Development of Medicines Terminology Standards for Use in Australia

National Clinical Terminology & Information Service
NEHTA
23 January 2013

Healthcare system: Australia

- One of the largest & most complex industry.
- Employs over 850,000 people.
- Delivers services to 22.6 million people.
- Multiple geographies and socio-economic settings.
- Complex network of mainly autonomous public & private care providers.
  - Over 1,000 public & private hospitals.
  - 10,000s of general practice, specialist, community health, allied health & aged care settings.

Healthcare system: Australia

- In 2010-2011, Australia spent about $130 billion on health. In 2000-2001, this was $77.5 billion[2].

- 9.3% of GDP vs. 8.2% of GDP for same periods.

- Estimated recurrent expenditure on health is about $5,800 p/p.

- Growth due to ↑ volume of health goods & services purchased, not price – mainly population growth, not ↑ expenditure p/p.

- Two largest increases:
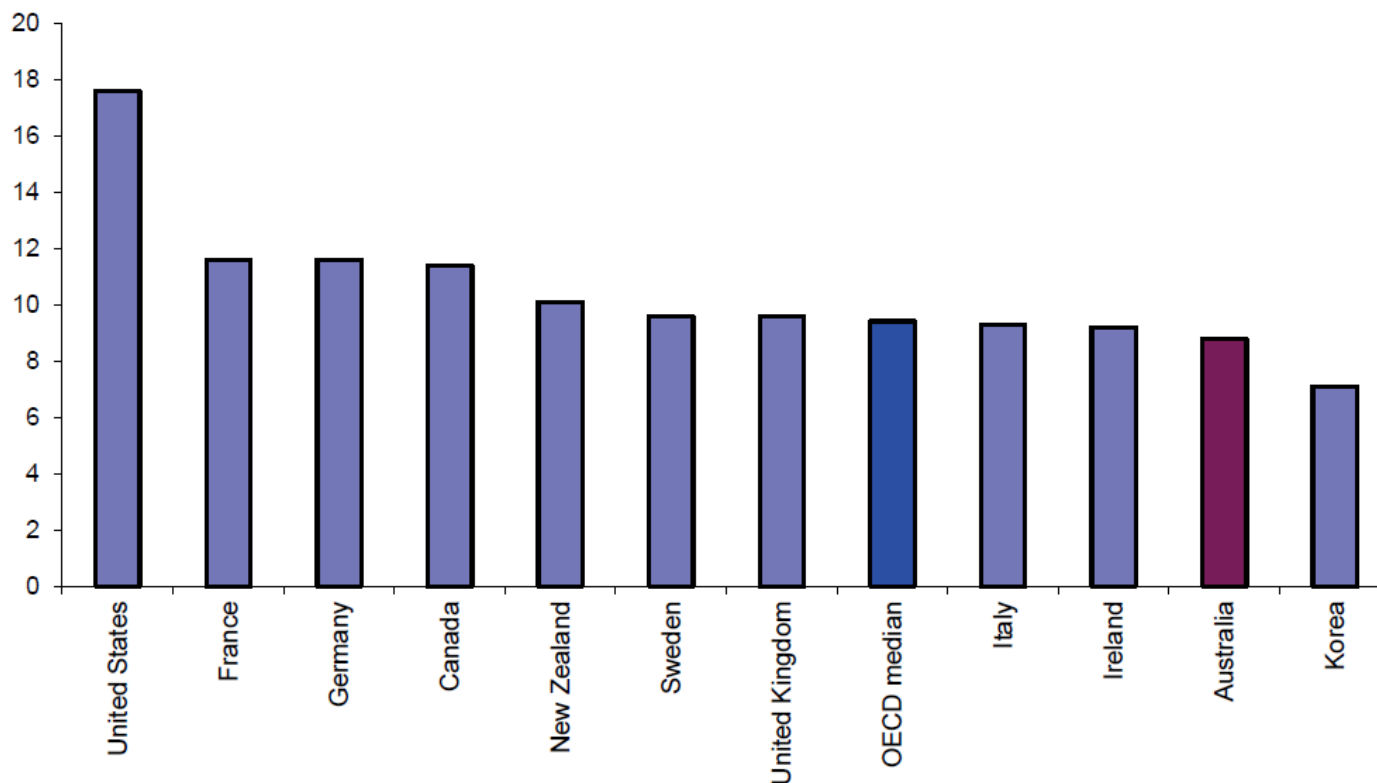 - Public hospital services (↑ $2.2 billion)
  - Medications (↑ $2.1 billion)

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[2] AIHW 2012. Health expenditure Australia 2010-11. Health and welfare expenditure series no. 47. Cat. no. HWE 56. Canberra: AIHW.

Health to GDP ratio: Aust vs. OECD countries

Figure 5.1: Health expenditure as a proportion of GDP, selected OECD countries, 2010[a]

(a) See definition of 'OECD financial year' in Box 5.1.

Source: Table 5.1.

Health to GDP ratio:
Aust vs. Asia-Pacific countries
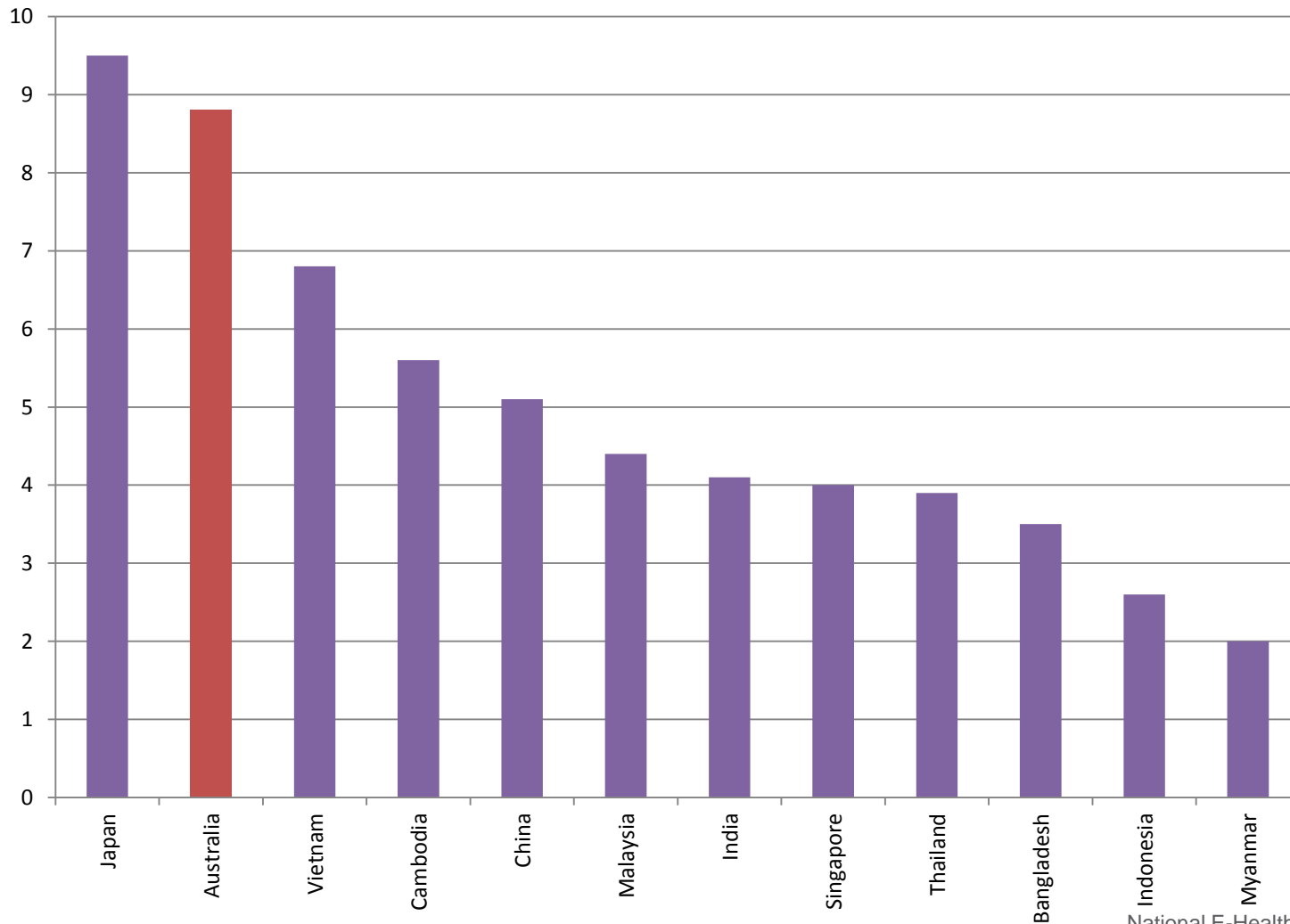
Health expenditure as a proportion of GDP, selected Asia-Pacific countries, 2010

Healthcare system challenges – Australia (1)

- Significant challenges in continuing to deliver high standards of health outcomes:
  - Large ageing population
  - Increasing incidence of chronic diseases
  - Increasing consumer demand for more costly, complex & tech advanced procedures
  - Differences between advantaged & disadvantaged Australians
  - Supply & distribution of skilled health sector workers

Healthcare system challenges – Australia (2)

- Various local/ proprietary code-sets, classifications & terminologies in use
- Various EMRs are in use
- Different states & jurisdictions
- Different healthcare settings
- Different reporting requirements
- Different underpinning business/editorial rules
- Little to no sharing of information:
  - Point to point
  - Point to share

Healthcare system challenges – Australia (3)

Clinical records:

- Not only a record for the author
- Essential to inform the *next person* in the care team

- Clinical safety risks of poor quality, ambiguous communication, e.g. prescribing, dispensing and administration errors

- Difficult to establish a person's medication history reliably and efficiently across the continuum of care

Australian Healthcare Community
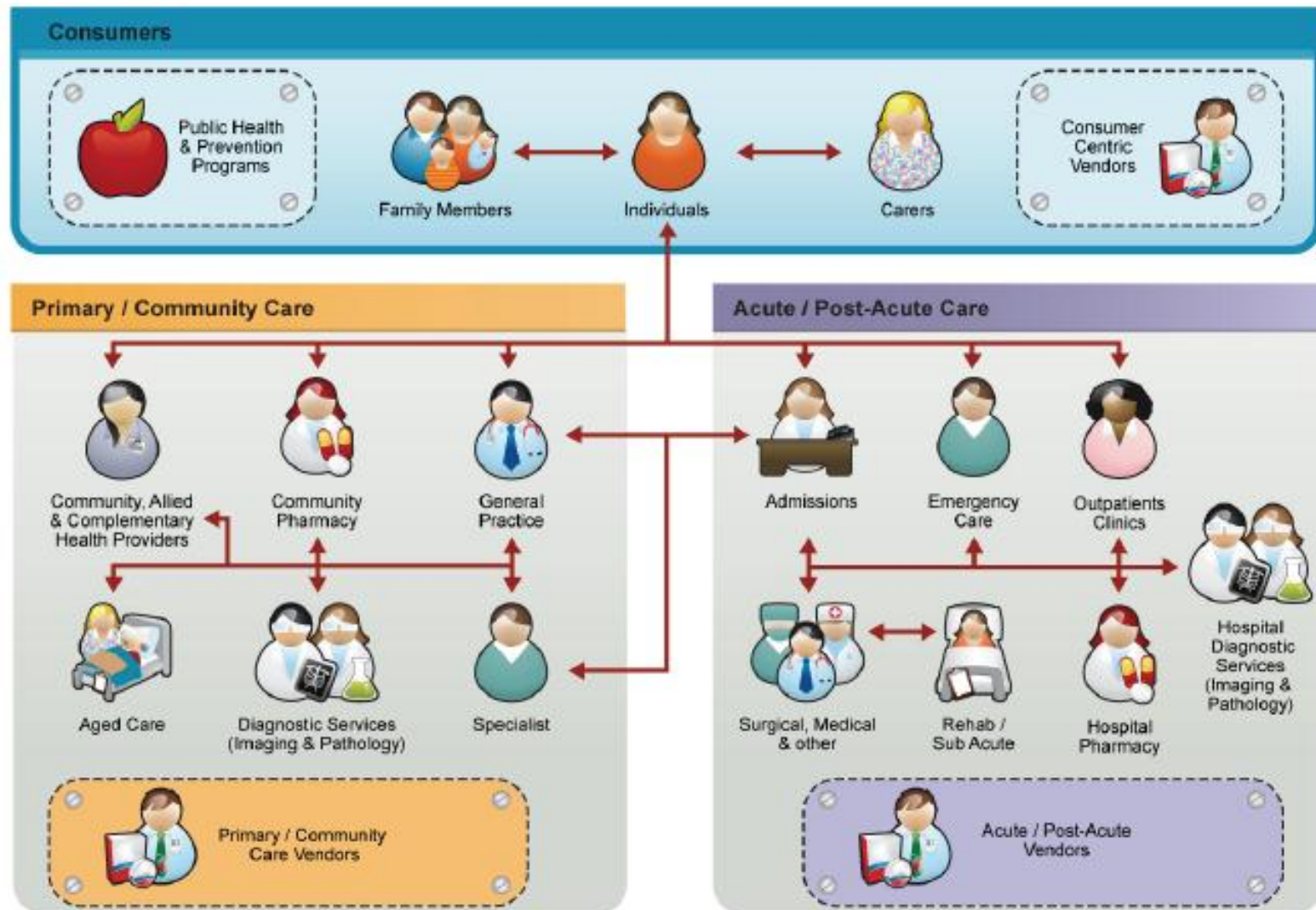
National E-Health Transition Authority (NEHTA)

- Identify and develop the necessary foundations for eHealth

- Develop the Personally Controlled Electronic Health Record (PCEHR)

NEHTA Vision

To enhance healthcare by enabling access to the right information, for the right person, at the right time and place.

NEHTA Purpose

- Lead the uptake of eHealth solutions

- Enable the progression and accelerate the adoption of eHealth through:

  - Infrastructure integration

  - Health information standards

NEHTA Work Program

PERSONALLY CONTROLLED ELECTRONIC HEALTH RECORD	CLINICAL INFORMATION	INDIVIDUAL INFORMATION	SHARED INFORMATION	MEDICARE DATA
E-HEALTH SERVICES	SHARED HEALTH SUMMARY	EVENTS SUMMARIES	CONSUMER HEALTH SUMMARY	CO-ORDINATED CARE
E-HEALTH SOLUTIONS	ePATHOLOGY	eDISCHARGE	eREFERRAL	eMEDICATIONS
NATIONAL INFRASTRUCTURE COMPONENTS	NATIONAL CLINICAL AND TERMINOLOGY INFORMATION SERVICE	SECURE MESSAGING	HEALTHCARE IDENTIFIERS	AUTHENTICATION

Personally Controlled Electronic Health Record

Priority health activities	Benefits of national PCEHR system (2010-2025) ($M)
Reduced avoidable hospital admissions and GP visits due to more effective medication management	$10,237
Improved continuity of care	$1,308
Total net community benefits	**$11,545**

Deloitte, Expected benefits of the National PCEHR System Based on economic modelling work undertaken in 2010-2011. Published 2012.

National Clinical Information & Information Service

- SNOMED CT-AU

- **Australian Medicines Terminology**

- Clinical Information

- Reference Group engagement

- Service Desk

- Implementation Support

# How does a national standardised medicines terminology enhance healthcare ?

Between 22% and 71.9% of consumers have errors at admission to hospital and 2.8% of medication discrepancies have the potential to cause probable 'patient discomfort or clinical harm'

Lehnbom EC, Stewart MJ, Wiley J, Manias E, Westbrook JI. Do medication reconciliation and review improve health outcomes? A review of the evidence and implications for the impact of the Personally Controlled Electronic Health Record (PCEHR). Australian Institute of Health Innovation, University of New South Wales. Sydney, July 2012.

Re-admission is more than twice as likely if more than one medication is unintentionally omitted from a discharge summary

2–3% of all hospital admissions are medication related and up to 30% of unplanned geriatric admissions are associated with Adverse medication events

Australian Commission for Safety and Quality in Healthcare, The Case for Medication Reconciliation, Presentation. December 2010
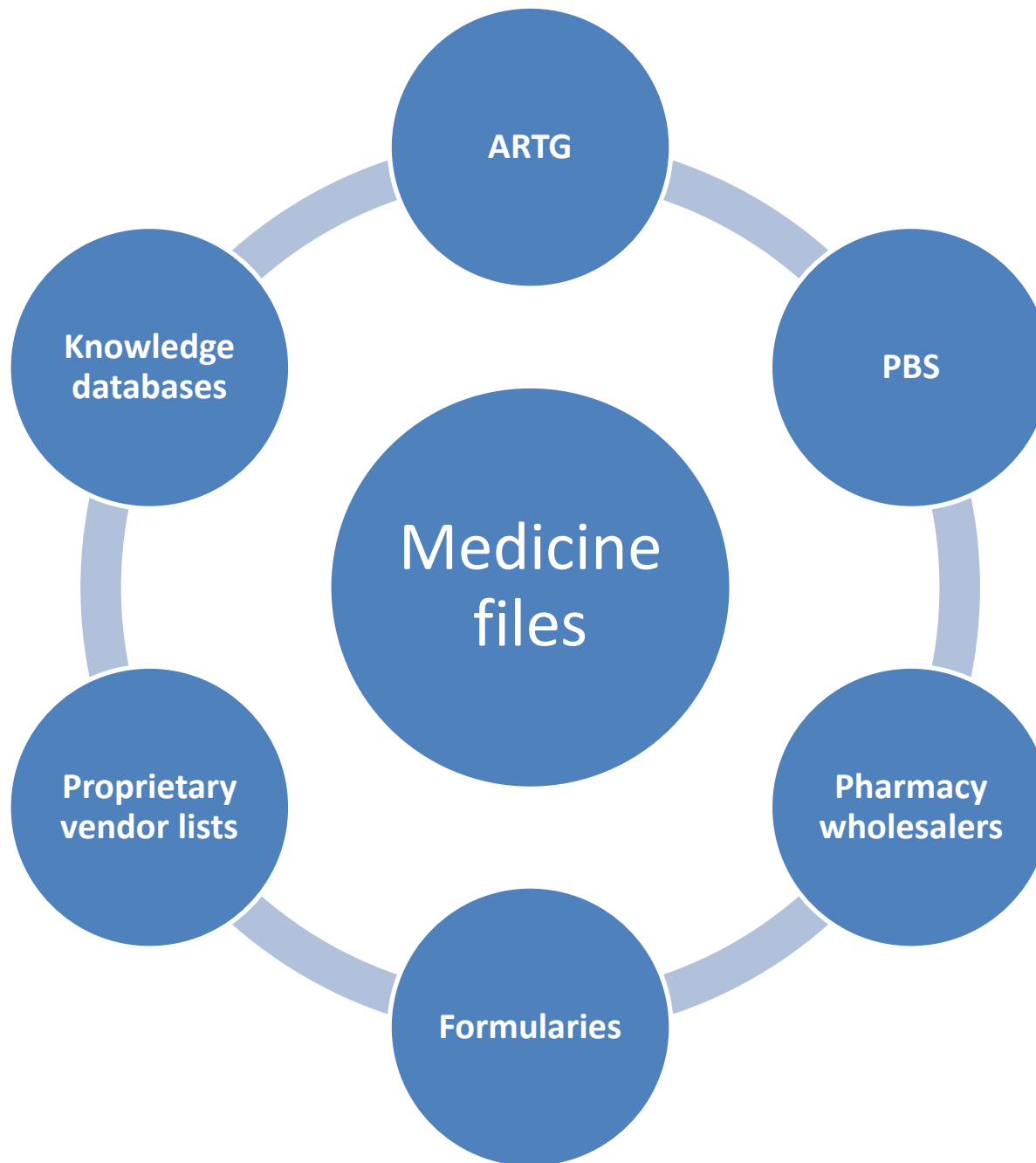
APO Pantoprazole 40mg Tablets, 30

or

Pantoprazole (Apotex) 40 mg tablet: enteric-coated, 30 tablets

Language

- guten morgen

buongiorno

- aloha kakahiaka

- selamat pagi

- bonjour

- buenos días

Language

- guten morgen

buongiorno

- aloha kakahiaka

- selamat pagi

- good morning

- bonjour

- buenos días

That's what I mean

I feel

The water is   **COLD**

I have a

What are the benefits of terminology?

Don't write like this

"If you're stumped, why not write an illegible prescription and hope the pharmacist comes up with something?"

Twentieth century picture of interoperability
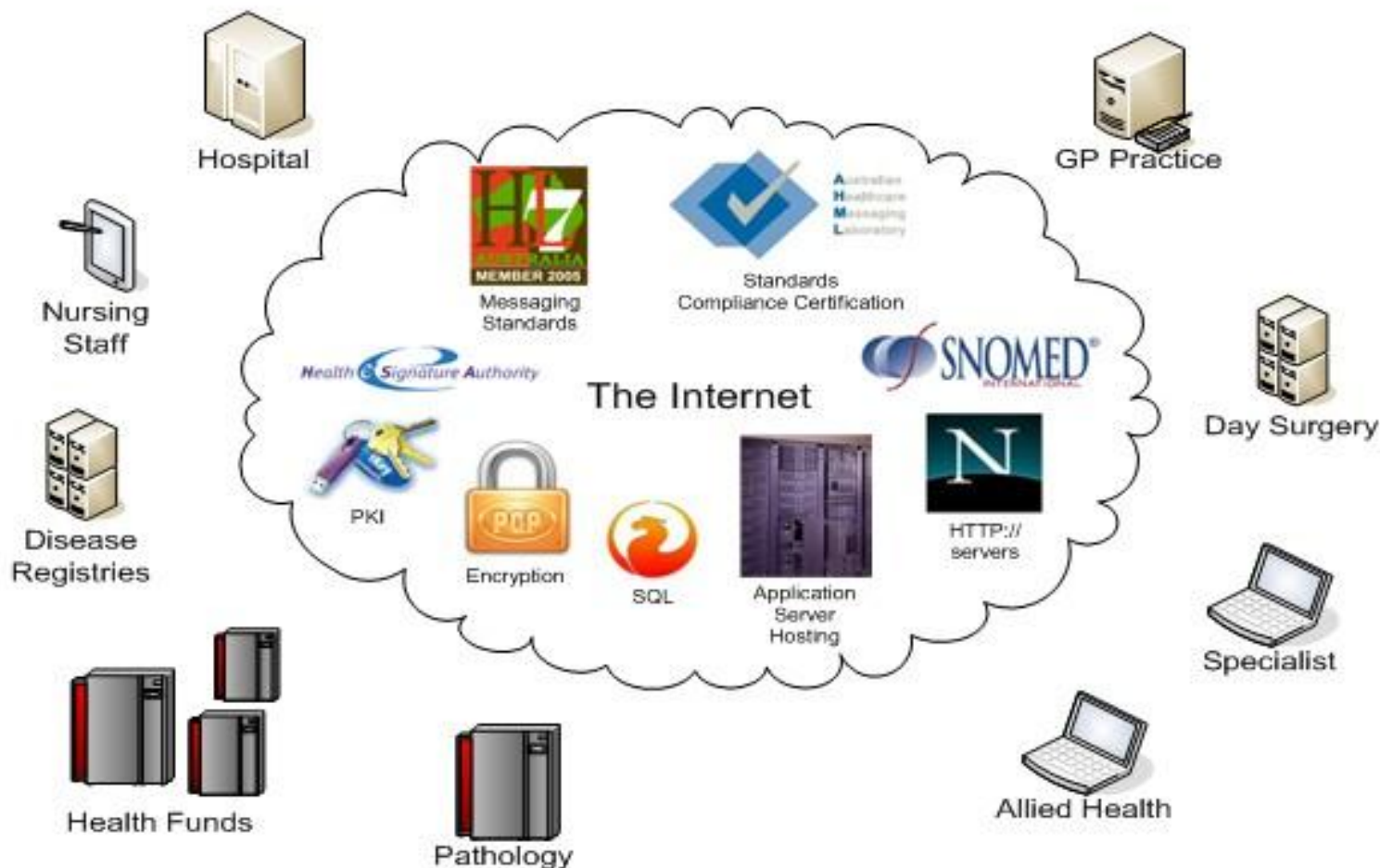
Benefits

- Improved data quality

- Enables unambiguous communication and interpretation across different healthcare settings

- Better ability to monitor patient care and clinical outcomes through the care continuum

- Supporting interoperability between clinical systems

- More efficient updates of clinical information, facilitating improved workflow;

- Better aggregation and re-use of information for population health/epidemiology, policy & Strategy, research and education purposes.

What have we achieved?

Design

Development

Maintenance

Design

Objectives

Use cases / requirements

Model design

Editorial Rules & technical documentation

Scope

Collaboration/user engagement

Review and evaluate existing standards

Objective

- Standardised medicines terminology universally used throughout the healthcare system.
- Communicate medicinal information without loss of detail or change to meaning.
- achieve semantic interoperability – "ability of computer systems to communicate and exchange data with unambiguous, shared meaning".
- Support effective and consistent clinical recording of medicinal data to improve patient care.

AMT overview

- AMT is a systematically organised computer readable collection of medicinal terms.

- Modeled according to international terminology SNOMED CT.

- Delivers standardised identification of brand (trade) products and equivalent generic medicines along with associated components.

- Standard naming conventions defined by editorial rules.

AMT is not...

- A classification system.

- Memorisable – meaningless identifiers.

- Just for human readership.

- Able to be printed out and used like a book.

- Replacing or displacing other instruments.

Use Cases / requirements

Provide medicines terminology for implementation in clinical information systems to support:

- Prescribing
- Recording
- Review
- Issue – including dispense
- Administration
- Transfer of information

Clinical Scenarios

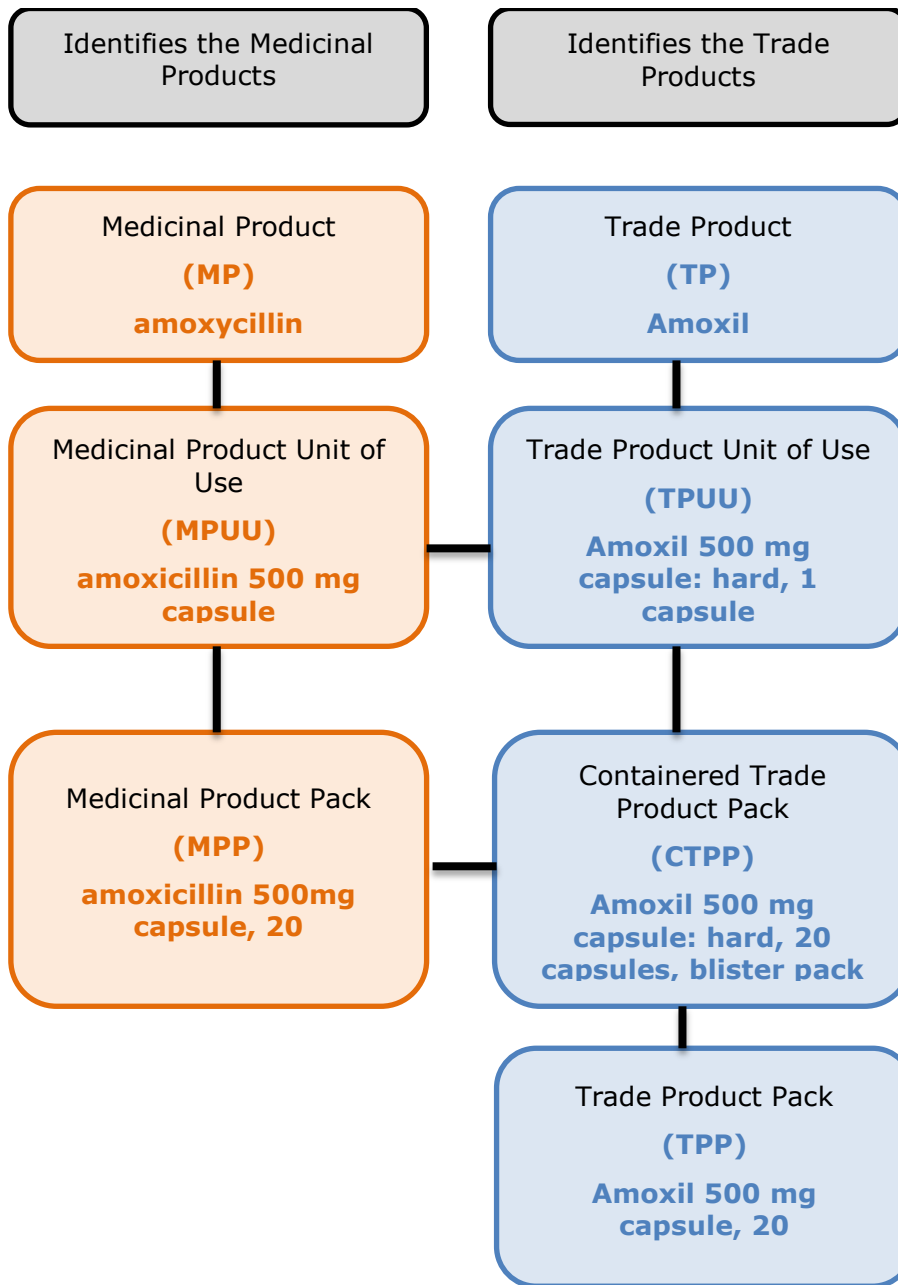| AMT concept groups	Prescribe	Record	Review	Issue (including dispense)	Administer	Transfer of information
Medicinal Product (MP)	✔	✔	✔			✔
Medicinal Product Pack (MPP)	✔	✔	✔			✔
Medicinal Product Unit of Use (MPUU)	✔	✔	✔			✔
Trade Product (TP)		✔	✔			✔
Trade Product Pack (TPP)	✔	✔	✔	✔		✔
Trade Product Unit of Use (TPUU)	✔	✔	✔	✔	✔	✔
Containered Trade Product Pack (CTPP)	✔	✔	✔	✔		✔

Model Design

Based on previous work undertaken prior to the establishment of NEHTA including:

- UK Dictionary of Medicines and Devices (dm+d)

- Australian Medicines and Devices Terminology developed by the Department of Health and Ageing in conjunction with HL7 Australia and New Zealand (Sep 2004)
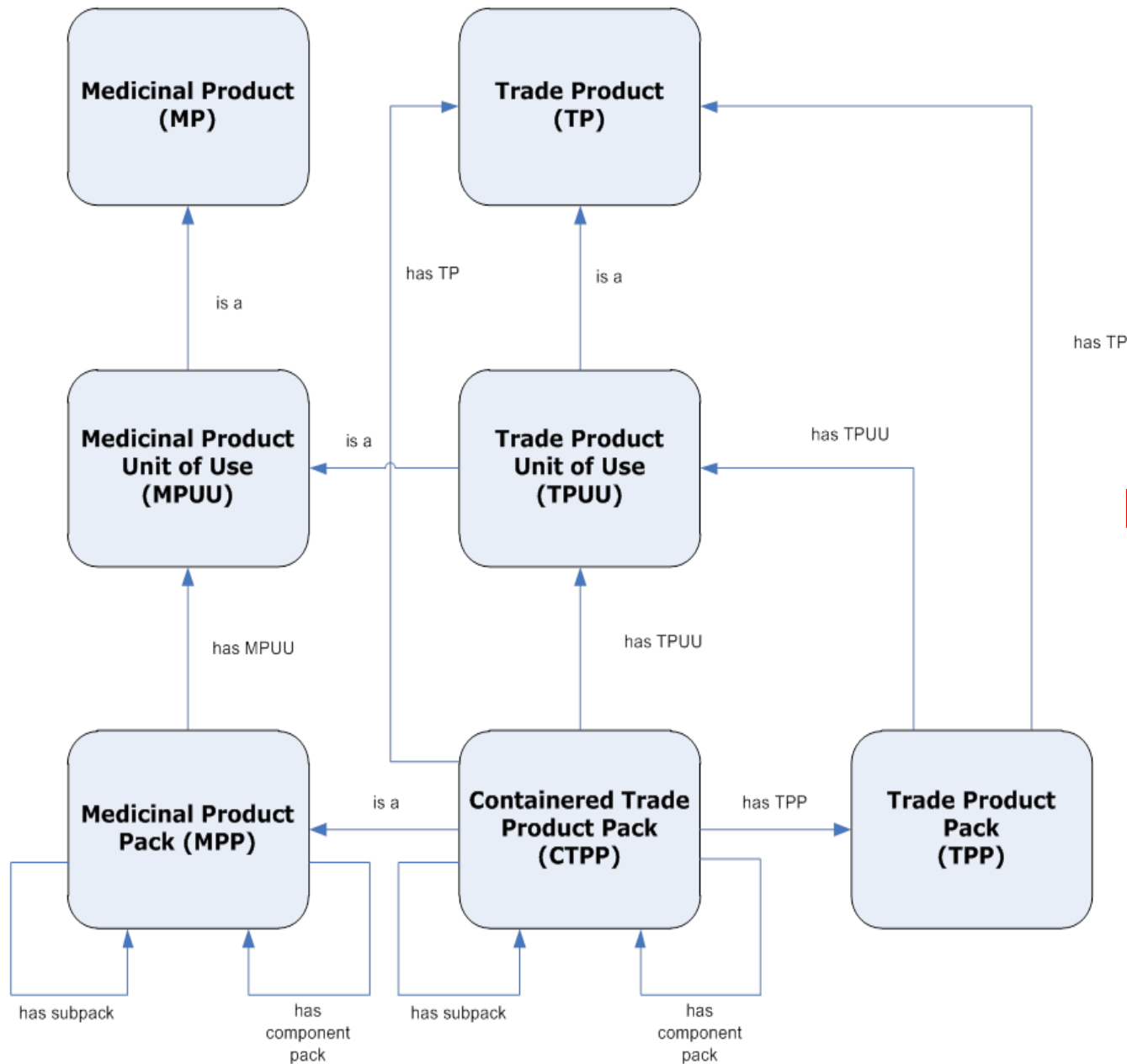
- SNOMED CT

AMT Components

Consists of

- concepts
- descriptions
- relationships
- Identifiers (codes)

Relational Model

Identifies the Medicinal Products

Identifies the Trade Products

Medicinal Product
(MP)
amoxycillin

Trade Product
(TP)
Amoxil

Medicinal Product Unit of Use
(MPUU)
amoxicillin 500 mg capsule

Trade Product Unit of Use
(TPUU)
Amoxil 500 mg capsule: hard, 1 capsule

Medicinal Product Pack
(MPP)
amoxicillin 500mg capsule, 20

Containered Trade Product Pack
(CTPP)
Amoxil 500 mg capsule: hard, 20 capsules, blister pack

Trade Product Pack
(TPP)
Amoxil 500 mg capsule, 20

Relationships

Editorial Rules

Focus on the naming conventions and rules associated with all description types for concepts in the AMT model.

| Rule ID	Description
AMT-MP-PT-5	The sequence of ingredients in the Medicinal Product Preferred Term will, by default, be based on the alphabetic order of the ingredient names. However, if every MPUU associated with one of the components of the MP (either through the ⬚MPUU is a MP" relationship, or through the two relationships ⬚MPP is a MP" and ⬚MPP has MPUU") has the same ⬚PreferredTermOrder" for the corresponding ingredients, then this order is used instead. EXCEPTION The order sequence for multi-ingredient products will be alphabetical, unless an altered sequence is determined as in Appendix C:. This will be developed on a case-by-case basis. The complete list of exceptions may be found in Appendix C:, Section C.6. Example: MP FSN is codeine + paracetamol MP PT is paracetamol + codeine MP FSN is clavulanic acid + ticarcillin MP PT is ticarcillin + clavulanic acid

Content - Terminology or Information?

- Product name, e.g. Panadol
- Clinical indication
- Pack size
- Strength
- Dose Form
- Unit of use
- Adverse reaction
- Relationships between concepts
- Availability

- Synonyms
- Identifier code
- Drug interaction
- Allergy class
- Dose
- Generic name, e.g. Paracetamol
- Contraindication
- Subsidy
- Container
- Price

Terminology *vs.* Information

- Wide range of knowledge about medicines not included in a medicines terminology.

- Terminology information must always, necessarily be 'true' (i.e. definitional) e.g. product name, active ingredients, strength, form, pack size, unit of use, container.

- Some information may change over time e.g. dosage, interactions, indications, contraindications, adverse reactions.

- This knowledge not included in terminology, but can be linked to product descriptions within the terminology.

Scope

- Registered items and listed items from the Australian Register of Therapeutic Goods

- All items included on Pharmaceutical Benefits Scheme and Repatriation Pharmaceutical Benefits Scheme inclusive of medical devices and nutritionals.

AMT December 2012
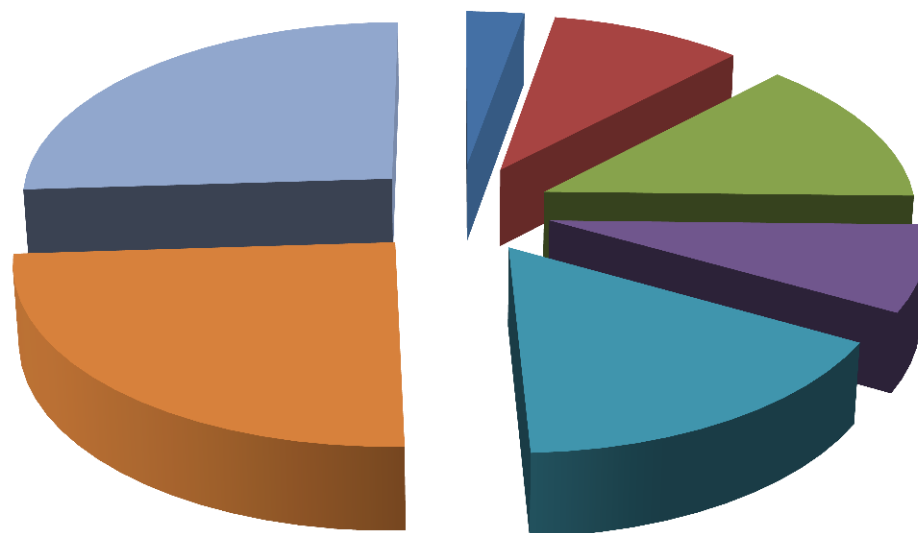
- Medicinal Product (1738)
- Medicinal Product Unit of Use (5805)
- Medicinal Product Pack (8160)
- Trade Product (4827)
- Trade Product Unit of Use (10054)
- Trade Product Pack (15258)
- Containered Trade Product Pack (16098)

Total product concept count 61,940

Stakeholder engagement

- Clinicians

- Health informaticians

- Software vendors

- Government

- Medicine information data providers

- Standards & peak industry organisations

- Health boards

- Encompassed Australia and New Zealand

What have we achieved?

Design

Development

Maintenance

Development

Source data

Tools

Resources

Testing

Release strategies

Safety/external review

Documentation including Quality Plan

Governance

How is it created?

Australian Medicines Terminology

File Edit View Insert Format Tools Data Window Help — Type a question for help

Arial — 10

B1 · ƒx ARTG_ID

Number	ARTG_ID	ARTG_LABEL_NAME	PRODUCT_ID	PRODUCT_NAME	COMPONENT_ID	COMPONENT_DESCRIPTION	COMPONENT_DOSAGE_FORM_CODE	COMPONENT_DOSAGE_FORM_DESCRIPTION	PROPRIETARY_DOSAGE_FORM	OTHER_IDENTIFYING_INFORMATION	TOTAL_PACK_QTY	PACK_QTY_UNITS	SIZE_UNITS	SIZE_UNITS	NUMBER_OF_SUBPACKS	NUMBER_OF_UUS_PER_SUBPACK
AMT-TGA	135726	NEXIUM esomeprazole 10 mg (as magnesium trihydrate) enteric coated granules for oral suspension sachet	301693	NEXIUM esomeprazole 10 mg (as magnesium trihydrate) enteric coated granules for oral suspension sachet	247769	enteric coa	GRNENT	Granules, enteric-coated			30	sachets				
AMT-TGA	155842	ONDANSETRON ALPHAPHARM ondansetron (as hydrochloride) 4 mg/2 mL solution for injection ampoule	294293	ONDANSETRON ALPHAPHARM ondansetron (as hydrochloride) 4 mg/2 mL solution for injection ampoule	241560	ONDANSE	INJSOL	Injection, solution			9999	ampoules	2	mL		
AMT-TGA	155843	ONDANSETRON ALPHAPHARM ondansetron (as hydrochloride) 8 mg/4 mL solution for injection ampoule	294294	ONDANSETRON ALPHAPHARM ondansetron (as hydrochloride) 8 mg/4 mL solution for injection ampoule	241561	ONDANSE	INJSOL	Injection, solution			9999	ampoules	4	mL		
AMT-TGA	113622	STYPTIC PENCIL tube	193065	STYPTIC PENCIL tube	141415	Medicine C	STICK	Stick			5	g				
Maintenan	10002966	Isoleucine 1000 Amino Acid Supplement (ISOLEUCINE with CARBOHYDRATE), Sachets 4 g containing 1 g isoleucine, 30	10002978	Isoleucine 1000 Amino Acid Supplement (ISOLEUCINE with CARBOHYDRATE), Sachets 4 g containing 1 g isoleucine, 30	10002979		ORLPWD	Oral Liquid, powder for			30	sachets	4	g		
Maintenan	10002967	Valine 1000 Amino Acid Supplement (VALINE with CARBOHYDRATE), Sachets 4 g containing 1 g valine, 30	10002975	Valine 1000 Amino Acid Supplement (VALINE with CARBOHYDRATE), Sachets 4 g containing 1 g valine, 30	10002976		ORLPWD	Oral Liquid, powder for			30	sachets	4	g		
Maintenan	10003745	Arginine 2000 Amino Acid Supplement Arginine with Carbohydrate, Sachets 4 g	10003749	Arginine 2000 Amino Acid Supplement Arginine with Carbohydrate, Sachets 4 g	10003753		ORLPWD	Oral Liquid, powder for			30	sachets	4	g		
Maintenan	10000258	PKU Lophlex LQ (AMINO ACID FORMULA with VITAMINS and MINERALS without PHENYLALANINE), Oral liquid 125 mL, 30	10003789	Lophlex LQ (AMINO ACID FORMULA with VITAMINS and MINERALS without PHENYLALANINE), Oral liquid 125 mL, 30	10003790		ORLSOL	oral liquid			30	cans	125	mL		
Maintenan	10002609	PKU Lophlex LQ 10 (AMINO ACID FORMULA with VITAMINS and MINERALS without PHENYLALANINE), Oral liquid 62.5 mL, 60	10003792	Lophlex LQ 10 (AMINO ACID FORMULA with VITAMINS and MINERALS without MINERALS without	10003793		ORLSOL	Oral Liquid, solution			60	cans	62.5	mL		

New_Product_Component_Final_R02

Ready — NUM

	A	B	C	AQ	AR	AS	AT	AU	AV	AW	AX	AY	BA	BB	BC	BD
1	Source	ARTG_ID	ARTG_LABEL_NAME	BASE_ DENOMI NATOR_ STRENG TH_ VALUE	BAS E_ DEN OMI NAT OR	AMT_ID_ AP	AP_INGREDIENT_ NAME	ACTIVE_ MOIETY_I D	OTHER_ STRENG TH_ REPRES ENTATIO N	PREFER RED_STR ENGTH_ REPRES ENTATIO N	PR EF ER RE D_ T	Biotech Descriptor	Product Type	Delete for PBS Oct 2007		
11476	AMT-TGA_Diff_2.22	97971	VAXIGRIP JUNIOR inactivated influenza vaccine (split virion) 0.25mL solution for injection syringe			6565	A/California/7/2009 (H1N1) - like strain (A/California/7/2009 (NYMC X-181))	1000742		N	1		PI=Base=BOSS			
11477	AMT-TGA_Diff_2.22	97971	VAXIGRIP JUNIOR inactivated influenza vaccine (split virion) 0.25mL solution for injection syringe			6624	A/Perth/16/2009 (H3N2) - like strain (A/Victoria/210/2009 (NYMC X-187))	1000785		N	2		PI=Base=BOSS			
11478	AMT-TGA_Diff_2.22	97971	VAXIGRIP JUNIOR inactivated influenza vaccine (split virion) 0.25mL solution for injection syringe			6567	B/Brisbane/60/2008 - like strain (B/Brisbane/60/2008)	1000744		N	3		PI=Base=BOSS			
11479	Maintenance 2.22	10001894	Tensocrepe 36300501 (BANDAGE-RETENTION-COTTON CREPE), Bandage 5 cm x 2.3 m	2.3	m	6205	bandage retention cotton crepe	1000429	5 cm x 2.3 m	A			PI=Base=BOSS			
11480	Maintenance 2.22	10001906	Tensocrepe 36301001 (BANDAGE-RETENTION-COTTON CREPE), Bandage 10 cm x 2.3 m	2.3	m	6205	bandage retention cotton crepe	1000429	10 cm x 2.3 m	A			PI=Base=BOSS			
11481	Maintenance 2.22	10001902	Tensocrepe 36307501 (BANDAGE-RETENTION-COTTON CREPE), Bandage 7.5 cm x 2.3 m	2.3	m	6205	bandage retention cotton crepe	1000429	7.5 cm x 2.3 m	A			PI=Base=BOSS			
11482	AMT-TGA_Diff_2.22	144670	AGRIPPAL inactivated influenza (surface antigen) vaccine injection pre-filled syringe			6624	A/Perth/16/2009 (H3N2) - like strain (A/Victoria/210/2009 (NYMC X-187))	1000785		N	2		PI=Base=BOSS			
11483	AMT-TGA_Diff_2.22	144670	AGRIPPAL inactivated influenza (surface antigen) vaccine injection pre-filled syringe			6567	B/Brisbane/60/2008 - like strain (B/Brisbane/60/2008)	1000744		N	3		PI=Base=BOSS			
11484	Maintenance 2.22	10002966	Isoleucine 1000 Amino Acid Supplement (ISOLEUCINE with CARBOHYDRATE), Sachets 4 g containing 1 g isoleucine, 30			6267	isoleucine with carbohydrate	1000491	containing 1 g isoleucine	A			PI=Base=BOSS			
11485	Maintenance 2.22	10002967	Valine 1000 Amino Acid Supplement (VALINE with CARBOHYDRATE), Sachets 4 g containing 1 g valine, 30			6279	valine with carbohydrate	1000503	containing 1 g valine	A			PI=Base=BOSS			
11486	Maintenance 2.22	10003745	Arginine 2000 Amino Acid Supplement Arginine with Carbohydrate, Sachets 4 g			6528	arginine with carbohydrate	1000717	containing 2 g arginine	A			PI=Base=BOSS			
11487	Maintenance 2.22	10000258	PKU Lophlex LQ (AMINO ACID FORMULA with VITAMINS and MINERALS without PHENYLALANINE), Oral liquid 125 mL, 30			6260	amino acid formula with vitamins and minerals without phenylalanine	1000484		N			PI=Base=BOSS			
			PKU Lophlex LQ 10 (AMINO ACID FORMULA with				amino acid formula with									

Resources

- Spreadsheets
- ACE workbench (customised version)
- Business rules
- Terminology analysts
- Data administrator / analysts
- Programmers
- Build/release team
- Test team
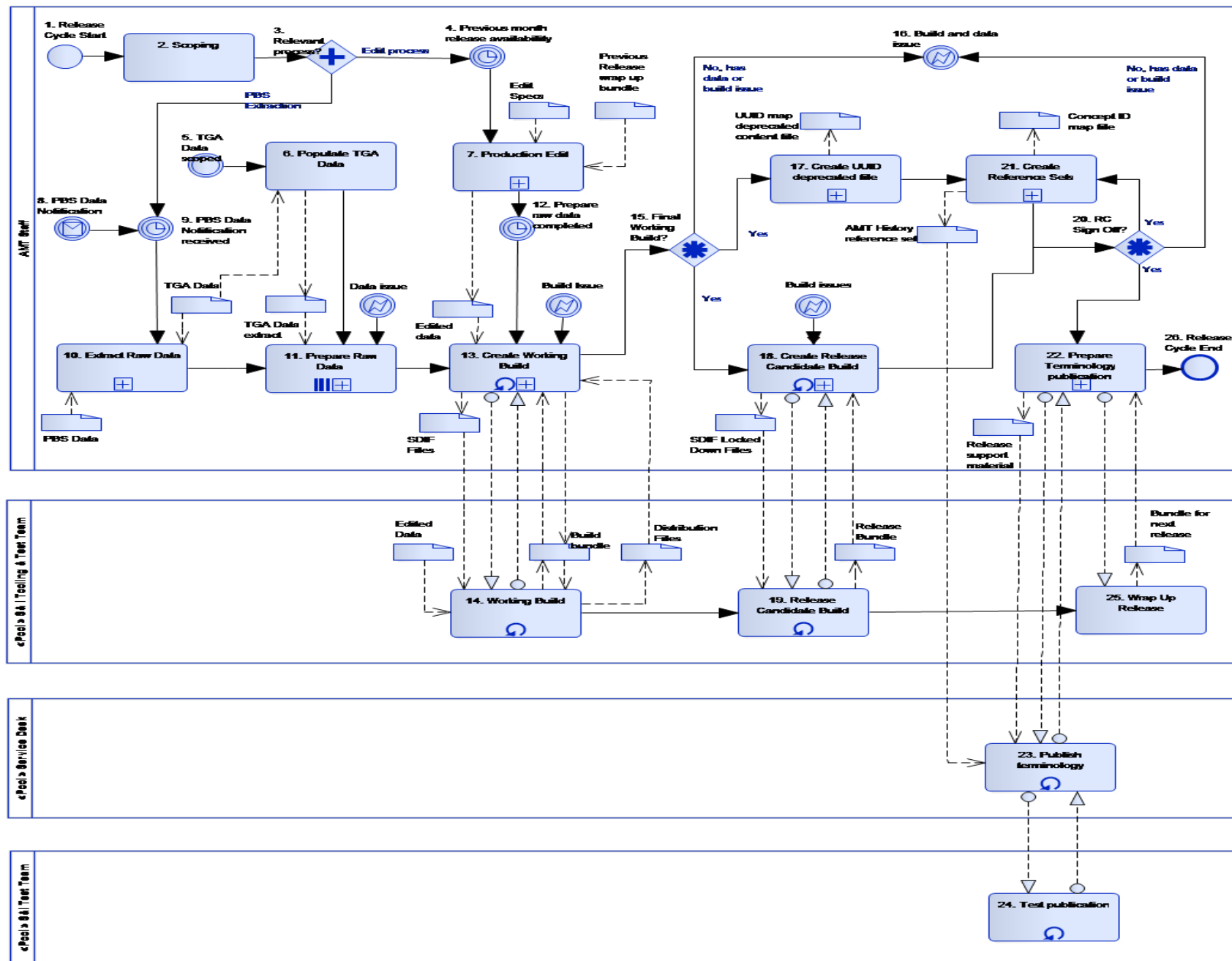
End-to-End Process

Data entry

- Single or dual

- Dual independent review

- Quality plan

- Sign off – including clinical safety

Build files– transformation of data

- Dual independent review of terms

- QA Reports

Release

BPMN AMT Release Cycle Process End to End

AMT Staff

1. Release Cycle Start
2. Scoping
3. Relevant process?
4. Previous month release availability
Edit process
PBS Extraction

Edit Specs
Previous Release wrap up bundle

5. TGA Data scoped
6. Populate TGA Data
7. Production Edit

16. Build and data issue
No, has data or build issue

UUID map deprecated content file
17. Create UUID deprecated file

Concept ID map file
21. Create Reference Sets

No, has data or build issue

8. PBS Data Notification
9. PBS Data Notification received

12. Prepare raw data completed
15. Final Working Build?
Yes

AMT History reference set

20. RC Sign Off?
Yes
Yes

TGA Data
TGA Data extract
Data issue

Edited data
Build Issue
Yes

Build issues
Yes

10. Extract Raw Data
11. Prepare Raw Data
13. Create Working Build

18. Create Release Candidate Build
22. Prepare Terminology publication

26. Release Cycle End

PBS Data

SDIF Files

SDIF Locked Down Files

Release support material

«Pool» B&I Tooling & Test Team

Edited Data
Build bundle
Distribution Files
Release Bundle
Bundle for next release

14. Working Build
19. Release Candidate Build
25. Wrap Up Release

«Pool» Service Desk

23. Publish terminology

«Pool» B&I Test Team

24. Test publication

Release

- Distributed via dedicated website with secure login

- Provided under the Licence agreements

- Released monthly since 2007

- Viewer/Terminology browser

- RSS feeds / Emails

- Release / supporting documentation including

What does AMT look like?

AMT browser

National E-Health Transition Authority
www.nehta.gov.au

What have we achieved?

Design

Development

Maintenance

Maintenance

Governance

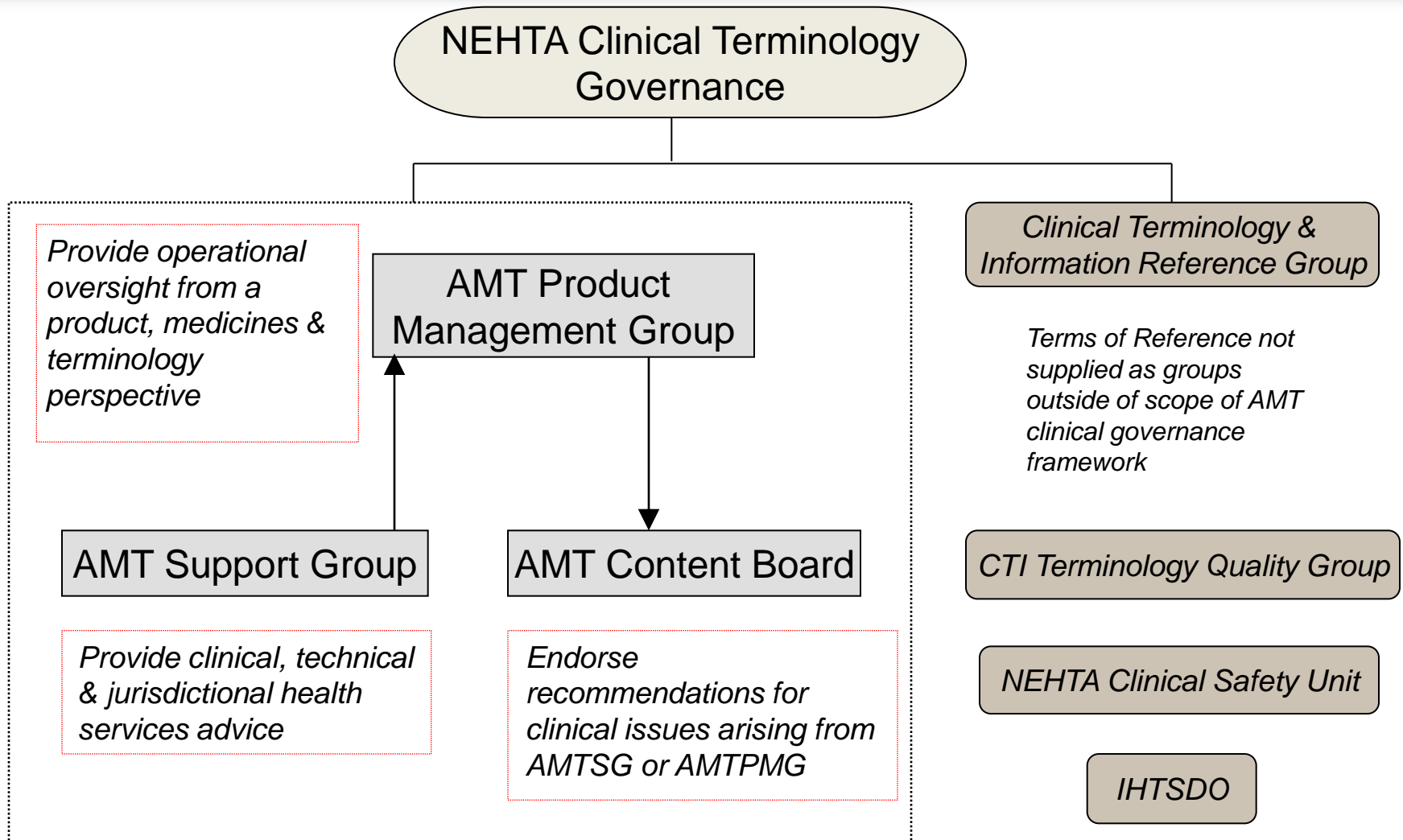Safety/CCA/service desk

User engagement/survey/workshops

Resources

Implementation support / documentation

Roadmap

National eHealth strategic initiatives

Model review

AMT Governance

NEHTA Clinical Terminology Governance

AMT Product Management Group

Provide operational oversight from a product, medicines & terminology perspective

Clinical Terminology & Information Reference Group

Terms of Reference not supplied as groups outside of scope of AMT clinical governance framework

AMT Support Group

Provide clinical, technical & jurisdictional health services advice

AMT Content Board

Endorse recommendations for clinical issues arising from AMTSG or AMTPMG

CTI Terminology Quality Group

NEHTA Clinical Safety Unit

IHTSDO

Maintenance

Governance

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