Ontology & Enterprise Architecture

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Enterprise Architecture

- ## Multi-Disciplinary
  - Policy, Process Modelling, Information, Data, Apps, Networks, etc.

- ## Different levels of abstraction
  - Types of people (posts), types of organization, types of systems, etc.
  - Actual systems, locations, etc.

- ## Need a way to
  - …say what exists, or what could exist
  - …tie it all together

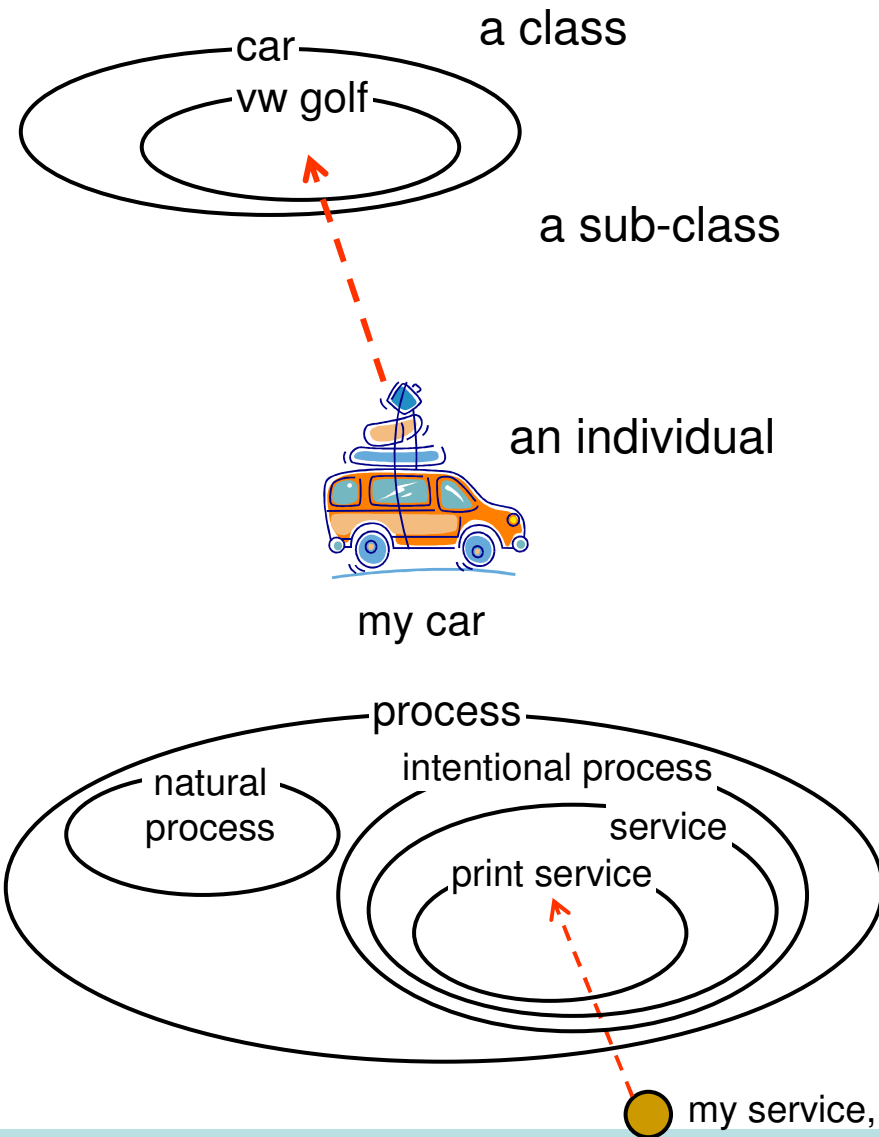model futures

EA & The Real World

- Very easy to say that EA is just about modelling
  - But, the models tend to describe actual systems, processes, etc.
  - Some aspects of an EA are "live" data – e.g. site data is business data to the facility managers
- Even models have impact on the daily business
  - Data models (which are usually part of the EA) are enable representation of the real world
  - Those same real world things may also be represented in other model – e.g. org structures, system deployments that are also part of the EA
- In other words, stratification of model and data is too simplistic an approach for EA

Business Architecture

IT

Technical Architecture

EA

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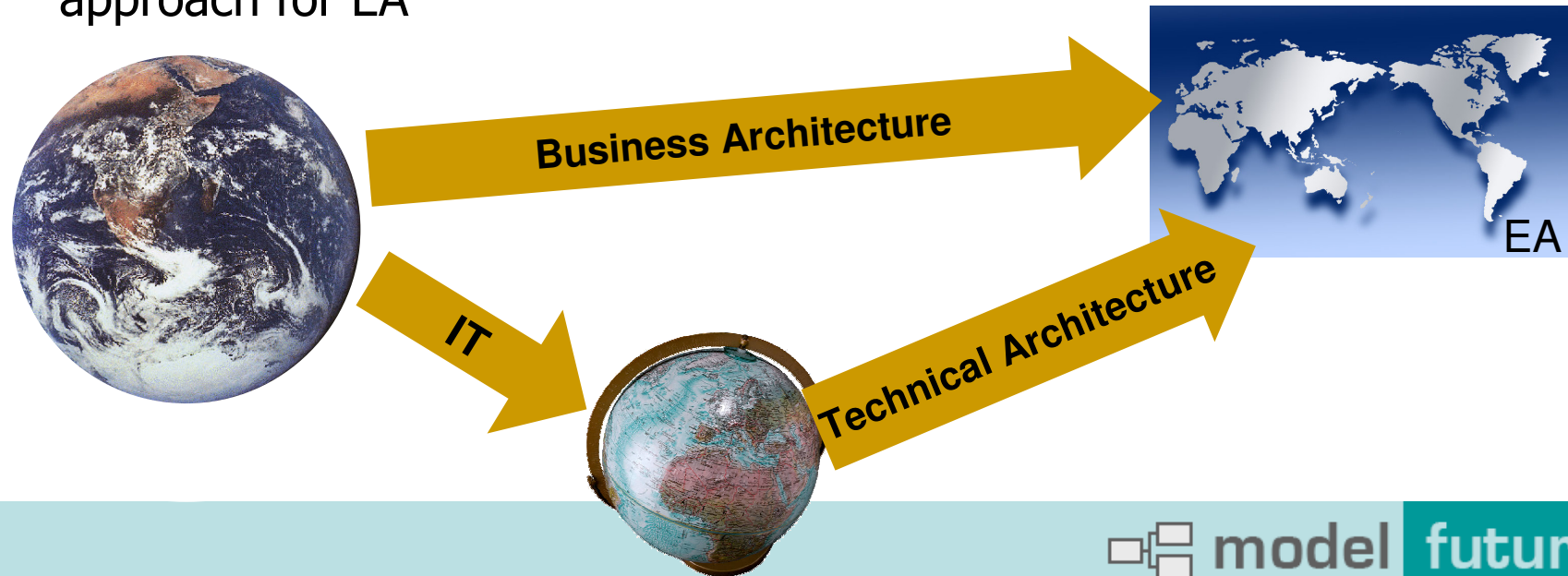
Ontology

- Currently much hype about ontology
  - But how much do people really understand about it ?
- There are two main types of ontology that appear in IT:
  - Formal ontology – usually based on AI concepts of machine "reasoning". Built for a purpose to enable a machine to make "decisions".
  - Philosophical ontology – using the best discoveries of mathematics and philosophy to create a model which best describes the things we're interested in
- The interest for EA is the latter, as we're seeking to have a common understanding

Key Ontological Concepts

car

a class

vw golf

a sub-class

an individual

my car

process

natural process

intentional process

service
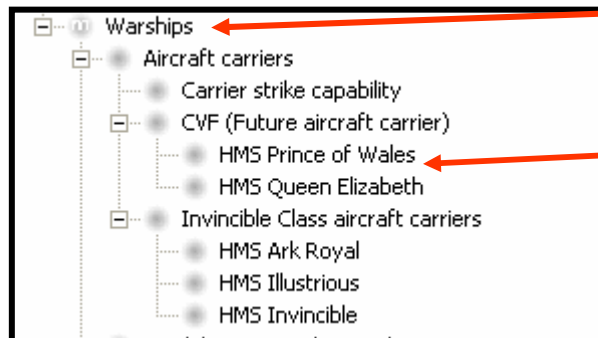
print service

my service, performed 13/11/06

- Useful to know a few terms before explaining more...

- Where would the service reference model fit ?
  - Classes of service
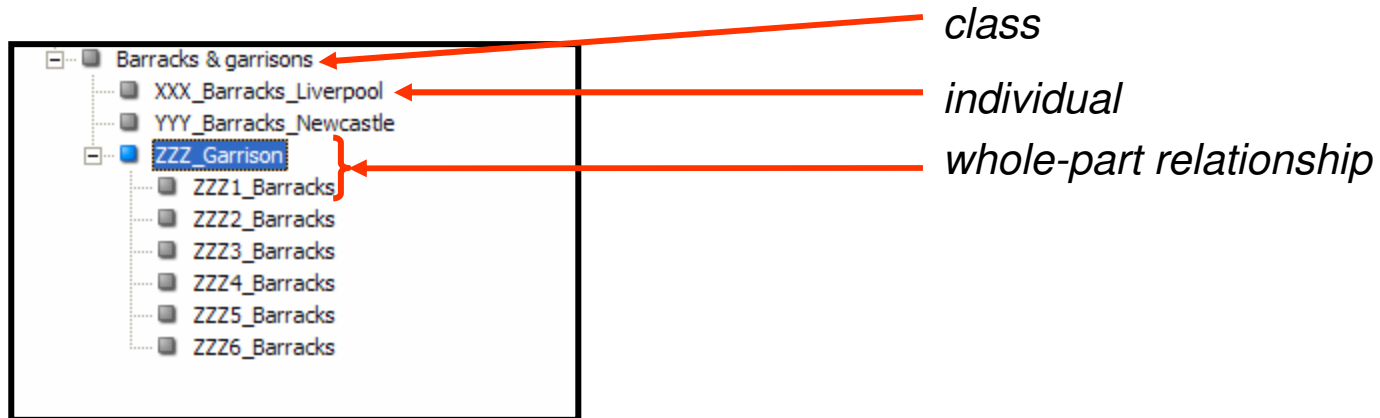 - Specialise from process

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Taxonomy

- But surely if we just need common understanding, all we need is a taxonomy ?
  - True up to a point, but all we then have are names, with no idea about their true meaning
  - A traditional taxonomy – e.g. IPSV or the UK Defence Taxonomy is a structure of broader and narrower terms:

class (i.e. type of thing)

individual (i.e. specific thing)

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Taxonomy & Ontology

Barracks & garrisons — *class*
- XXX_Barracks_Liverpool — *individual*
- YYY_Barracks_Newcastle
- ZZZ_Garrison — *whole-part relationship*
  - ZZZ1_Barracks
  - ZZZ2_Barracks
  - ZZZ3_Barracks
  - ZZZ4_Barracks
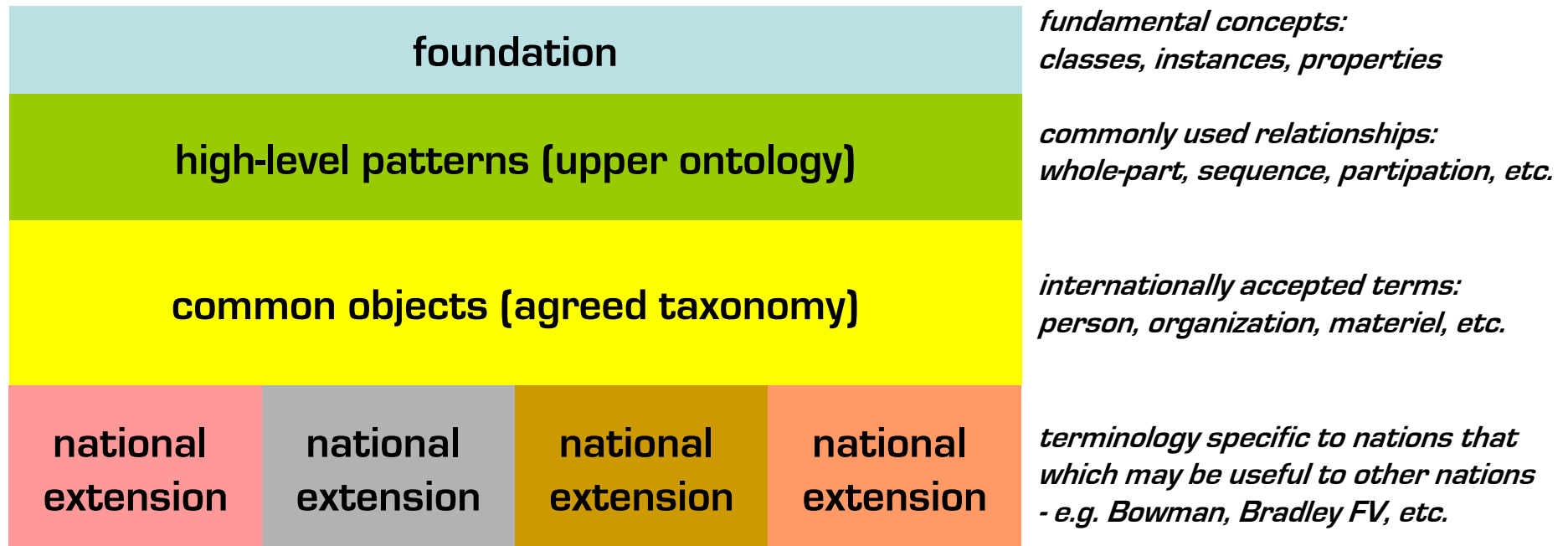 - ZZZ5_Barracks
  - ZZZ6_Barracks

- Above shows a typical taxonomy short-cut
- An ontology would distinguish between all of these.
- In addition, a well-founded ontology can provide a good deal more functionality

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IDEAS Group

- Consisting of representatives from the defence departments of four countries:
  - Australia, Canada, UK, USA
  - + Sweden and NATO as observers
- Goal is to develop a common model for interoperability of defence enterprise architecture
- Adopted the BORO Methodology

Structure

- Layered approach
  - Starting from first principles to ensure common understanding at the most fundamental level
  - Reaching down to country-specific definitions whose meaning may need to be understood by other nations

foundation	*fundamental concepts: classes, instances, properties*
high-level patterns (upper ontology)	*commonly used relationships: whole-part, sequence, partipation, etc.*
common objects (agreed taxonomy)	*internationally accepted terms: person, organization, materiel, etc.*
national extension / **national extension** / **national extension** / **national extension**	*terminology specific to nations that which may be useful to other nations - e.g. Bowman, Bradley FV, etc.*

Foundation

- The nations involved were using different modelling paradigms:
    - Entity-Relationship
    - Object-Oriented (inc. UML Meta-Models)
    - Ontology
- All of these modelling approaches are based on formal logic and set theory, but each is subtly different – especially as users tend to adopt a given "style"
    - These differences were making it hard to establish a common approach between the nations – there was too much scope for misunderstanding between parties
- To mitigate these problems, the IDEAS Model defines a foundational layer (based on IEEE Candidate Upper Ontologies such as SUMO & ISO15926)
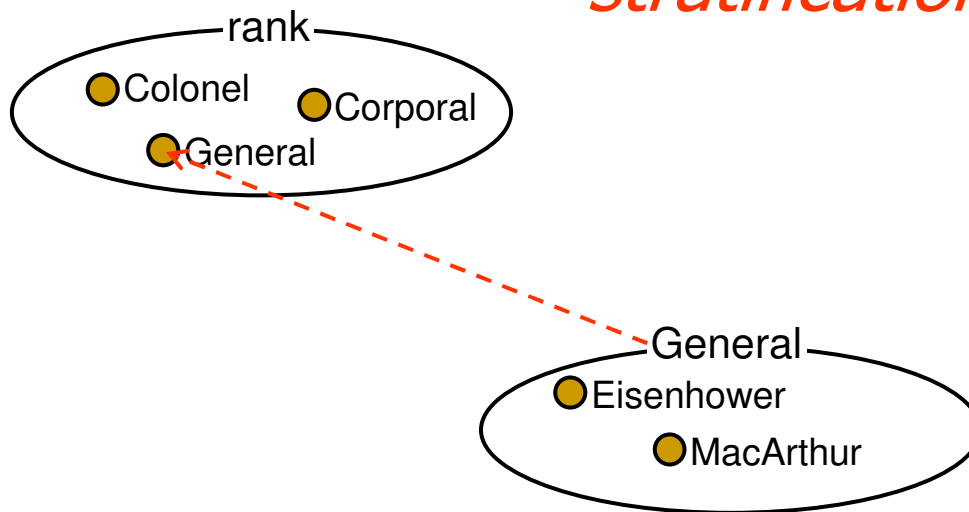
Unlearning-1

- IT professionals have a lot to "unlearn" before they can work with ontologies

1 - Need to stop thinking about the representation of the thing, and think about the actual thing

Unlearning-2

- IT professionals have a lot to "unlearn" before they can work with ontologies
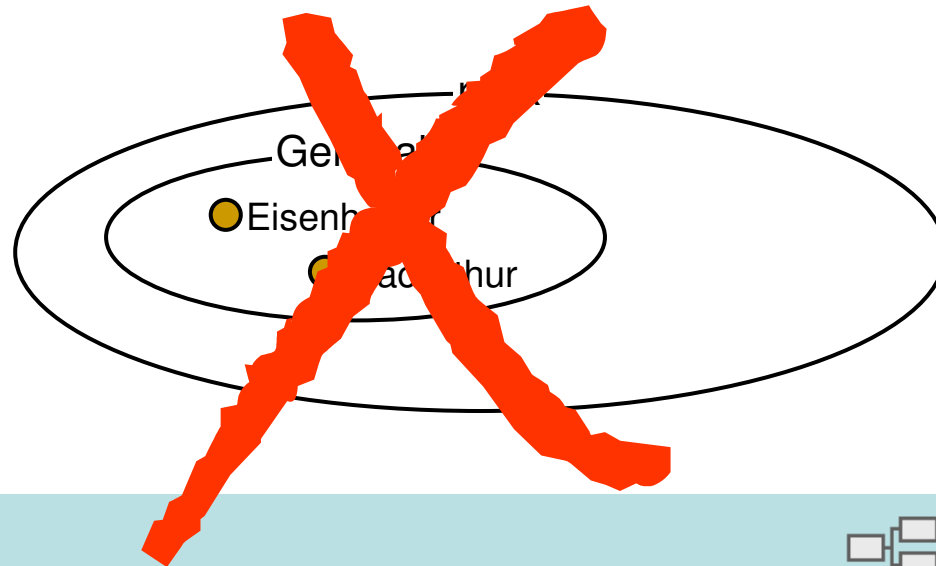
2 – Need to forget the type-instance (class-object) stratification

Unlearning-3

- IT professionals have a lot to "unlearn" before they can work with ontologies

3 – Need to be careful not to mix type-instance relationships with sub-super
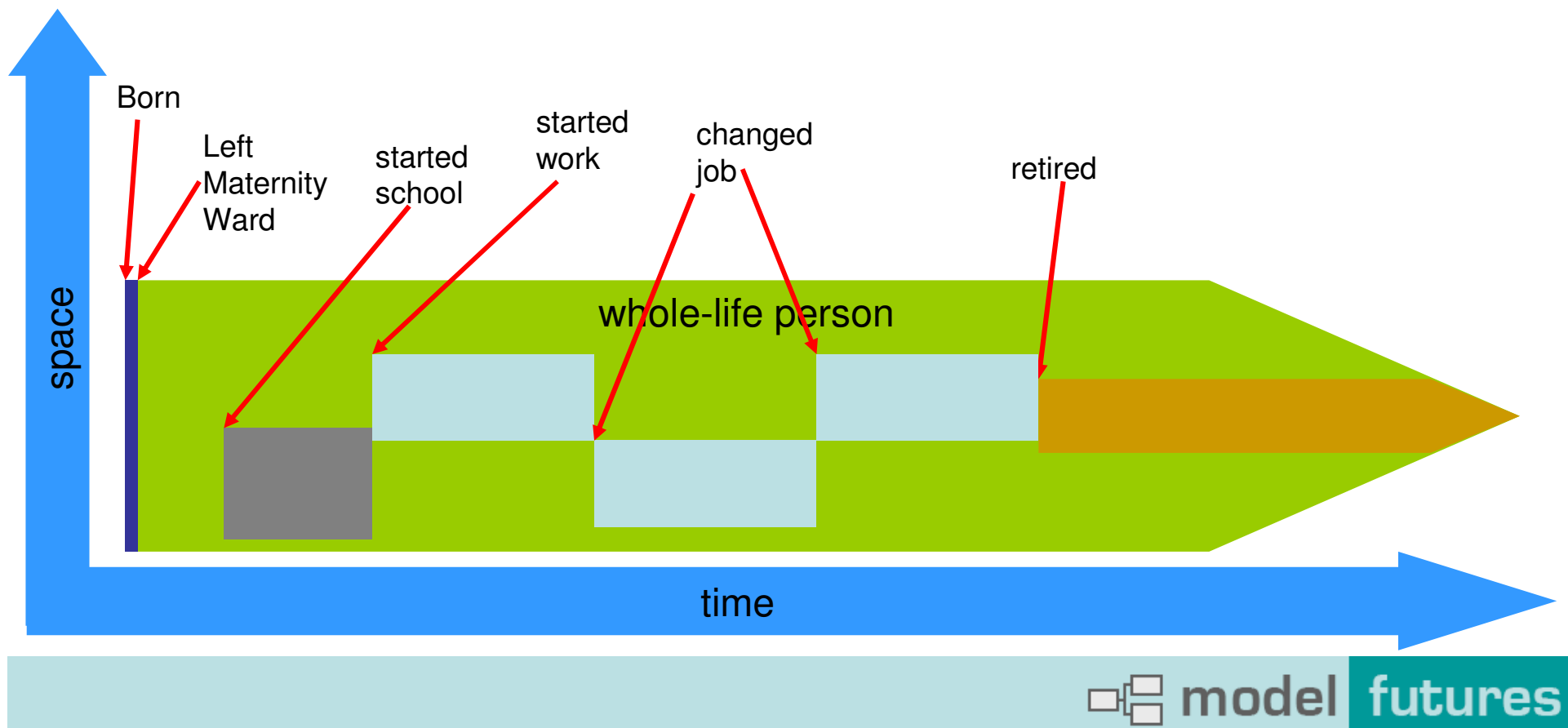

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Unlearning-4

- IT professionals have a lot to "unlearn" before they can work with ontologies

4 – Need to let go of obsessions about names – the elements position in the ontology defines what it is, not its name

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Managing Change Over Time

- One type of ontology approach deals particularly well with the tricky subject of time – the 4D ontology
- Distinguished between whole life things and the states they have throughout time – e.g. a person

space

Born

Left Maternity Ward

started school

started work

changed job

retired

whole-life person

time

Managing Identity

- A good ontology will identify the states of the individual
- It will also say who owns the identification scheme used
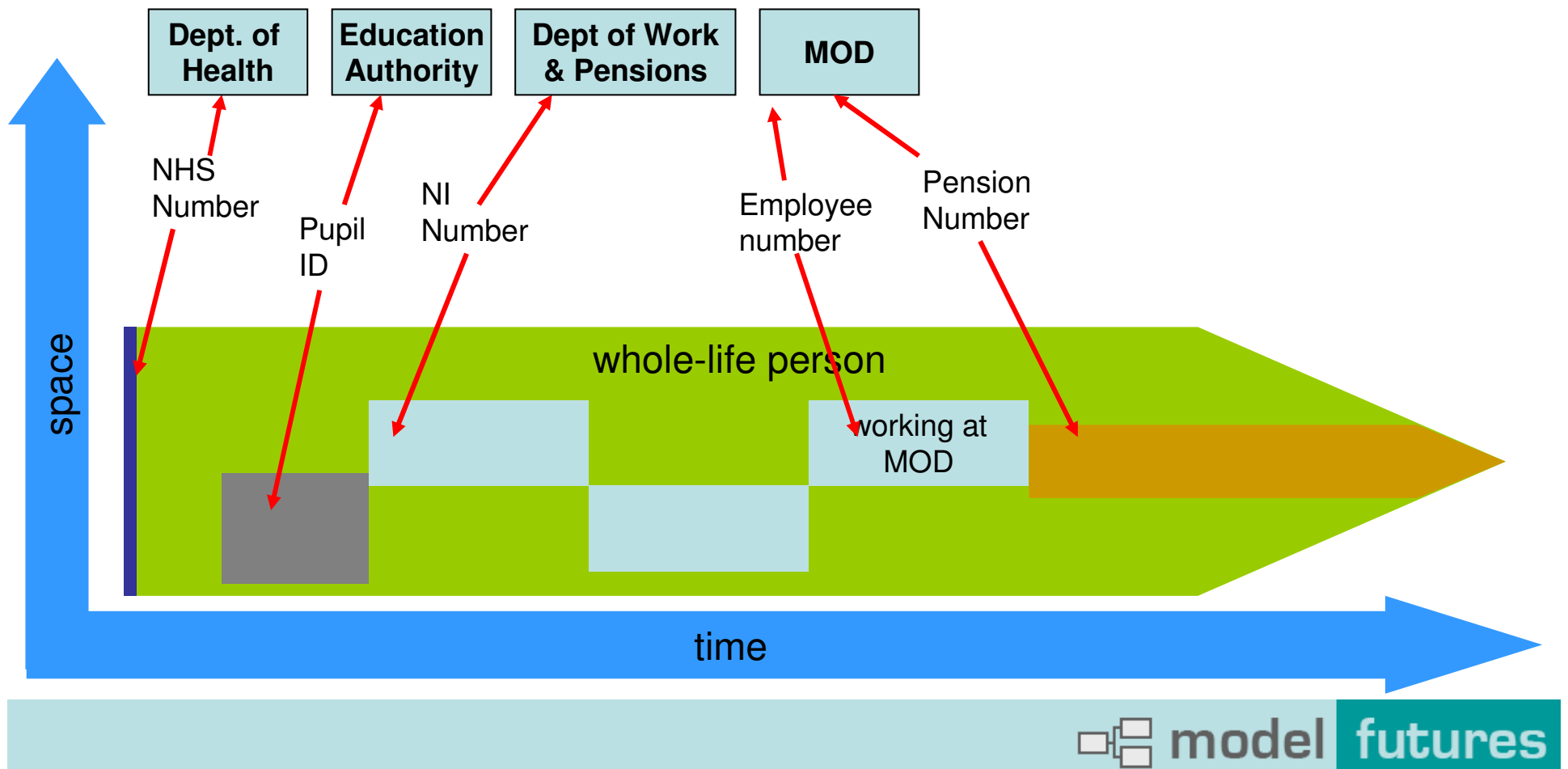
Last Slide

- ## What does ontology do for me ?
  - Provides a single coherent <u>reference</u> model for the whole enterprise
  - Supports the enterprise architect
  - Supports the applications and data
- ## What do I require ?
  - Need to decide type of ontology to use
  - Can I re-use anything out there – e.g. IDEAS, ISO15926, SUMO
- ## More than taxonomy
  - Ontology is not about words
  - It's about identifying the nature of things – the relationships between elements do more to identify them than the names do
- ## What Next ?
  - Try it !
  - Choose a subject area and model it

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