Supporting SNOMED-CT implementation through a Solution Capability Matrix

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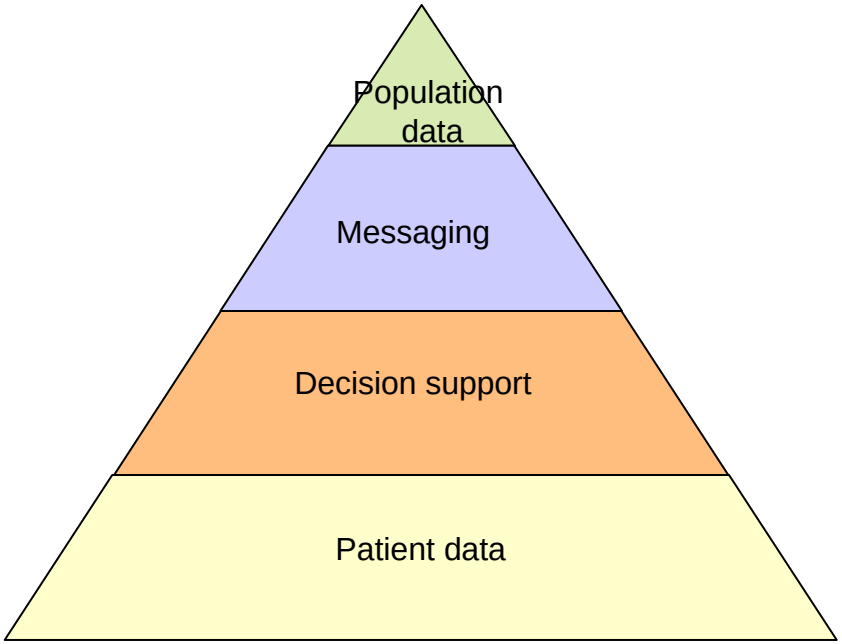
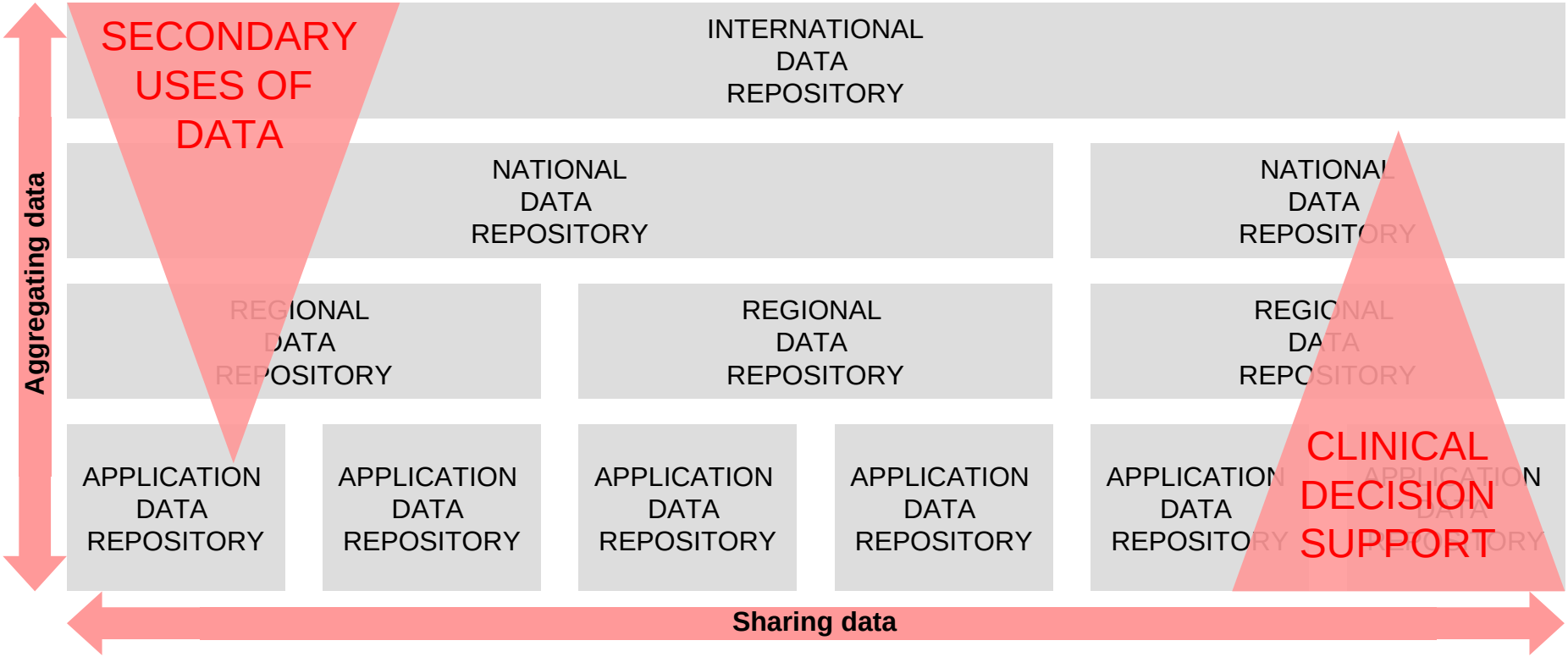
Introduction to SNOMED-CT

- International medical terminology used to encode clinical data in electronic patient records
- In 2006
  - 400,000 healthcare concepts
  - over 1 million descriptions
  - nearly 1.5 million semantic relationships
- As with all clinical terminology it is, and will always be, a work in progress



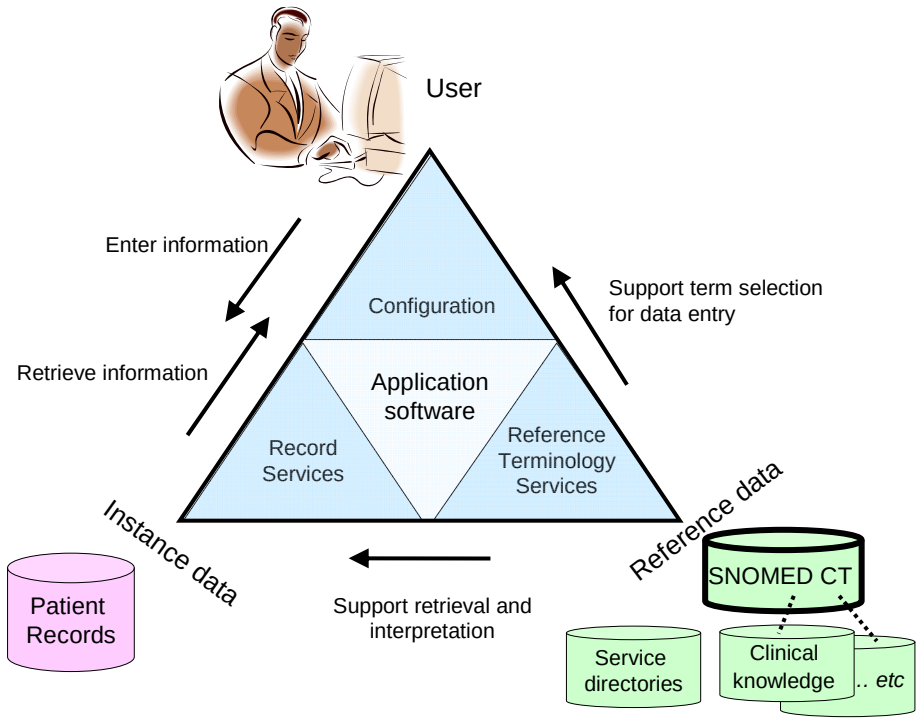
SNOMED-CT use

Vision of SNOMED-CT use



SNOMED-CT is the foundation stone for achieving the vision of continually improving healthcare outcomes and efficiencies by enabling communication and data analysis at patient, local, national and international levels

SNOMED-CT in single organisation



In supporting clinical practice, several different applications are used and these may be separately configured for users in different specialties and disciplines.

The role of SNOMED CT is to enable processable representation of meaning in forms that can be shared between a diverse range of disciplines, specialties and software applications.

Failure to adopt & standardise SNOMED-CT use, will impact on:

- *safe interchange of clinical information*
- *decision support to provide consistent responses for safer care*
- *use of data for research, healthcare improvement and commissioning*

SNOMED-CT lessons learnt

- SNOMED-CT has developed extensively at a pace separate from that of the vast majority of end users and products
- The lessons learnt from implementation projects have highlighted significant variation between solution capabilities and user expectations
- Now we have a better understanding of what factors impact on success, including the need
  - to address what a “SNOMED-CT enabled”, or a “SNOMED-CT supporting” application actually means
  - for cross-vendor consistency and convergence of terminology support

We have learnt a lot from current and past implementation projects

Supporting software vendors

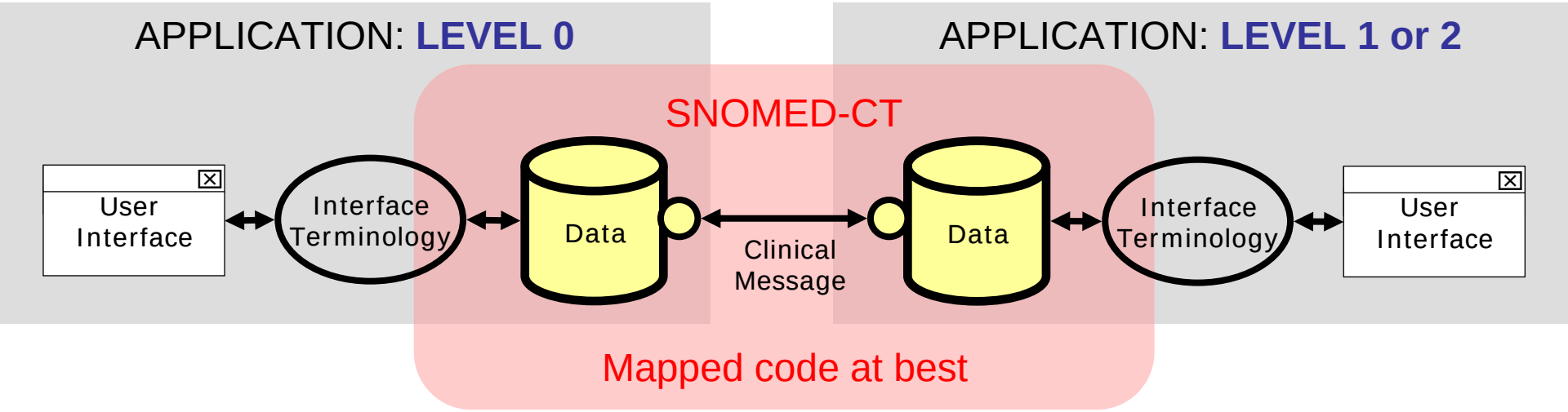
- The adoption of SNOMED-CT will, by necessity, be incremental
- In this extended implementation period, solution providers will need to support workarounds such as maintaining separate clinical terming and classification coding processes
- Therefore, there will be a mixed population of systems and users that either can or cannot support SNOMED-CT
- This will present new problems

A Solution Capability Matrix is required to support software vendors to promote communication & understanding between stakeholders

Solution Capability Matrix

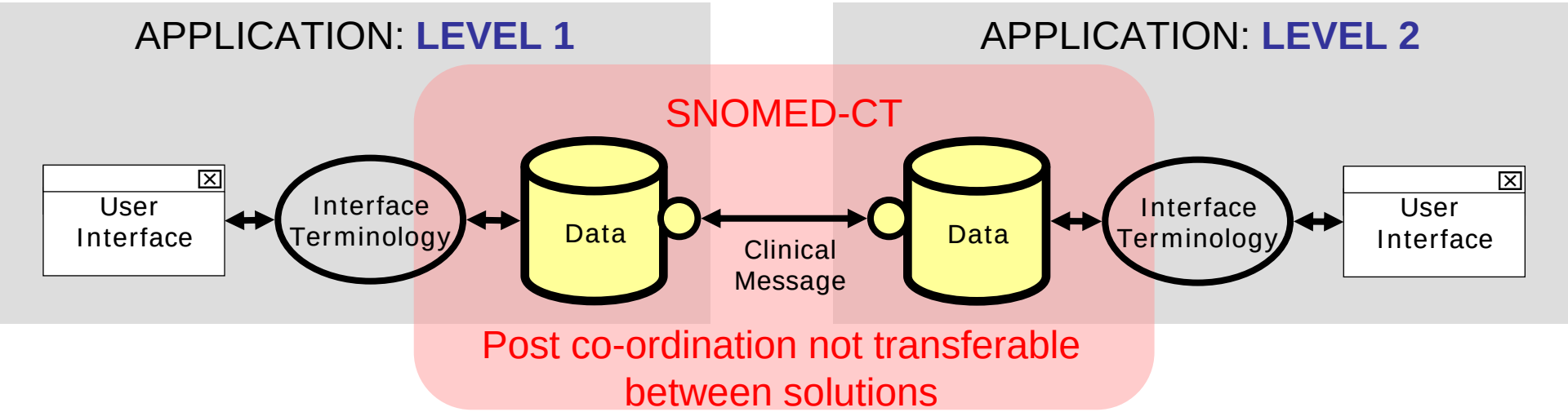
L0	Systems do not internally support SCT. They may not be capable of working in a SCT world at all, or may be provided with a mapping function to map outbound messages containing local codes into messages containing SCT codes to support communication with other systems or for reporting.
L1	Systems support SCT internally but with restrictions, which may include shortened descriptions, restricted subsets of terms and limited hierarchical browsing. They will not support inbound post-coordinated expressions. Most existing systems with some SCT support would be in this category. Some systems have pushed the upper limits but require extensive maintenance overhead to maintain pre-coordinated ('ready defined') terms in line with needs.
L2	Systems support post-coordinated expressions and can communicate with other Level 2 systems using messages containing post-coordinated expressions (which adds additional qualifiers to 'terms' to improve clinical detail). They may have many styles of user interface to support different users and user contexts (eg nurses on wards, surgeon in theatre) and their requirements to add information to patient records. These systems would also be able to exploit the encoded data within decision support rules. With its ability to store detail and fully interoperate with similarly supportive systems, level 2 would need substantive development of the existing solutions in terms of user interfaces, processing and database structures, to support the encoded data meaningfully. They also need configuration tools to enable the system to relate to the appropriate SCT subsets and, inbuilt maintenance processes to respond to changes in

Solution Capability Matrix: Level 0



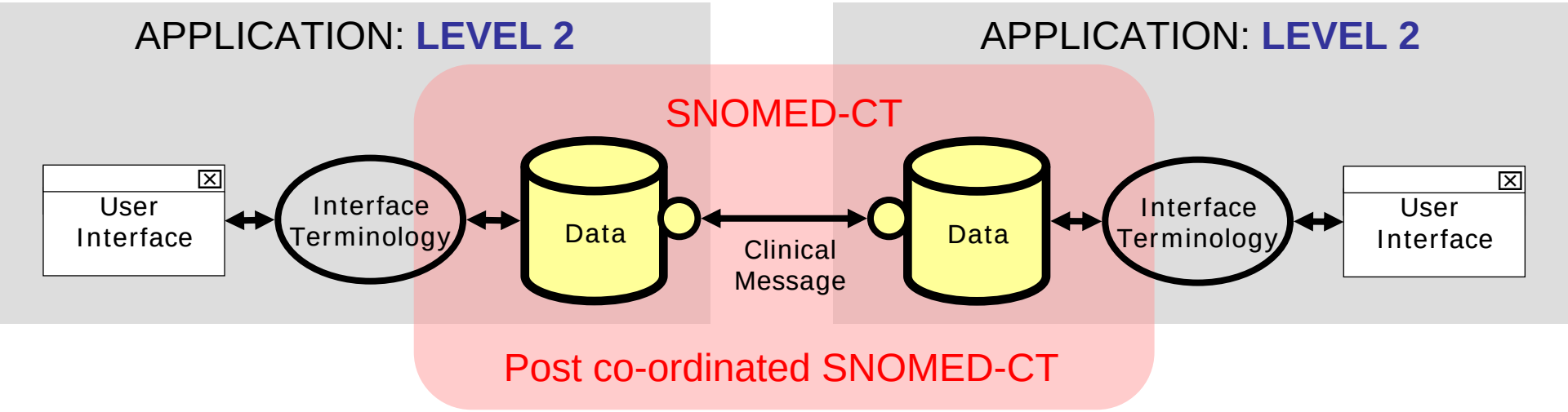
- Systems do not internally support SNOMED-CT
- Systems may not be capable of working in a SNOMED-CT world as they have not been designed and built around a terminology as large and as complex as SNOMED-CT
- Systems may be provided with a mapping function to map outbound messages containing local codes into messages containing SNOMED-CT codes to support communication with other systems or for reporting
- Post co-ordination is impossible and mapping restricted
- Sharing of termed data, and semantic granularity is limited
- Decision support is limited to the lowest level of system in which data is held
- Level 0 solutions cannot be readily engineered to become Level 1

Solution Capability Matrix: Level 1



- Systems support SNOMED-CT internally but with restrictions
  - e.g. shortened descriptions, restricted subsets, limited hierarchical browsing
- Systems will not support inbound post-coordinated expressions
- Most existing systems offering some SCT support would be in this category
- Some systems have pushed the upper limits but require extensive maintenance overhead to maintain pre-coordinated ('ready defined') terms in line with needs
- Sharing of data and decision support using data from more than one system is compromised
- Level 1 solutions cannot be readily engineered to become Level 2

Solution Capability Matrix: Level 2



- Systems support post-coordinated expressions and can communicate with other Level 2 systems using messages containing post-coordinated expressions (which adds additional qualifiers to ‘terms’ to improve clinical detail)
- Systems will have potentially many styles of User Interface to support different users and user contexts (e.g. nurses on wards, surgeon in theatre) and their requirements to add information to patient records
- These systems would also be able to exploit the encoded data within decision support rules

Drivers for SNOMED-CT adoption

- The implementation of SCT requires software applications that exploit its features to meet the real and perceived needs of users. Users include those who enter or retrieve clinical information, who utilise population and other aggregated data. and those who design, commission and configure software for use in a particular clinical environment
- Increasingly the assumption of purchasers is that SCT is used as the common terminology which drives the clinical functionality within products. However the majority of systems and applications have not been designed around a terminology as large and complex as SCT
- An increasing user and customer demand for SCT based products will drive the vendor community to develop their products and their data models accordingly
- Those vendors who have made the investment in developing their products to use SCT at its core will be best placed to compete within this evolving market
- Electronic clinical record system providers or solutions who can support post co-ordinated SCT will still be constrained by the limitations of others, especially departmental solutions (pathology, radiology, pharmacy)

New SNOMED-CT based vendors will add their voice to the increasing demand for SNOMED-CT based solutions

Conclusions

- The effect of products with mixed capabilities in supporting SNOMED-CT, combined with disparate purchasers, timetables, political, economic and clinical imperatives, results in a complex mixture
- However utilising the proposed capability matrix enables understanding of the interplay, and interaction of each stakeholders' issues
- Software vendors need to
  - understand how they can achieve higher support for their products within a level, recognising the constraints imposed by that level.
  - determine the re-engineering required to provide an equivalent solution at a higher level
  - recognise that such a model can not constitute a roadmap for their products
- To achieve Level 2 and support the encoded data meaningfully will need substantive development of many solutions in terms of user interfaces, processing and database structures
- Care is required by all stakeholders when, in the future, local and national solutions comprise a mix of Level 0, 1 and 2 solution support.
  - Level 1 solutions cannot interoperate with messages from Level 2 solutions unless the Level 2 solutions comply with the restrictions imposed by each of the Level 1 solutions
  - At this stage solutions will be built around SNOMED-CT and will likely provide sophisticated native SNOMED-CT terminology services
  - Until that time sophisticated and iterative workarounds will need to be in place and utilised by all users

Only when all solutions are Level 2 will the full benefits of SCT be realised

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- **Related reading**
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