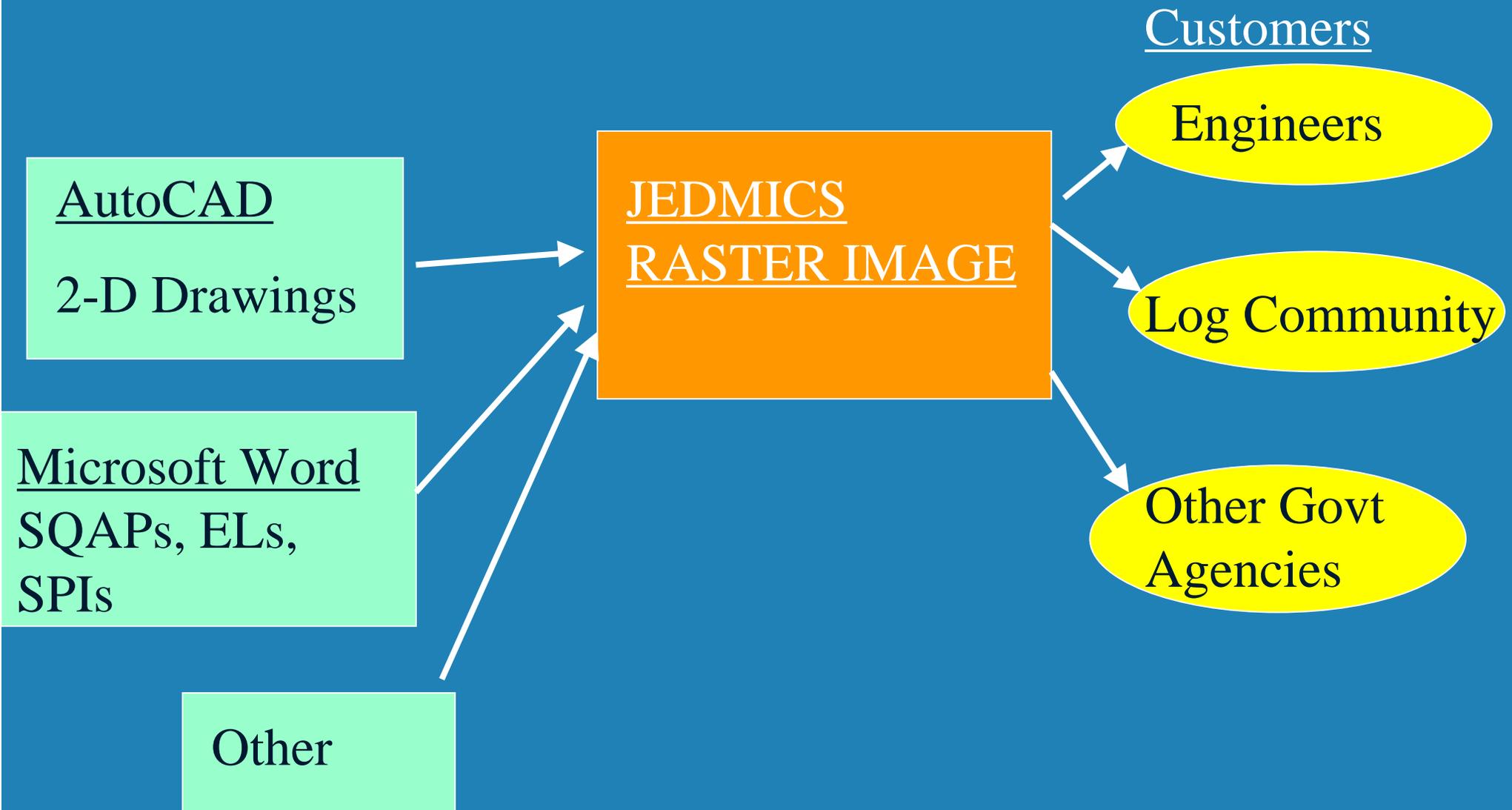


Tech Data Issues

- * Goal is that tech data will be available from ARDEC with 1 week of request
- * Tech data will be delivered in 5 formats:
 - Pro/ENGINEER native solid models
 - Pro/ENGINEER native drawings
 - Adobe acrobat (.pdf) drawings (contractually binding)
 - VRML file of solid models
 - STEP file of solid models

Current Tech Data System

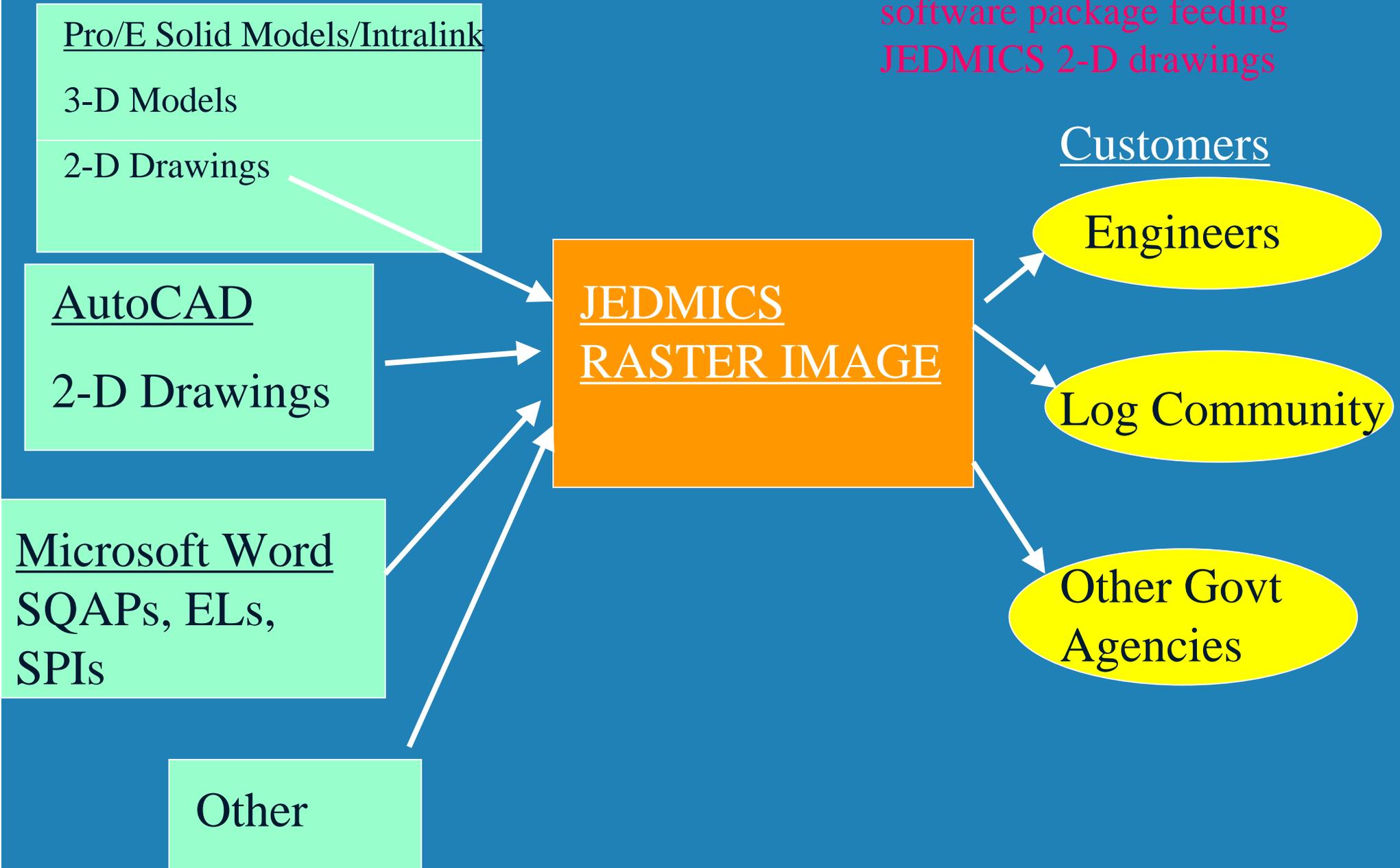
Drawings, SQAPS, packaging sheets etc are created in various software package and exported as raster to JEDMICS



Solid Model Based Tech Data System Implementation

Phase I

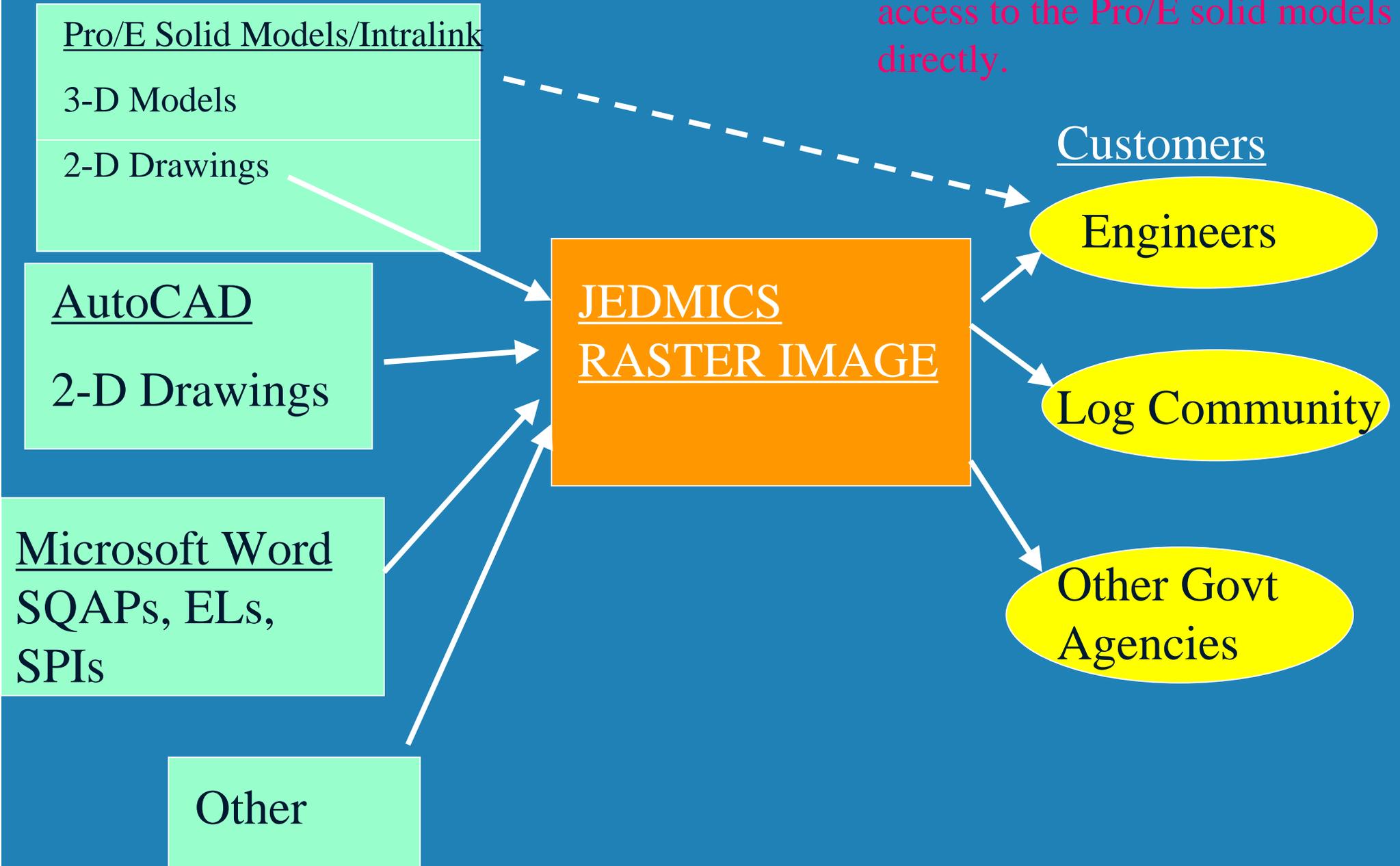
Initially, Pro/E will be another software package feeding JEDMICS 2-D drawings



Solid Model Based Tech Data System Implementation

Phase II

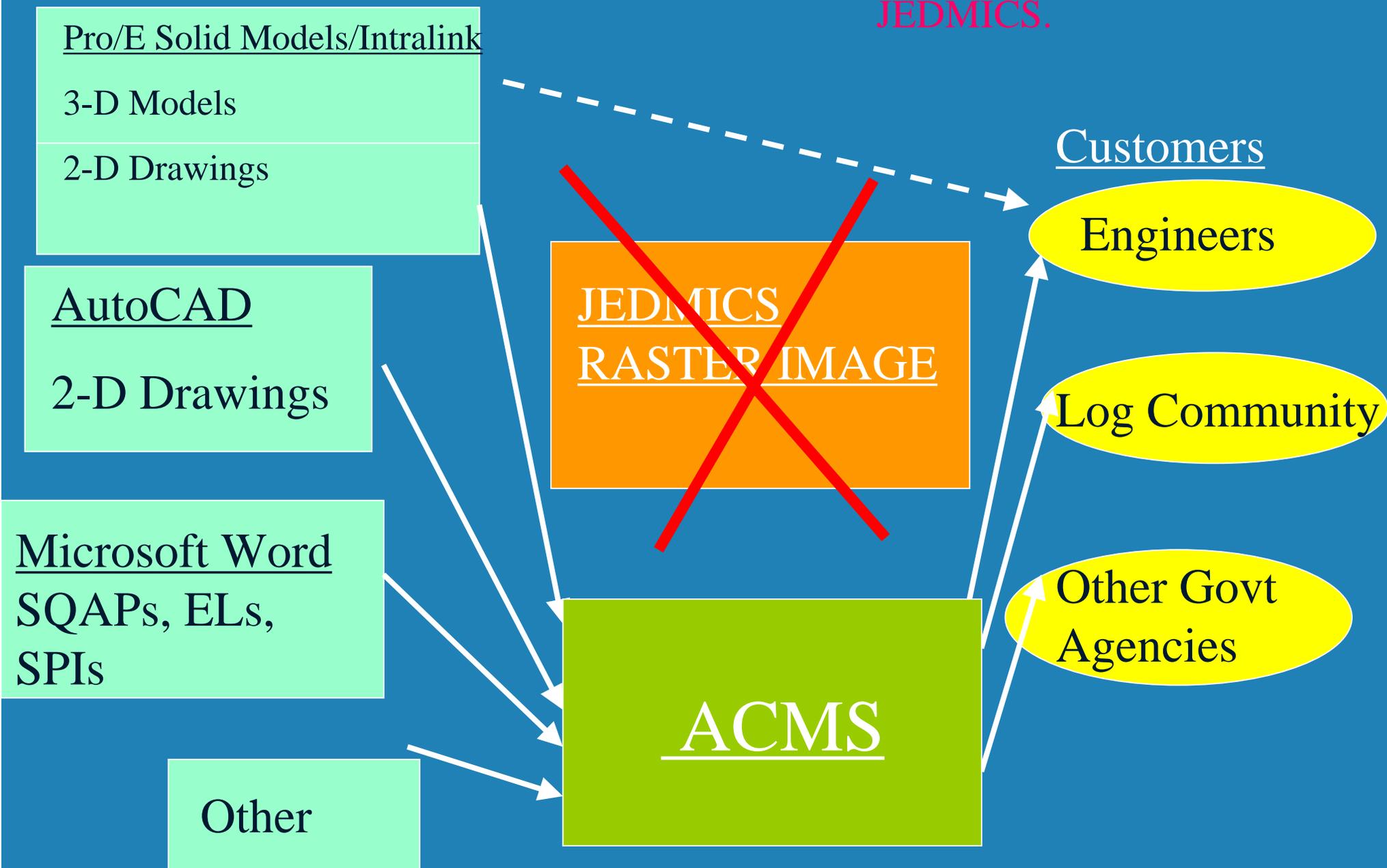
Next, customers would be given access to the Pro/E solid models directly.



Solid Model Based Tech Data System Implementation

Phase III

Finally, ACMS will replace JEDMICS.



ARDEC (R) PRO/Engineer Training

Apr-00

Class	% Trained	Training	Text	Instructor	
	Goal/Achieved	Hours			
Basic Pro/Engineer	100%/90%	40	PRO/E Tutorial-SDC Publications	Kreider or	
			or Pro/E 2000i-Lamit	Collum-CCL-FS	
TACOM-ARDEC Stds & Intralink	100%/10%	40	ARDEC Standards	Collum-CCL-FS	
Fundamentals of Drawings	100%/50%	24	Various	Kreider CCL-FS	
Fundamentals of Design	30%/10%	40	PTC Workbook	Torres-FSAC@	
Mechanica Structure	15%/15%	56	PTC MECHANICA WORKBOOK	Windham-CCL-FS	
Mechanica Motion*	15%/2%	40	TBD	TBD	
Fundamentals of Sheetmetal*	30%/2%	24	Intro to Sheetmetal, SDC Pubs.	Morford-EST	
Advanced Surfacing*	30%/2%	24	TBD	Collum-CCL-FS	
* IN-HOUSE TRAINING NOT YET STARTED.					
All Classes 2-3 hours/2 times per week.					
Class Size 6-12 Students.					



Small Arms Converted to Solid Models

- ✧ M9 pistol
- ✧ M240 MG (FNMI)
- ✧ M249 MG (FNMI)
- ✧ M16A2/M16A4 rifles (ECD Oct 2000)
- ✧ M4 carbine (ECD Oct 2000)
- ✧ M203 grenade launcher (partial)
- ✧ MK19 (partial)
- ✧ M9 bayonet
- ✧ M4/M5 rail systems (partial)



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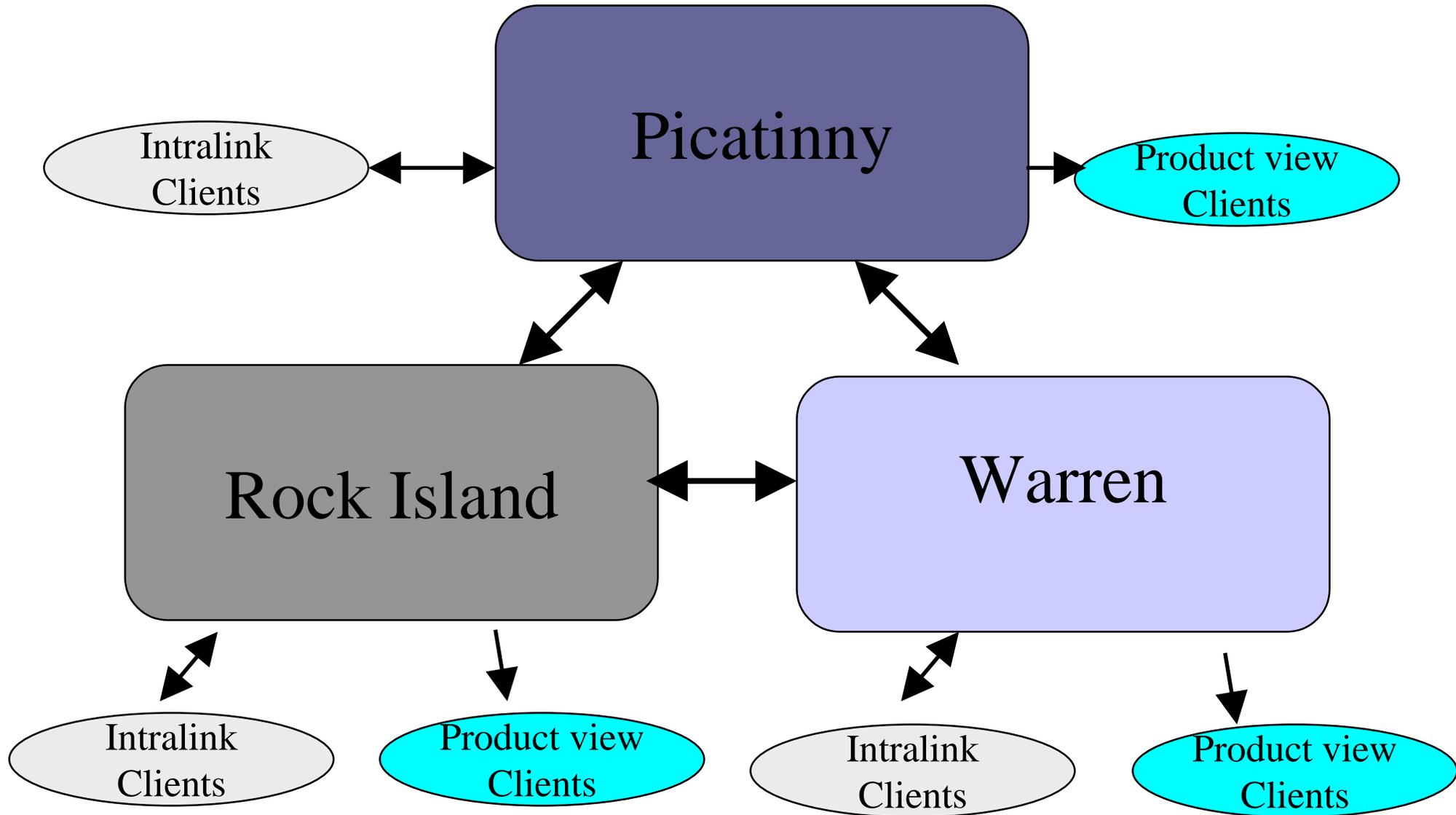
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3-D/TDP Outline

- * Every engineering change will result in a new revision level and vice versa
- * Engineers will incorporate changes to their parts, centralized drafting function eliminated
- * Centralized check against standards will remain
- * Information on drawing such as tolerances, materials, notes etc. Will source from solid model
- * 3D/TDP parts will be master for CM purposes

Intralink Server-Client Map



Pro/INTRALINK

Pro/INTRALINK is the database management tool for Pro/ENGINEER files. Features include:

- **Storage of Pro/ENGINEER data**
- **Controlled distribution of data**
- **Configuration management tools**
- **Lifecycle management tools**
- **Change control (ECP's etc.)**

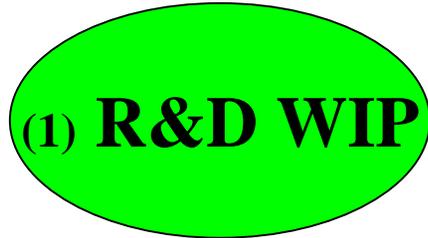


3D/TDP Outline

- * 7 release levels
- * File folder scheme by system
- * 58 parameters maintained in model
- * All parts in the pre-production release and production release must have fully defined 2-D line drawings
- * 3D/TDP parts will be master for CM purposes
- * Jedmics/viewer will remain. Source data will be 3D/TDP drawing
- * 3D/TDP product release files will be maintained in Pro/E, STEP, IGES

TACOM 3-D SOLID MODEL RELEASE SCHEME

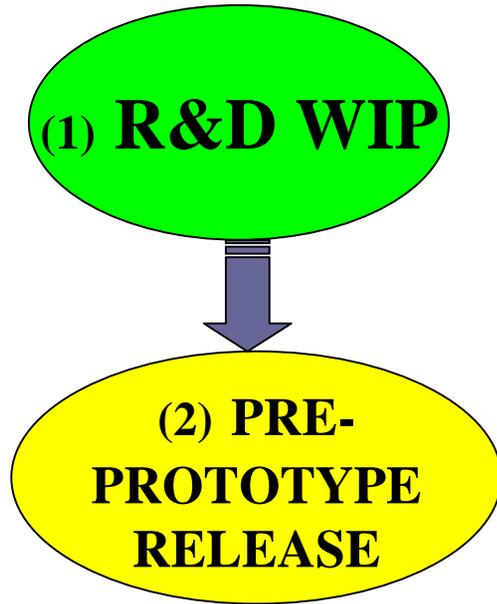
R&D



R&D PROGRAMS START
MODELS IN R&D WORK IN
PROCESS (WIP) RELEASE
LEVEL

TACOM-ARDEC 3-D SOLID MODEL RELEASE SCHEME

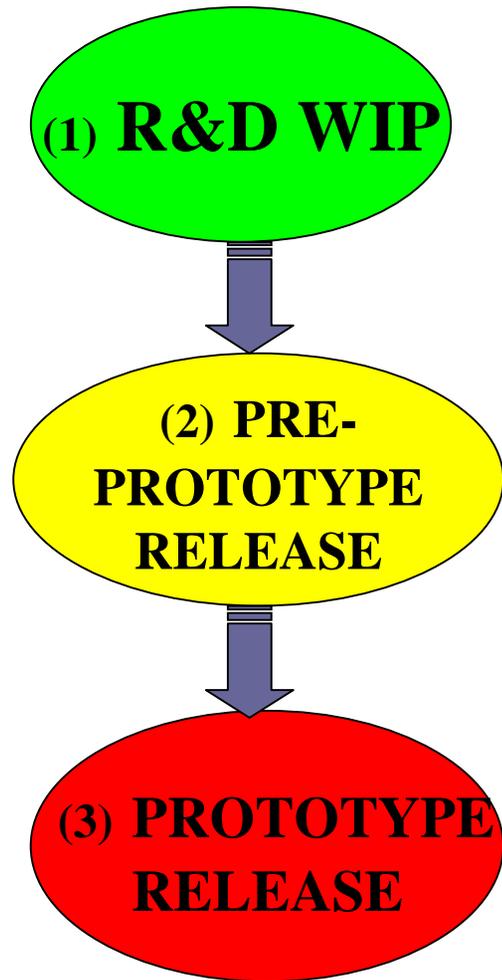
R&D



ONCE DESIGN IS COMPLETE, ENGINEER
ADVANCES MODEL TO PRE-
PROTOTYPE RELEASE LEVEL.

TACOM-ARDEC 3-D SOLID MODEL RELEASE SCHEME

R&D



**No 2-D Line Drawings
Required in R&D**

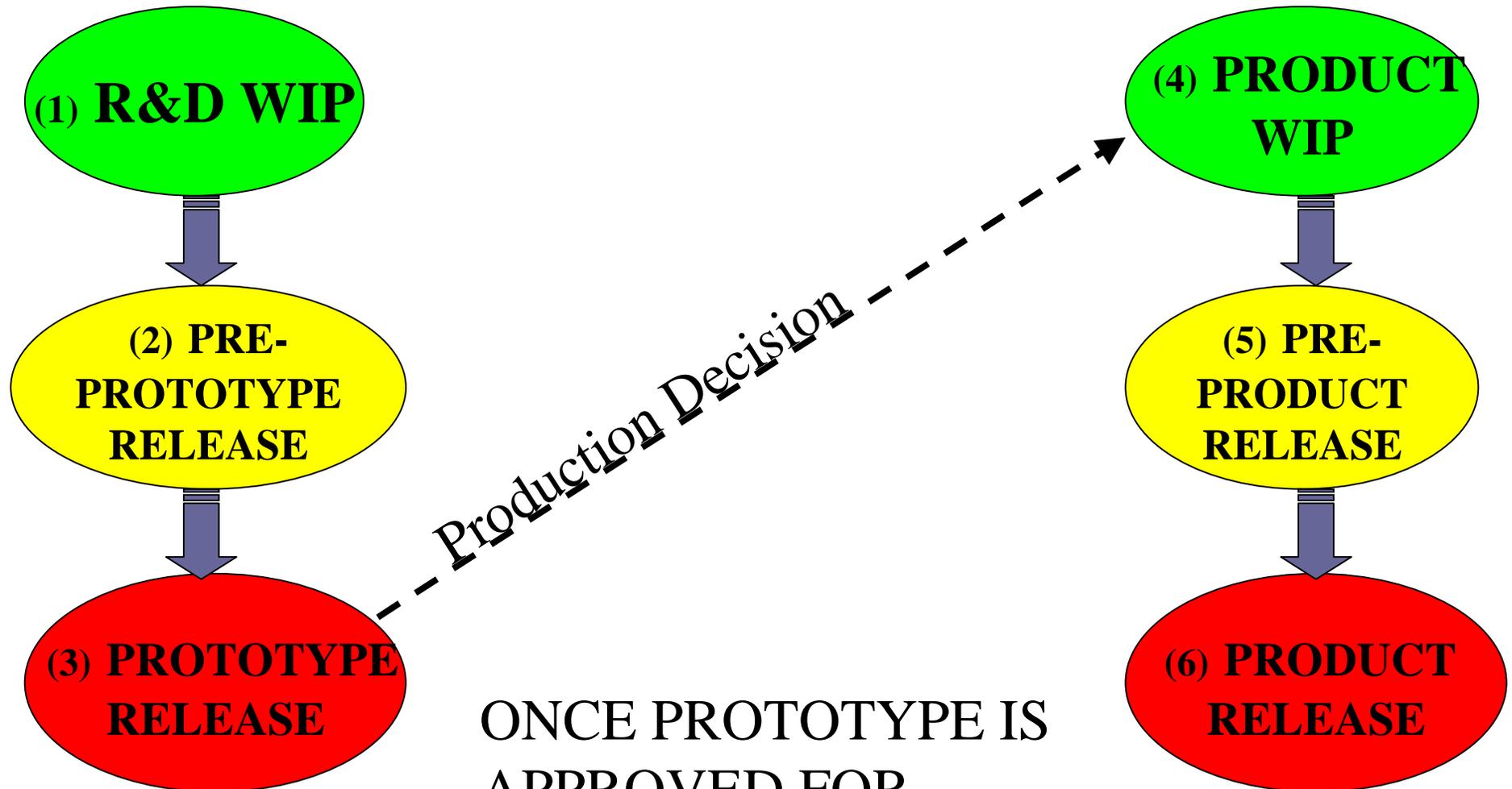
AFTER CHECKING MODEL
AGAINST STANDARDS, MODEL
ADVANCES TO PROTOTYPE
RELEASE LEVEL.

TACOM-ARDEC 3-D SOLID MODEL

RELEASE SCHEME

R&D

PRODUCT



ONCE PROTOTYPE IS APPROVED FOR PRODUCTION, IT MOVES TO PRODUCT WIP

TACOM-ARDEC 3-D SOLID MODEL RELEASE SCHEME

PRODUCT



ARDEC CUSTOMERS THEN HAVE
ACCESS TO THE PRODUCT RELEASE
MODELS.

TACOM 3-D SOLID MODEL RELEASE SCHEME

R&D

PRODUCT

