Concept Modelling for Business Analysts –
Making Data Modelling a Vital Technique

A half-day workshop presented by Adept Events
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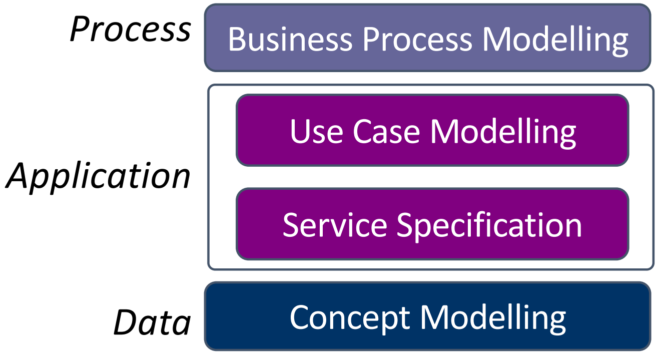
Instructor / course developer background…

Alec Sharp, Clariteq Systems Consulting – *asharp@clariteq.com*

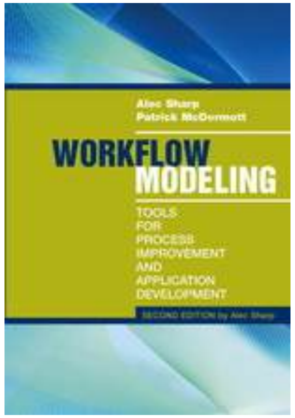
- 40+ years global experience as an independent consultant:
  - Business Process Modelling & Business Process Change – discover, scope, analyse, and design/redesign processes
  - Application Requirements Specification
  - Data Modelling and Management My roots!
  - Facilitation & Organisational Change
  - Project Recovery



- Awarded DAMA's global Professional Achievement Award for contributions to "human-friendly" data modelling

- Author of "Workflow Modeling"
  - best-selling book on process modelling & improvement
  - second edition – a complete re-write

Check out the nice reviews on Amazon - http://amzn.to/dHun1o


Alec Sharp
Patrick McDermott
WORKFLOW MODELING
TOOLS FOR PROCESS IMPROVEMENT AND APPLICATION DEVELOPMENT
SECOND EDITION by Alec Sharp

Clariteq – small, husband & wife company, global clients

ABB (ASEA Brown Boveri)
Aflac
American Honda
AMP (Australia Mutual Provident)
BackOffice Associates
Bank of Finland
Bellrock
Booking.com
Brisbane City Council (Australia)
Canadian Natural Resources Ltd.
City of Seattle
Civica UK
Clearwater Paper
Corvias
Dell
DHL Express
Dutch National Bank
Elisa
Ericsson
Essity
Eurojust (European Justice Comm.)
European Central Bank
Fortum
Gofore
Helse Vest - Norway
HM Land Registry - UK
Home Depot
Idaho Transportation Dept.
Intel
ISO New England

ING Bank
JP Morgan
Kal Tire
KONE
LGM Financial Services
Liberty Mutual
Livestock Improvement Corp.
MacDonald Dettwiler
Manitoba Public Insurance
Marathon Pipe Line
Microsoft
Ministry of Defence - UK
Ministry of Defence - NL
Ministry of the Interior - Slovakia
MTS Allstream
Nexen
Novo Nordisk
Nusenda Credit Union
OP Bank
Partner Reinsurance
Ritchie Brothers
Phillip Morris
Roche Diagnostics/Pharmaceuticals
Salt River Project
Saudi Aramco
Serco
Shell
Sparta Consulting
State Street Bank
SunGard

SVB (NL)
Synechron
Sysdoc
Talent Base
Teck
The MUSIC Group
The Seattle Times
UK Government
University Med Ctr Groningen
YIT(FI)
Washington Gas & Light

– *Higher Education* –
Carnegie Mellon University
Cornell University
Douglas College
Gonzaga University
Humboldt State University
The Jackson Laboratory
The Ohio State University
Portland State University
Salt Lake Community College
Southern NH University
University of Arkansas
University of British Columbia
University of the Fraser Valley
University of Maryland
University of Utah
University of Washington
Utah Valley University

What we'll cover…

★ *Topics*

- Concept Modelling within a Business Analysis framework
- Case study – using a Concept Model to discover Use Cases, User Stories, Business Services, and other requirements
- The essential elements of Concept Modelling
- Data model components – "ERA"
- Critical distinctions among Conceptual, Logical, and Physical Models
- Consistency in drawing the model

Introductions, if time/numbers permits:

- Name (how should I address you?)
- Role / job title, organisation, and location
- Is there a topic you are especially interested in?
- *Please try to keep your introduction to one minute or less*

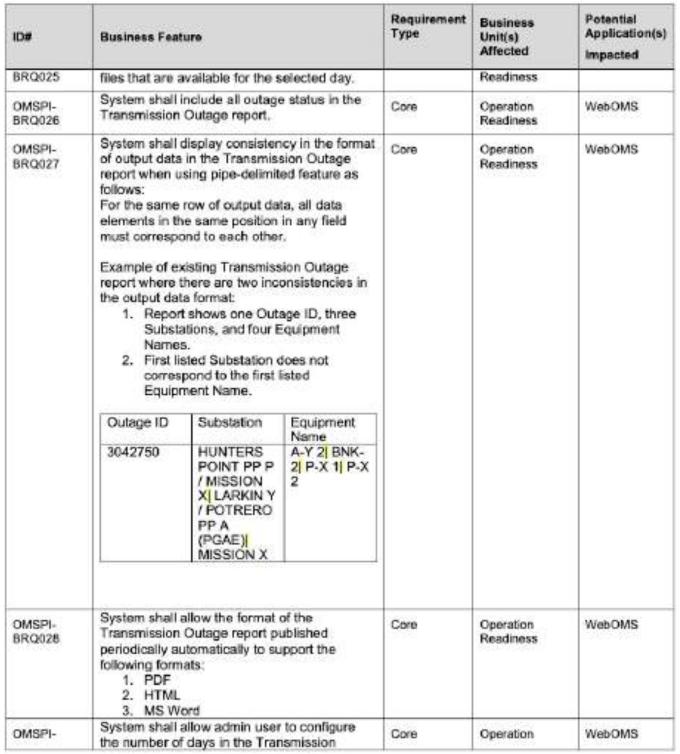
"Analysis" gets criticised because of the extremes

Simplistic methods at one extreme:
can do as much harm as good

The goal lies in the middle ground:

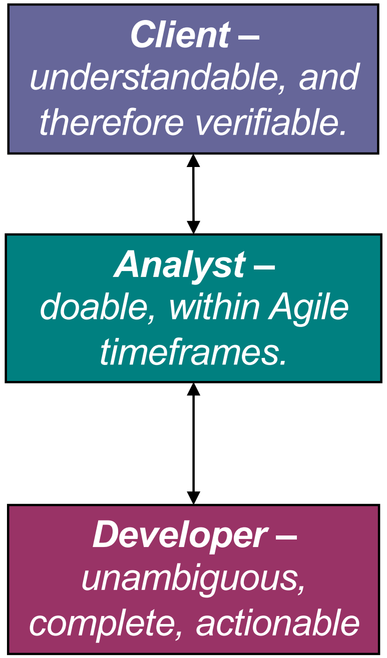
Overly complex methods at the other extreme:
difficult for businesspeople to verify

List-form requirements, typically a Business Requirements Document – "*context-free requirements*"



<table>
<tr><th>ID#</th><th>Business Feature</th><th>Requirement Type</th><th>Business Unit(s) Affected</th><th>Potential Application(s) Impacted</th></tr>
<tr><td>BRQ025</td><td>files that are available for the selected day.</td><td></td><td>Readiness</td><td></td></tr>
<tr><td>OMSPI-BRQ026</td><td>System shall include all outage status in the Transmission Outage report.</td><td>Core</td><td>Operation Readiness</td><td>WebOMS</td></tr>
<tr><td>OMSPI-BRQ027</td><td>System shall display consistency in the format of output data in the Transmission Outage report when using pipe-delimited feature as follows:
For the same row of output data, all data elements in the same position in any field must correspond to each other.

Example of existing Transmission Outage report where there are two inconsistencies in the output data format:
1. Report shows one Outage ID, three Substations, and four Equipment Names.
2. First listed Substation does not correspond to the first listed Equipment Name.
<table>
<tr><th>Outage ID</th><th>Substation</th><th>Equipment Name</th></tr>
<tr><td>3042750</td><td>HUNTERS POINT PP P / MISSION X| LARKIN Y / POTRERO PP A (PGAE)| MISSION X</td><td>A-Y 2| BNK-2| P-X 1| P-X 2</td></tr>
</table></td><td>Core</td><td>Operation Readiness</td><td>WebOMS</td></tr>
<tr><td>OMSPI-BRQ028</td><td>System shall allow the format of the Transmission Outage report published periodically automatically to support the following formats:
1. PDF
2. HTML
3. MS Word</td><td>Core</td><td>Operation Readiness</td><td>WebOMS</td></tr>
<tr><td>OMSPI-</td><td>System shall allow admin user to configure the number of days in the Transmission</td><td>Core</td><td>Operation</td><td>WebOMS</td></tr>
</table>

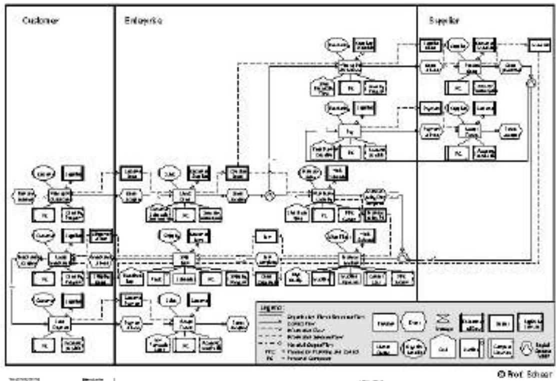


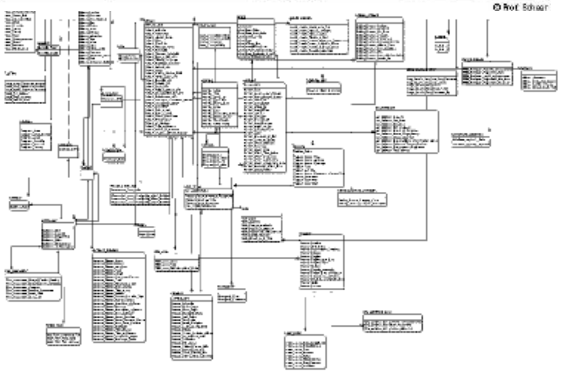
Client – *understandable, and therefore verifiable.*

Analyst – *doable, within Agile timeframes.*

Developer – *unambiguous, complete, actionable*

Thinly-disguised, implementation-level design methods – *not* useful for discovering stakeholder needs





The problem with list-based requirements

Simplistic methods at one extreme:

An actual example, one in a list of 451 individual requirements for the "Provide Scientific Evidence" process at a national forensic science laboratory:

#49 -

> *The system shall provide a visual mechanism through which to view or amend the sequencing of items for a previously selected case or allocations thereof.*

WHAAAT???!!!

List-based approaches to business analysis quickly break down – no way to ensure *completeness, accuracy, consistency, …*

So… what's wrong with this as a requirement?
What does it NOT tell us?

What are they really trying to say?

Who?	Senior Scientist
What?	Schedule a Test (an Allocation) on a Sample from an Item
When?	At Item Submission
How?	By viewing upcoming workload
Why?	To provide a completion date to the Customer (the Police)

Essentially, a Use Case or *User Story*:

As a Senior Scientist, I need the ability to view upcoming workload and schedule a Test on an Item, so I can provide a completion date to the Customer.

We will also use

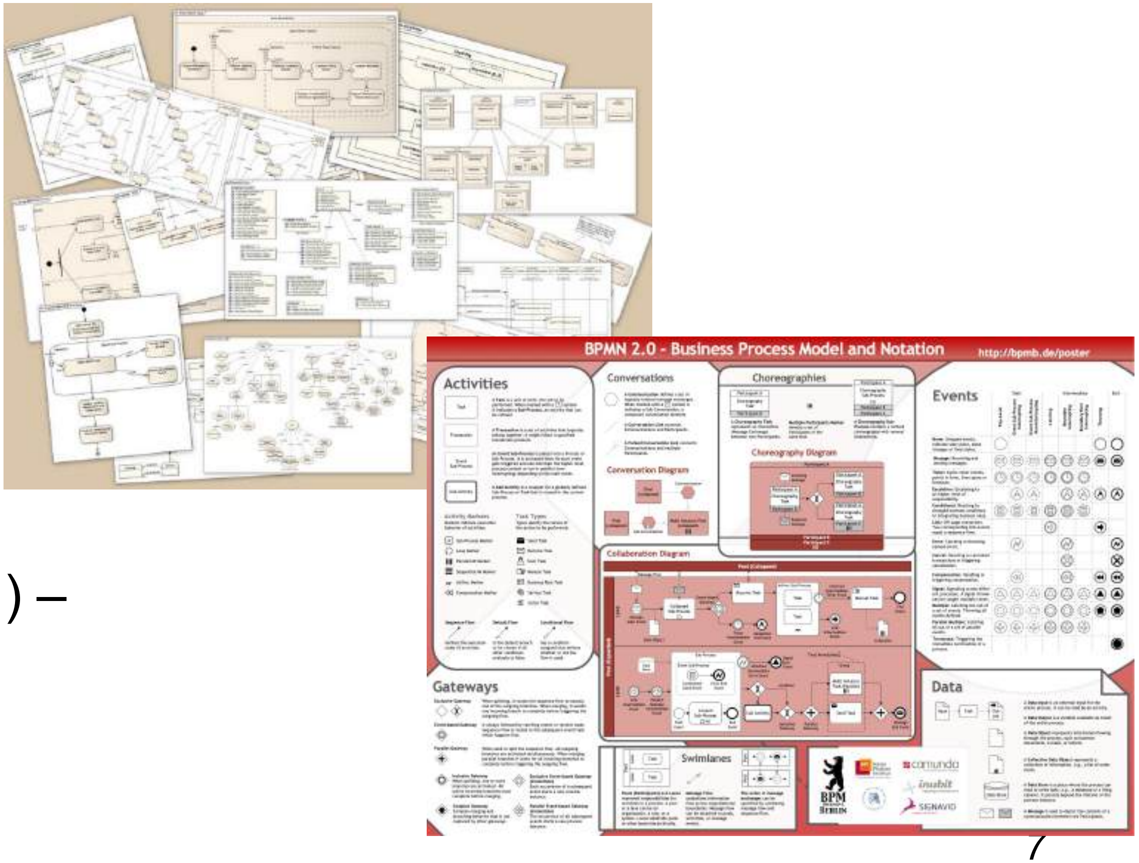
- *Business Process Models* to show where this fits in the end-to-end process
- *Concept Models* to show the required information

Complicated methods at the other extreme

"Can we use UML for Business Analysis?" As the late Michael Hammer said: "You could, but it will be like eating rice with a steak knife – messy, and someone's going to get hurt."

From the original UML specification: "The Unified Modeling Language (UML) is a graphical language for visualizing, specifying, constructing, and documenting the *artifacts of a software-intensive system*."

Same story for full BPMN (Business Process Model & Notation) – a platform-independent *visual programming language* for specifying automated workflows.



Case study – Concept Model, Services, Use Cases, Business Processes

Client –

- Regulatory agency ensuring the safe design, installation, and use of technical equipment
- Natural gas systems, electrical systems, boilers and pressure vessels, elevating devices, & many more

Goal –

- Shift from an inspection-based model (~800 inspectors!) to client-managed safety programs
- Clients will apply for a *Client Safety Management Program Authorisation (CSMP Authorisation)* - must show effective processes and accurate record-keeping
- Clients will pay a fee for managing *their own safety programs!* Still beneficial!

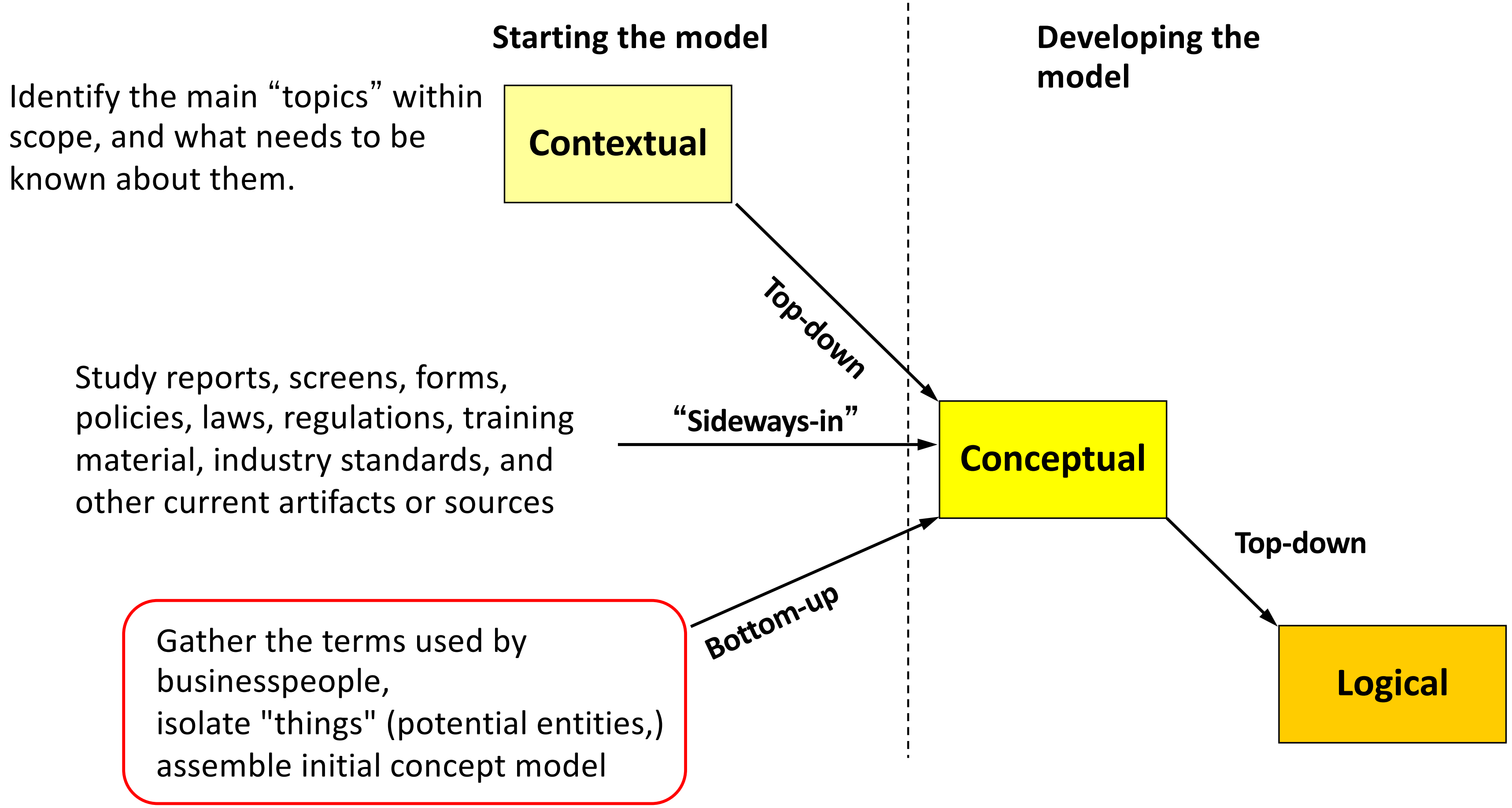
DO IT YOURSELF

Case study – Concept Model, Services, Use Cases

- Business Development chooses Pilot Program –
boilers and pressure vessels in Oil & Gas fields

- Current systems won't support CSMP, time-consuming and expensive to change them – IT and Finance suggest 18 – 24 months of work
- BD is unimpressed by IT and Finance objections ("You're being mindlessly obstructionist!") and proposes work-around procedure. *Guess which tool they intend to use?*
- I'm hired to identify end-to-end implications –
"Design a process and determine IT requirements that will allow this procedure to work."
- *Concept Modelling was a critical tool in understanding the underlying policies, and developing the process & requirements*

Different ways to get started



Starting the model

Developing the model

Identify the main “topics” within scope, and what needs to be known about them.

Contextual

Top-down

Study reports, screens, forms, policies, laws, regulations, training material, industry standards, and other current artifacts or sources

“Sideways-in”

Conceptual

Top-down

Logical

Gather the terms used by businesspeople,
isolate "things" (potential entities,)
assemble initial concept model

Bottom-up

Building your initial Concept Model, step-by-step

Identify and define "Things"

1. Collect terms
- 1:1 interviews
- survey (e.g., email)
- group brainstorm
- analyse documents

2. Isolate "things"

Ask *Is this…*
- a thing?
- a fact about a thing?
- or "other stuff?"

3. Identify synonyms
- select a term to use
- as general as possible
- just for this initiative, not the entire enterprise

4. Define each thing
- "good enough for now"
- first, identify "anomalies, sources of confusion, and valid differences of opinion"
- select which to include

Develop initial Concept Model

5. Organise things
- independent things across the top
- then laid out top-down by dependency

6. Draw relationships
- show dependency
- parent-child drawn bottom-to-top
- otherwise, side-to-side

7. Name relationships
- in both directions
- active verb-based!
- not mushy – *has*
- not meaningless – *related to*

8. Add cardinality
- use words first
- 1:1 is probably wrong
- 1:M (one to many)
- M:M (many to many)

Refine Concept Model

9. State assertions
- forcefully, for each relationship
- challenge the assertions!
- restate the assertion & why it changed, if it did

10. Redraw the model
- shows revised assertions
- e.g., 1:M becoming M:M
- e.g., dependent things becoming independent

11. Collect attributes
- a few for each thing
- not *all* attributes
- don't worry about normalisation

12. Move to identifying:
1. events / services
2. use cases / user stories

Starting a Concept Model bottom-up – 1

1) Interview business representatives about their area.
First, in preparation for the interviews, I send out the following note:
<<
The interviews will not follow a scripted list of questions. Instead, they'll be more open-ended, and driven in part by what *you* think I need to know. The interviews will cover three main topics:

1. *The work:* What does your organisation do, what is your role, and what 5 – 10 activities are central to your role? What information do you rely on?
2. *The issues & objectives:* What issues are you currently facing, and/or what issues will this undertaking raise? Are there any specific goals you're striving for? How will you and your group be impacted by this undertaking?
3. *The environment:* Are there cultural or historical factors that will impact the success of this undertaking?

>>

2) Later, scan your notes for the terms that arose in the interview,
and write each term on a large Post-it

Starting a Concept Model bottom-up – 2

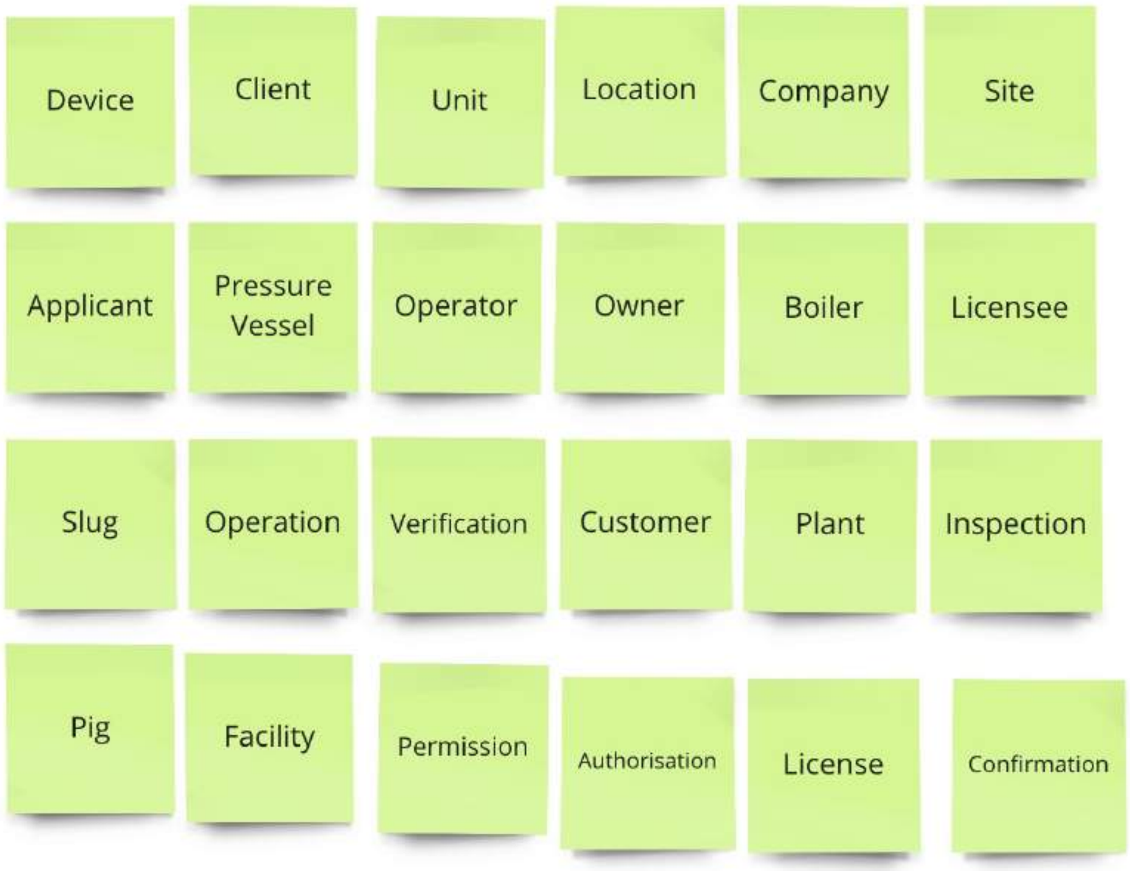
3) In a facilitated session, participants sort terms into categories:

- Things (entities, but don’t use the term… yet)
- Facts about things (add new “thing” if it's not there already)
- “Other stuff” includes artifacts (forms, spreadsheets, reports, …) systems, mechanisms, job titles, organisational structures, work (processes, activities, steps…,) and anything else that isn't a basic thing or fact about a thing

As needed, introduce criteria to be a“thing” (an entity)

Always start with terminology (the “things”)

From one-on-one interviews with 8-10 key stakeholders we gathered ~200 terms related to CSMP (Client Safety Management Program) – "anything that went by a name."
Here are 24 that met the criteria to be a "thing"– the candidate *Entities.*



Device, Client, Unit, Location, Company, Site

Applicant, Pressure Vessel, Operator, Owner, Boiler, Licensee

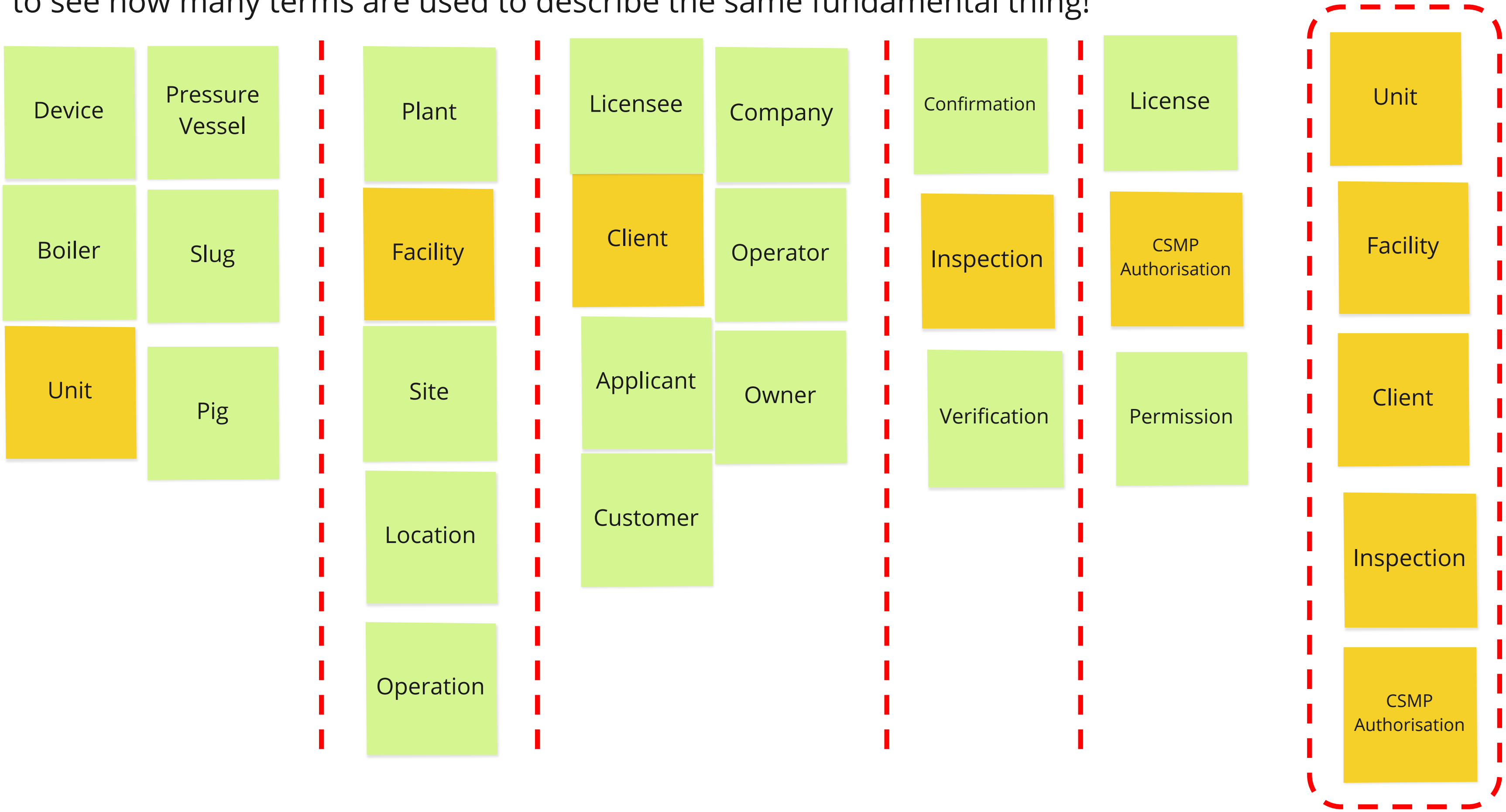
Slug, Operation, Verification, Customer, Plant, Inspection

Pig, Facility, Permission, Authorisation, License, Confirmation

Identify synonyms and select one term.
How do these relate to one another?
What do you need to know about each?

Review of a Miro example – Terminology Analysis

Terminology analysis (continued):
Let's arrange these terms into columns of synonyms. It's always a surprise for the business to see how many terms are used to describe the same fundamental thing!



Device
Pressure Vessel
Boiler
Slug
Unit
Pig

Plant
Facility
Site
Location
Operation

Licensee
Company
Client
Operator
Applicant
Owner
Customer

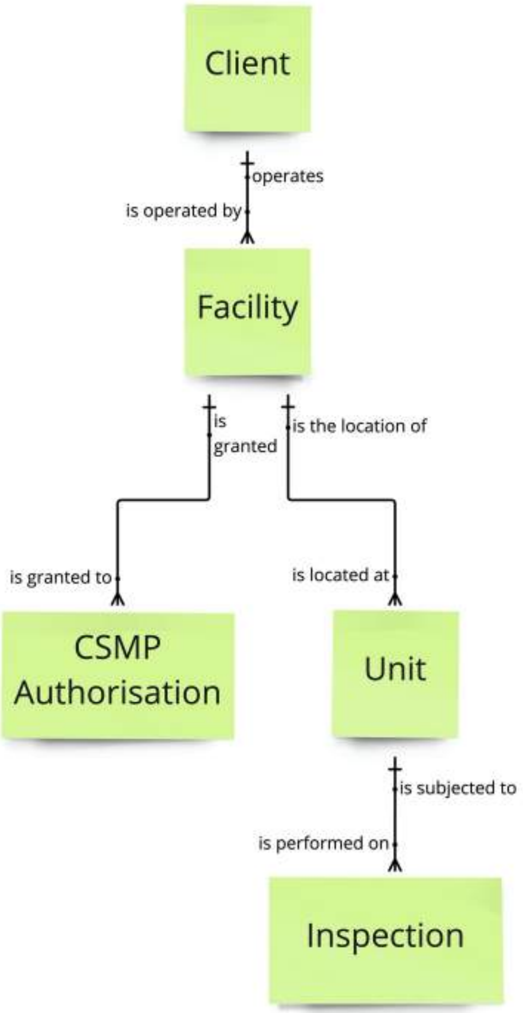
Confirmation
Inspection
Verification

License
CSMP Authorisation
Permission

Unit
Facility
Client
Inspection
CSMP Authorisation

Concept Model Version 1 – not perfect, but a good start

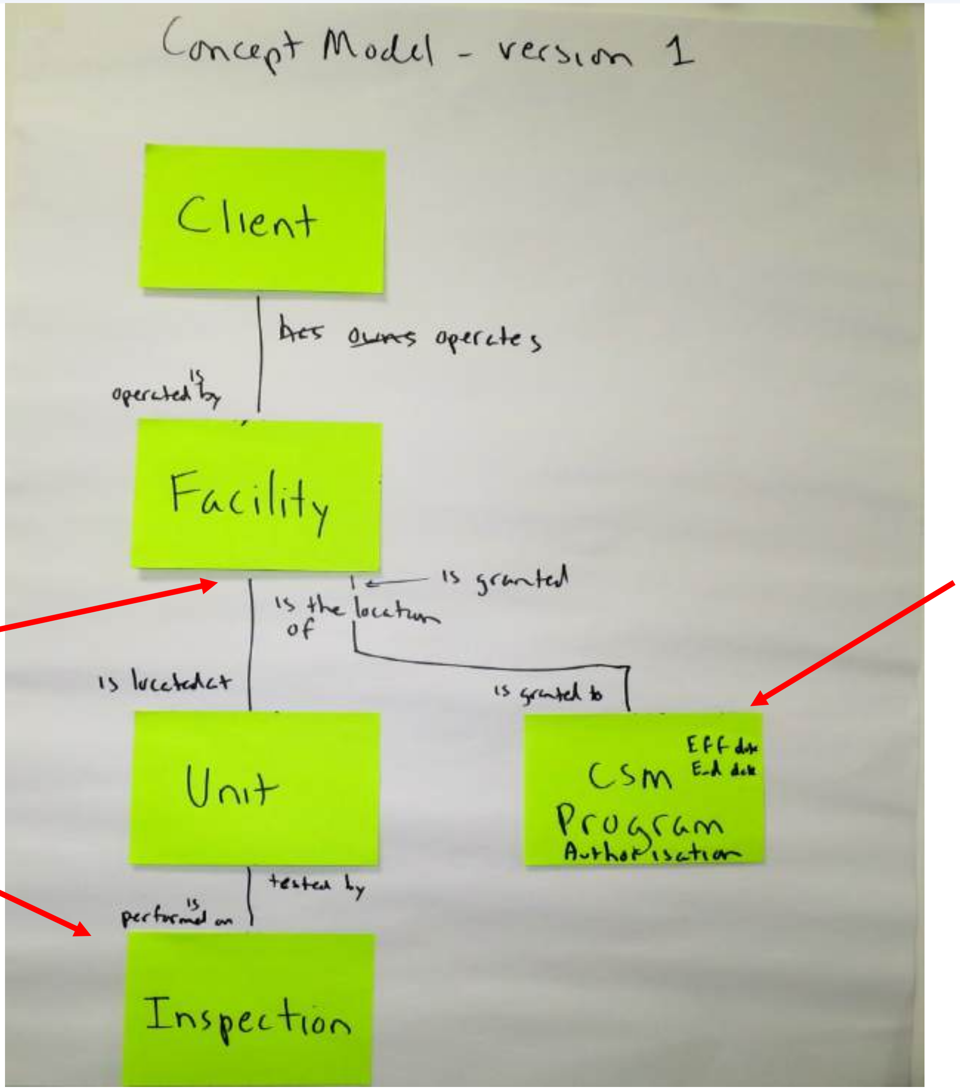
1. We arranged the entities / business objects by dependency
2. Then we drew relationship lines
3. Then we added a relationship name in each direction
4. Only then did we state (in words) the cardinality (1:1, 1:M, M:M) and then update the diagram with hash marks (┼) and crowsfeet (⋔)



Definition -
A CSMP Authorisation is a permission (or license) to operate a self-managed safety program (a Client Safety Management Program) at a specific Facility, for a specified time period, usually 1, 2, or 5 years.

The CSMP Authorisation is "all or nothing" - it covers ALL the Units at a Facility.

Just boxes and lines, but raises important questions



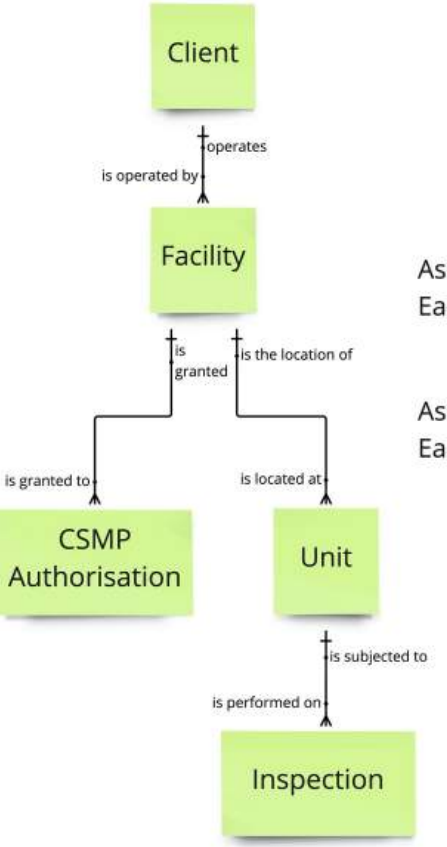
Are Units permanently part of one Facility?

What do we Inspect?
- the Facility?
- the Unit

What do we issue the Authorisation to?
- the Client?
- the Facility?
- some set of Units?

Concept Model Version 1 – state Assertions and challenge them

Now, state the relationships ***emphatically*** as Assertions. ***Each*** Client operates ***one or more*** Facilities! Then, ***challenge*** them!
Again, don't worry yet about ***optionality*** – whether the relationship ***must be*** or ***may be*** be present.
We only care now about the ***maximum*** – each ObjectA is related to a ***maximum*** of ***one*** or ***one or more (or many)*** ObjectB.



Assertion:
Each Client operates ___

Assertion:
Each Facility is operated by ___

Assertion:
Each Facility is granted ___

Assertion:
Each CSMP Authorisation is granted to ___

Assertion:
Each Facility is the location of ___

Assertion:
Each Unit is located at ___

Assertion:
Each Unit is subjected to ___

Assertion:
Each Inspection is performed on ___

Concept Model Version 1 – revised Assertions from challenges

Now, state the relationships ***emphatically*** as Assertions. ***Each*** Client operates ***one or more*** Facilities! Then, ***challenge*** them!
Again, don't worry yet about ***optionality*** – whether the relationship ***must be*** or ***may be*** be present.
We only care now about the ***maximum*** – each ObjectA is related to a ***maximum*** of ***one*** or ***one or more (or many)*** ObjectB.

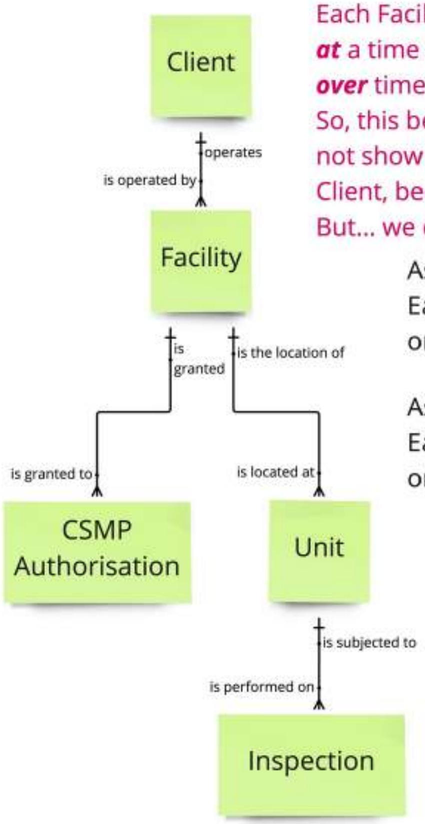
Assertion:
Each Client operates
one or more Facilities

Assertion:
Each Facility is operated by
one Client

Assertion:
Each Facility is granted
one or more CSMP Authorisations

One CSMP Authorisation ***at*** a time,
but one or more ***over*** time

Assertion:
Each CSMP Authorisation is granted to
one Facility



Each Facility is operated by one or more Clients
at a time (Joint Ventures) and
over time (changes in Ownership or Lease.)
So, this becomes a M:M relationship, and we should
not show a Facility as being dependent on a single
Client, because a Facility is an independent thing.
But... we don't always get our way!

Assertion:
Each Facility is the location of
one or more Units

Assertion:
Each Unit is located at
one Facility

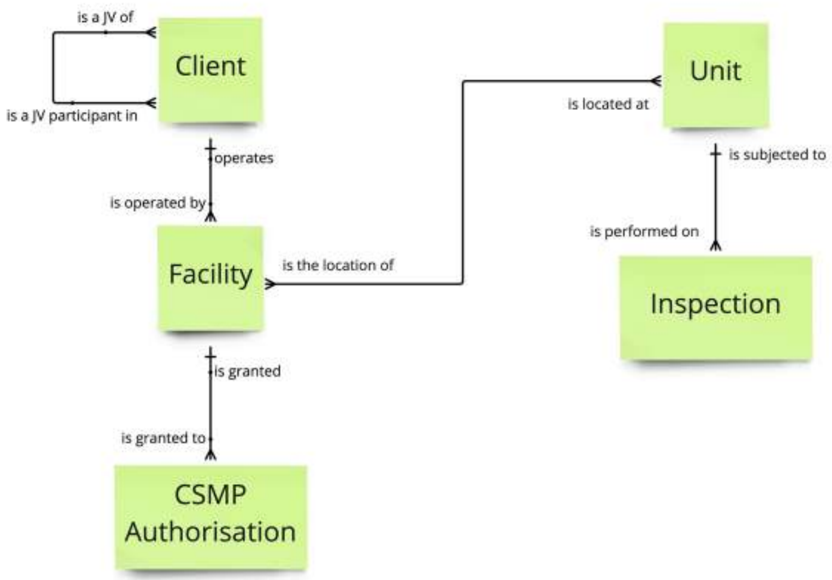
YES, but one or more Facilities ***over*** time, because
Units can move between Facilities. So, this
becomes a M:M relationship, and we cannot show
a Unit as being dependent on a single Facility,
because a Unit is an independent thing

Assertion:
Each Unit is subjected to
one or more Inspections

Assertion:
Each Inspection is performed on
one Unit

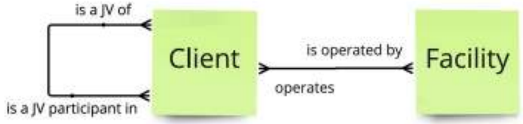
Concept Model Version 2 – revised from challenging Assertions

Now we will re-draw the initial Concept Model based on changes that came from challenging the Assertions in Ver. 1.

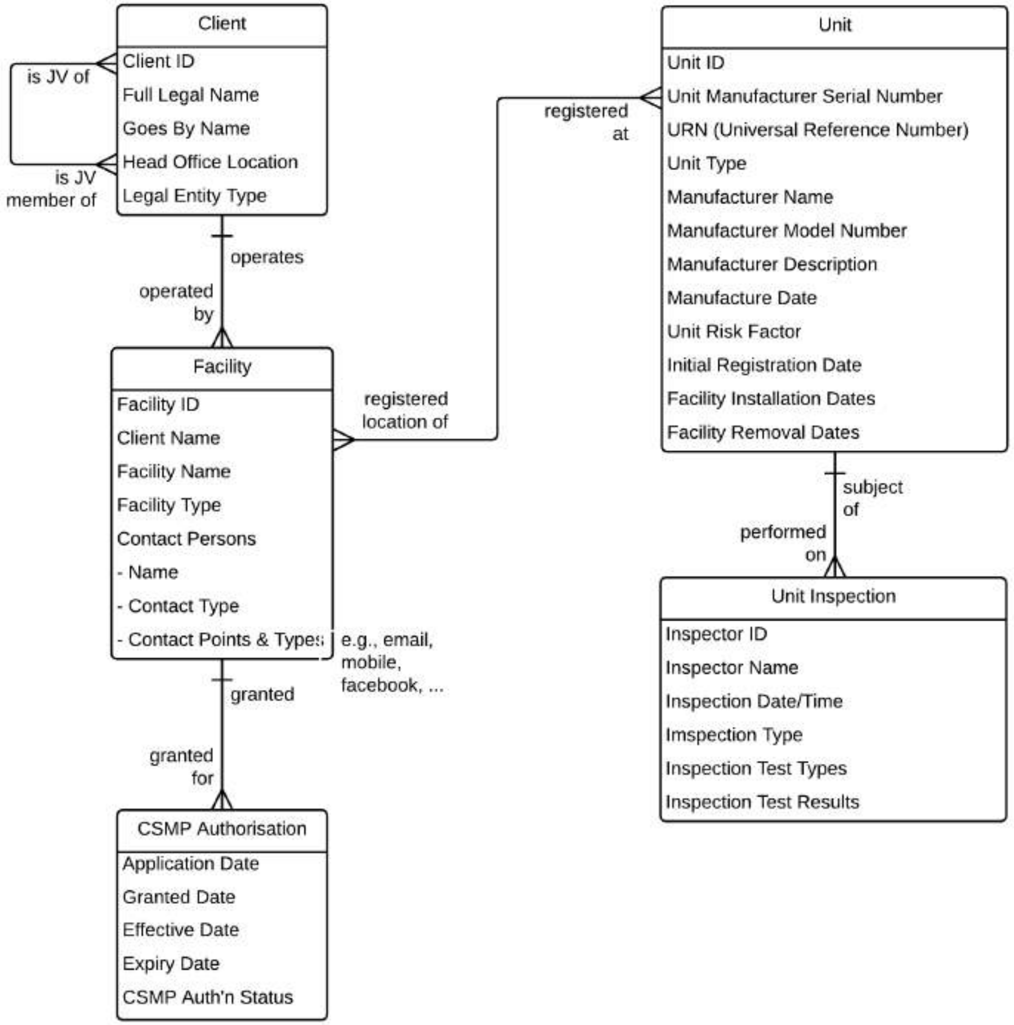


Note:
You don't always get what you *want* or what you think is the *right* thing in Concept Modelling. In this case the client (the Regulator) said they always wanted a Facility to be operated by ONE AND ONLY ONE Client.
If a Facility was operated by multiple Clients, they would require the Clients to form a new Joint Venture Client. This was to ensure that if there were legal difficulties, there was only ONE Client to go after.
Or, as they put it, "one throat to choke."

Later in the project, they realised they needed a history of the Clients that had operated a Facility, so the Client-Facility relationship became Many-to-Many, and Facility was modelled (correctly) as an independent Entity, as shown here:



"What do you need to know about the things in the Concept Model?"



Client
- Client ID
- Full Legal Name
- Goes By Name
- Head Office Location
- Legal Entity Type

is JV of / is JV member of

operates / operated by

Facility
- Facility ID
- Client Name
- Facility Name
- Facility Type
- Contact Persons
- - Name
- - Contact Type
- - Contact Points & Types

e.g., email, mobile, facebook, ...

registered location of / registered at

granted / granted for

CSMP Authorisation
- Application Date
- Granted Date
- Effective Date
- Expiry Date
- CSMP Auth'n Status

Unit
- Unit ID
- Unit Manufacturer Serial Number
- URN (Universal Reference Number)
- Unit Type
- Manufacturer Name
- Manufacturer Model Number
- Manufacturer Description
- Manufacture Date
- Unit Risk Factor
- Initial Registration Date
- Facility Installation Dates
- Facility Removal Dates

subject of / performed on

Unit Inspection
- Inspector ID
- Inspector Name
- Inspection Date/Time
- Imspection Type
- Inspection Test Types
- Inspection Test Results

Sketching this out was *fast, and* raised many questions that had not occurred to the client.

It's not perfect, but the businesspeople found it incredibly useful.

This was done initially without any data modelling terminology or symbols!

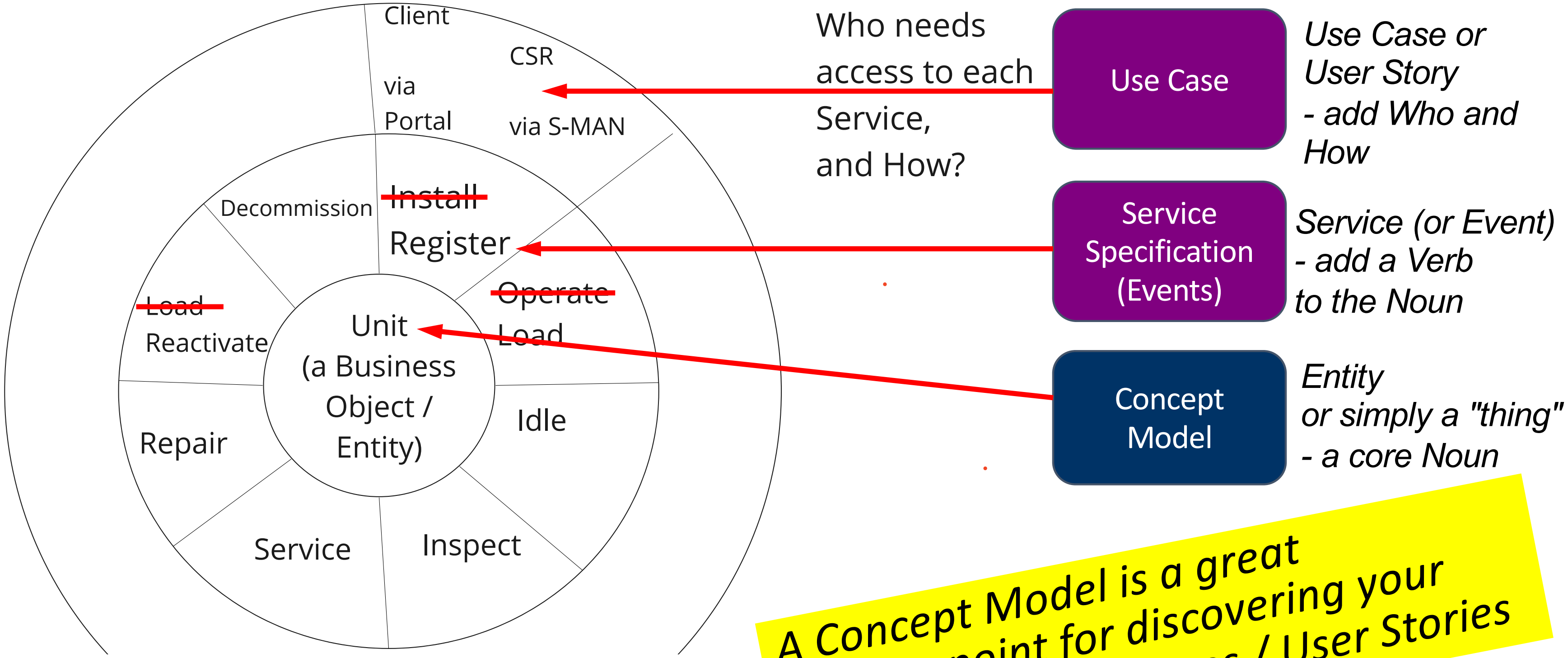
Model took ~90 minutes

Identify Services (Events) then Use Cases / User Stories

Finally, we identified the necessary Services (verb-noun pairs) and Use Cases / User Stories that would access the Services. We developed high-level ("upper conceptual") descriptions to provide the vendor with core requirements and avoid a bulleted list requirements document.

What events happen to a Unit - what are the needed services? (Verb - Noun)

- …
- …
- …
-



A Concept Model is a great starting point for discovering your Services and Use Cases / User Stories

Supports *Service-Oriented Business Analysis*

Note – "User Story" and "Use Case" are not so different

Different format and detail, but the same basic concept.
Initially, at the Scope level, they're much the same:

User Story (who – what – *why*):
"As a Client, I need the ability to Register Unit(s,)
so I can maintain compliance with my CSMP Authorisation"

Use Case: (who – what – *how*):
"Client Register Unit via Portal"

When we add detail at the Concept level, they become identical:

- User Story / Use Case abstract
- Main success sequence – dialogue in "when-then" format
- Alternate sequences – variations, exceptions, errors

Develop high-level services then high-level use cases

Service: *Register Unit*

- Check for presence of properly formatted UR Number
- Determine if Unit UR Number is previously known
- If known, has it (a) moved (b) changed ownership (c) …?

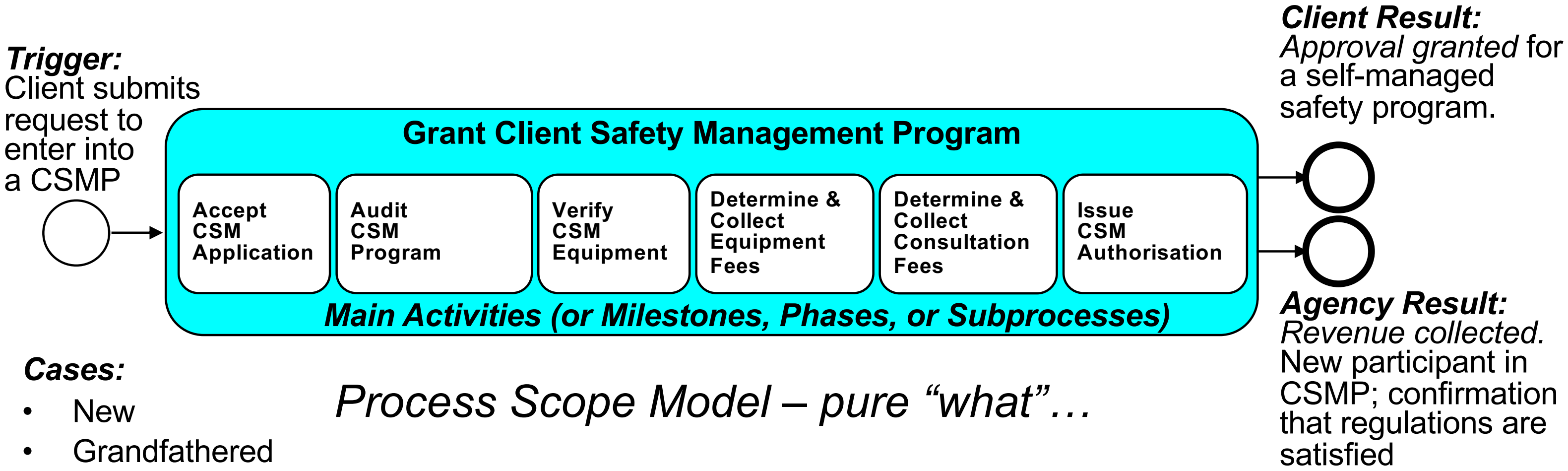
Use Case: *CSR Registers Unit via S-MAN*

- CSR will select "spreadsheet" of all Units covered by CSMP app
- S-MAN will highlight all that can proceed immediately
- For each category of Units requiring intervention…

Note:

Services and Use Cases at the "upper conceptual" level to provide vendor with key elements of requirements and avoid the usual bulleted list requirements document.

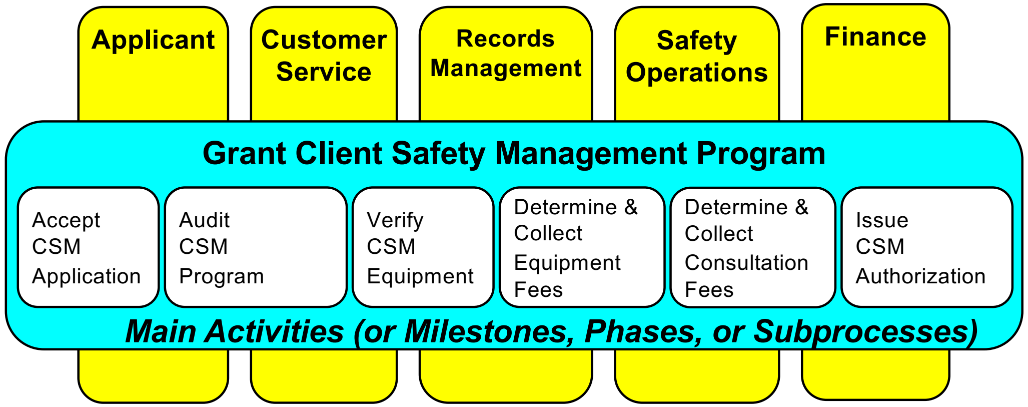
Clarify scope of the new process and identify participants


Trigger:
Client submits request to enter into a CSMP
Grant Client Safety Management Program
Accept CSM Application
Audit CSM Program
Verify CSM Equipment
Determine & Collect Equipment Fees
Determine & Collect Consultation Fees
Issue CSM Authorization
Main Activities (or Milestones, Phases, or Subprocesses)
Client Result:
Approval granted for a self-managed safety program.
Agency Result:
Revenue collected.
New participant in CSMP; confirmation that regulations are satisfied

Cases:

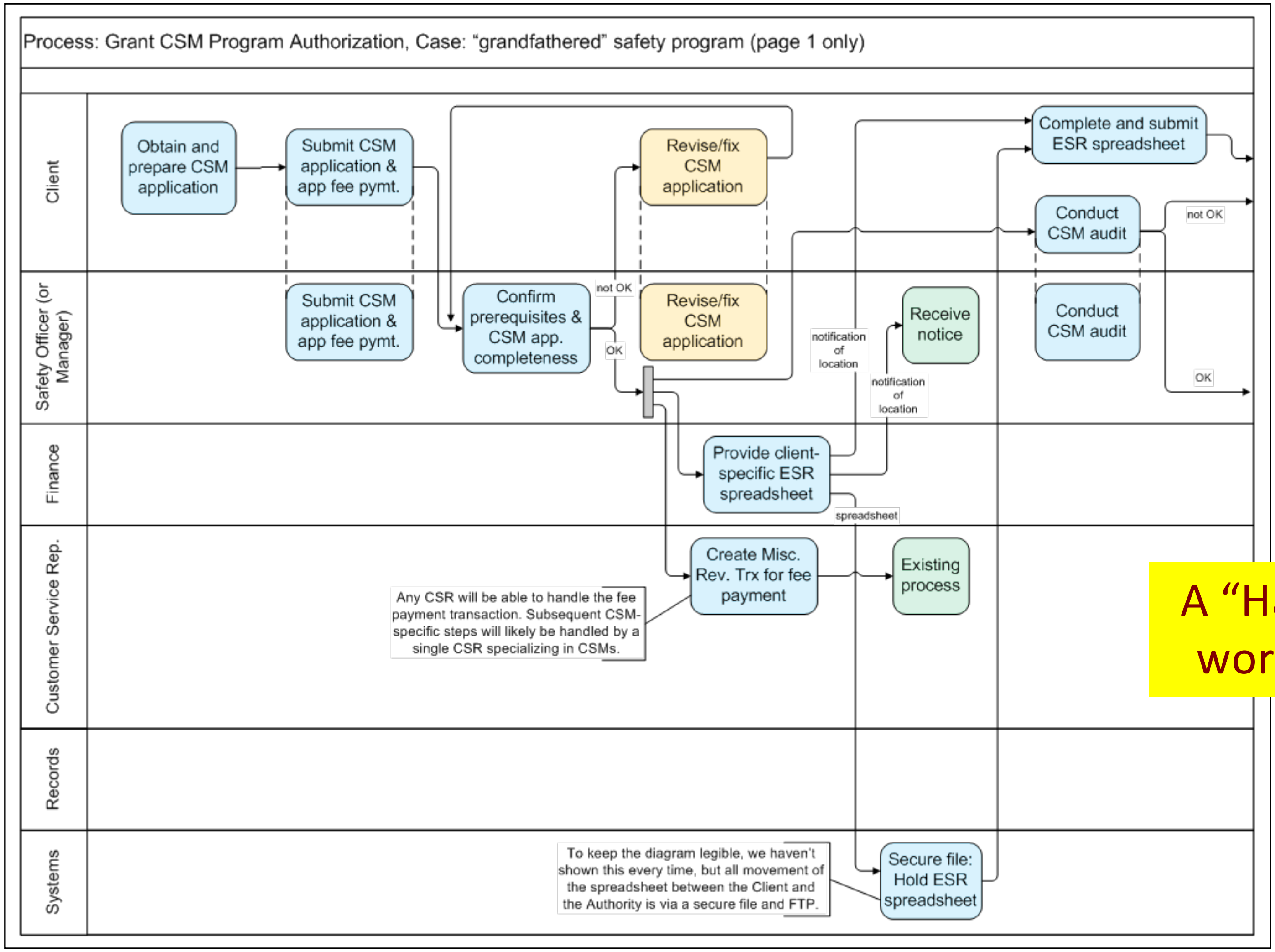
- New
- Grandfathered
- Ownership Change

Process Scope Model – pure "what"…


Applicant
Customer Service
Records Management
Safety Operations
Finance
Grant Client Safety Management Program
Accept CSM Application
Audit CSM Program
Verify CSM Equipment
Determine & Collect Equipment Fees
Determine & Collect Consultation Fees
Issue CSM Authorization
Main Activities (or Milestones, Phases, or Subprocesses)

Process Summary Chart – simplified "what," plus "who"

The initial, business-friendly workflow model



Process: Grant CSM Program Authorization, Case: “grandfathered” safety program (page 1 only)

Client

Obtain and prepare CSM application

Submit CSM application & app fee pymt.

Revise/fix CSM application

Complete and submit ESR spreadsheet

Conduct CSM audit

not OK

Safety Officer (or Manager)

Submit CSM application & app fee pymt.

Confirm prerequisites & CSM app. completeness

not OK

OK

Revise/fix CSM application

notification of location

Receive notice

notification of location

Conduct CSM audit

OK

Finance

Provide client-specific ESR spreadsheet

spreadsheet

Customer Service Rep.

Any CSR will be able to handle the fee payment transaction. Subsequent CSM-specific steps will likely be handled by a single CSR specializing in CSMs.

Create Misc. Rev. Trx for fee payment

Existing process

Records

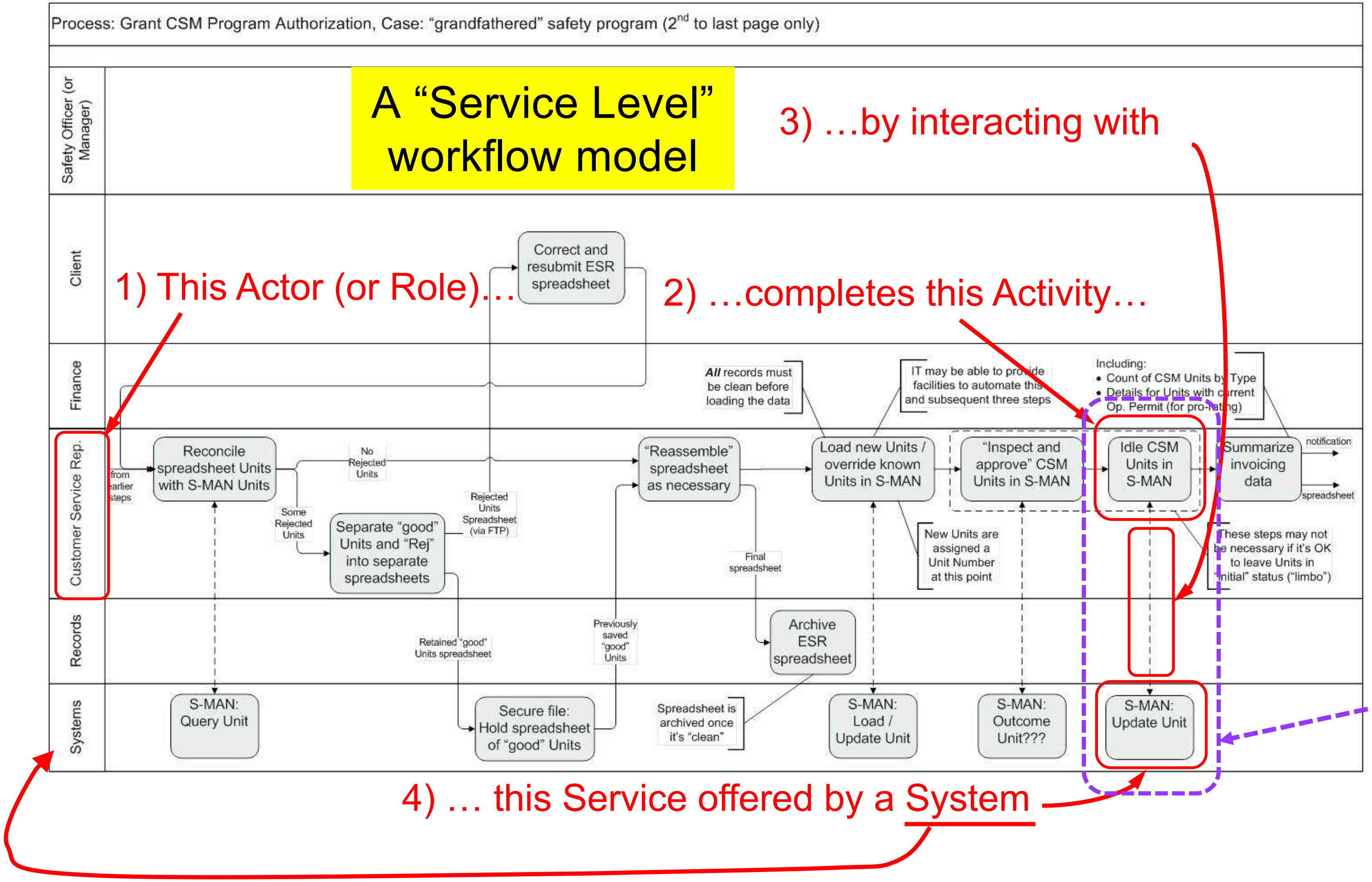
Systems

To keep the diagram legible, we haven't shown this every time, but all movement of the spreadsheet between the Client and the Authority is via a secure file and FTP.

Secure file: Hold ESR spreadsheet

A “Handoff Level” workflow model

Then detail showing where use cases & services fit


Process: Grant CSM Program Authorization, Case: “grandfathered” safety program (2nd to last page only)
Safety Officer (or Manager)
Client
Finance
Customer Service Rep.
Records
Systems
Correct and resubmit ESR spreadsheet
from earlier steps
Reconcile spreadsheet Units with S-MAN Units
No Rejected Units
Some Rejected Units
Separate “good” Units and “Rej” into separate spreadsheets
Rejected Units Spreadsheet (via FTP)
Retained “good” Units spreadsheet
Previously saved “good” Units
“Reassemble” spreadsheet as necessary
Final spreadsheet
Archive ESR spreadsheet
All records must be clean before loading the data
Load new Units / override known Units in S-MAN
IT may be able to provide facilities to automate this and subsequent three steps
New Units are assigned a Unit Number at this point
“Inspect and approve” CSM Units in S-MAN
Idle CSM Units in S-MAN
Including:
• Count of CSM Units by Type
• Details for Units with current Op. Permit (for pro-rating)
Summarize invoicing data
notification
spreadsheet
These steps may not be necessary if it's OK to leave Units in “initial” status (“limbo”)
S-MAN: Query Unit
Secure file: Hold spreadsheet of “good” Units
Spreadsheet is archived once it's “clean”
S-MAN: Load / Update Unit
S-MAN: Outcome Unit???
S-MAN: Update Unit

A “Service Level” workflow model

1) This Actor (or Role)…

2) …completes this Activity…

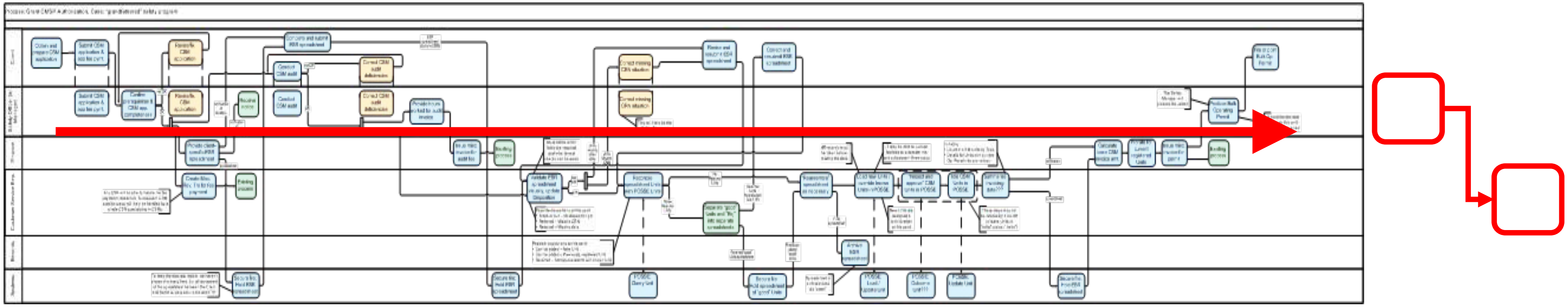
3) …by interacting with

4) … this Service offered by a System

That's a Use Case!
- an actor
- interacting with a system
- to obtain a service
- to help them complete a task or obtain information
is what we mean by a Use Case
(which may begin as a User Story)

Mission accomplished! Conclusions:

- "Plan A" rejected – agreement that Unit data *must* get into S-MAN
- "Plan B" (change the app) looks good, but the vendor estimates are *HIGH*
- "Plan B Minus" (existing functionality plus CSR work) is *worth the cost*



1. If requirements, issues, assumptions, etc. are in lists, people will argue endlessly; if they are in an *integrated* and *understandable* set of models, it's much harder to dismiss the reality of the situation
2. Process Models, Use Cases, Service Specs, & *Concept Models*: ***essential!***

Best Practice – a business-friendly, model-based framework for Business Analysis

The Clariteq Framework for Business Analysis

This is not a sequence!

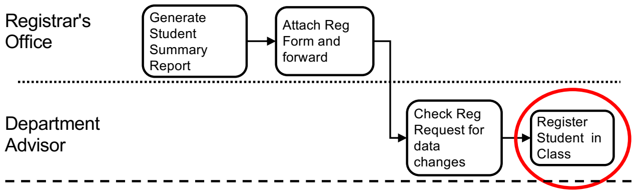
Framework Layer | Technique sample | What it covers

Business Goals & Objectives

The university is initiating the "Strategic Enrollment" program to raise Student graduation rates in part by ensuring Classes are available for Student registration when needed.

✓ ***Project Charter*** – documents the rationale, objectives, scope, and success measures for the project

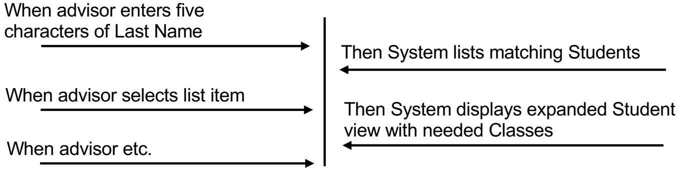
Business Process


Registrar's Office
Generate Student Summary Report
Attach Reg Form and forward
Department Advisor
Check Reg Request for data changes
Register Student in Class

✓ ***Process Model*** - shows "what" in a Scope Model, then "who & how" in a Workflow Model – the steps done by the actors in the process

Business Process:
gives great context
for Business Analysis

Presentation Layer (user interface)


When advisor enters five characters of Last Name

Then System lists matching Students

When advisor selects list item

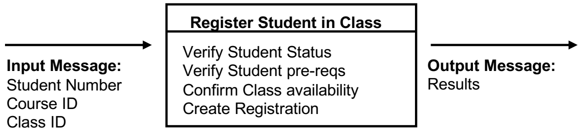
Then System displays expanded Student view with needed Classes

When advisor etc.

✓ ***Use Case*** – models how an actor interacts with a system to obtain (trigger) a service, typically to complete a step in a process

Use Cases and Services:
where we capture
Functional Requirements

Application Layer (rules & logic)


Register Student in Class

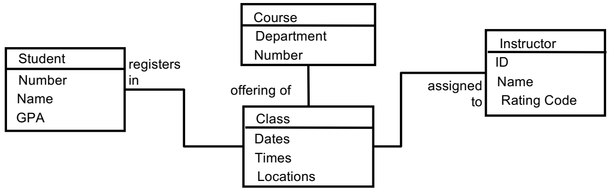
Verify Student Status
Verify Student pre-reqs
Confirm Class availability
Create Registration

Input Message:
Student Number
Course ID
Class ID

Output Message:
Results

✓ ***Service Specification*** - describes a service – a package of rules and logic – that is triggered to complete or respond to a business event

Data Layer (data & storage)



✓ ***Concept Model*** - depicts the things and the facts about things the organisation needs to record; the things (the entities) are what processes and solutions act on.

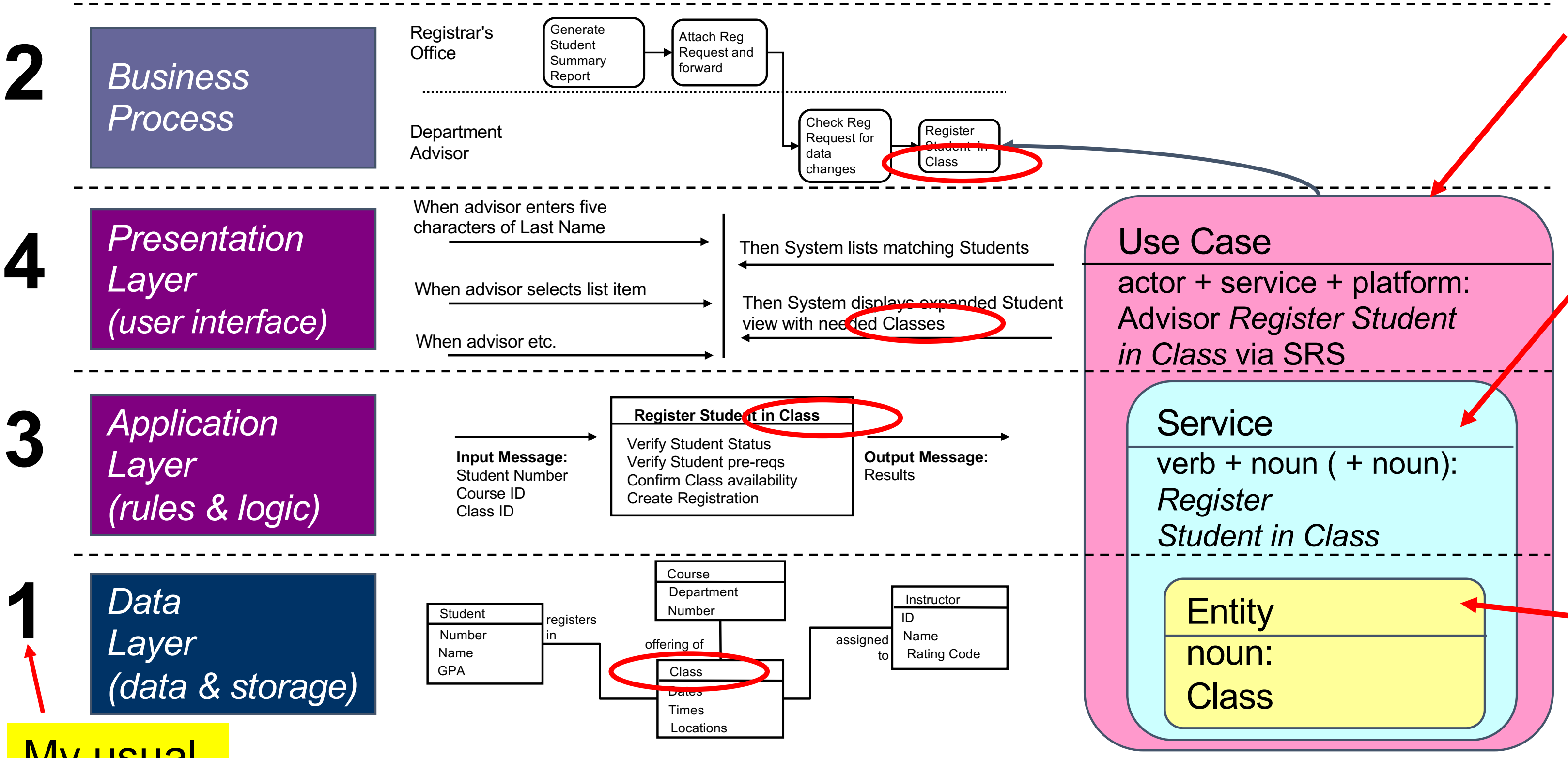
Concept Model /
Data Model:
a great platform
for Business Analysis

Everything relies on the Concept Model / Data Model

<u>All</u> use the language and constraints of the Concept Model (the “thing model”) – the ultimate “what”

Business Goals & Objectives

The university is initiating the “Strategic Enrollment” program to raise Student graduation rates in part by ensuring Classes are available for Student registration when needed.


2
Business Process
Registrar's Office
Generate Student Summary Report
Attach Reg Request and forward
Department Advisor
Check Reg Request for data changes
Register Student in Class
4
Presentation Layer (user interface)
When advisor enters five characters of Last Name
Then System lists matching Students
When advisor selects list item
Then System displays expanded Student view with needed Classes
When advisor etc.
3
Application Layer (rules & logic)
Input Message:
Student Number
Course ID
Class ID
Register Student in Class
Verify Student Status
Verify Student pre-reqs
Confirm Class availability
Create Registration
Output Message:
Results
1
Data Layer (data & storage)
Student
Number
Name
GPA
registers in
Course
Department
Number
offering of
Class
Dates
Times
Locations
assigned to
Instructor
ID
Name
Rating Code
Use Case
actor + service + platform:
Advisor *Register Student in Class* via SRS
Service
verb + noun (+ noun):
Register Student in Class
Entity
noun:
Class

My usual sequence

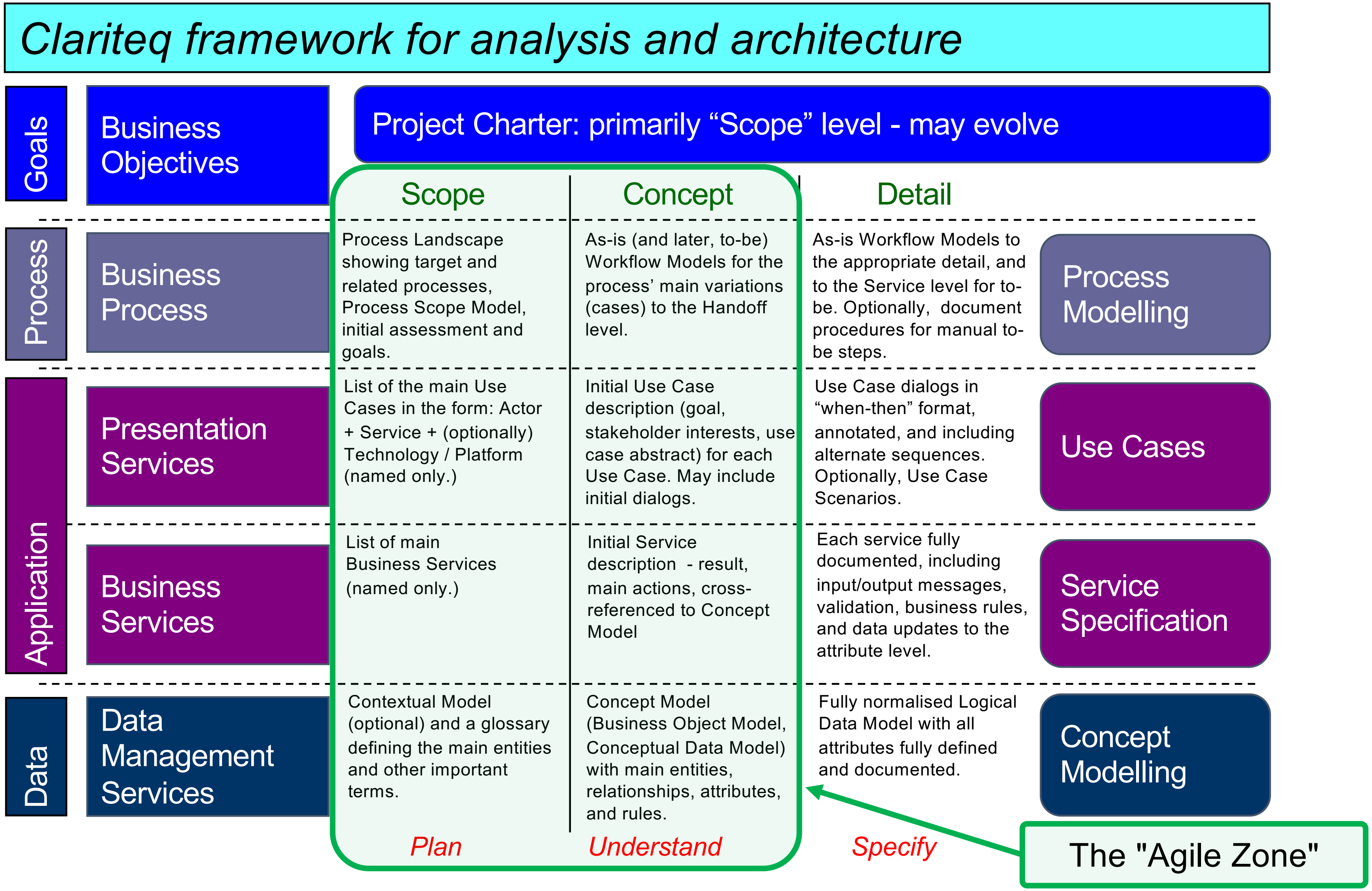
Use Cases/User Stories:
- Who (Actors) needs access to the Services, and how (Platform)?

Verb-Noun pairs:
- The *Services* (event-handlers) that are at the heart of a *Service Oriented Architecture.*
- *Also* "building blocks" of Business Processes

The core *Nouns or* Things in your enterprise. Also known as *Business Objects.*

Bonus – great starting point to discover your Events/Services and Use Cases/User Stories

Progressive detail for <u>all</u> techniques

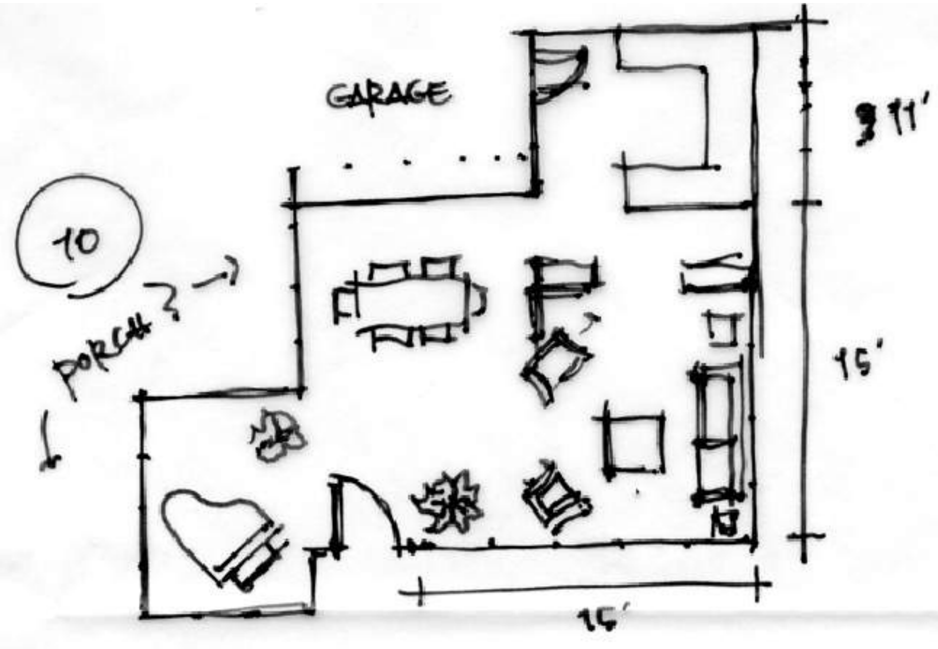


Clariteq framework for analysis and architecture

		Scope	Concept	Detail	
Goals	Business Objectives	Project Charter: primarily “Scope” level - may evolve			
Process	Business Process	Process Landscape showing target and related processes, Process Scope Model, initial assessment and goals.	As-is (and later, to-be) Workflow Models for the process’ main variations (cases) to the Handoff level.	As-is Workflow Models to the appropriate detail, and to the Service level for to-be. Optionally, document procedures for manual to-be steps.	Process Modelling
Application	Presentation Services	List of the main Use Cases in the form: Actor + Service + (optionally) Technology / Platform (named only.)	Initial Use Case description (goal, stakeholder interests, use case abstract) for each Use Case. May include initial dialogs.	Use Case dialogs in “when-then” format, annotated, and including alternate sequences. Optionally, Use Case Scenarios.	Use Cases
	Business Services	List of main Business Services (named only.)	Initial Service description - result, main actions, cross-referenced to Concept Model	Each service fully documented, including input/output messages, validation, business rules, and data updates to the attribute level.	Service Specification
Data	Data Management Services	Contextual Model (optional) and a glossary defining the main entities and other important terms.	Concept Model (Business Object Model, Conceptual Data Model) with main entities, relationships, attributes, and rules.	Fully normalised Logical Data Model with all attributes fully defined and documented.	Concept Modelling
		Plan	*Understand*	*Specify*	

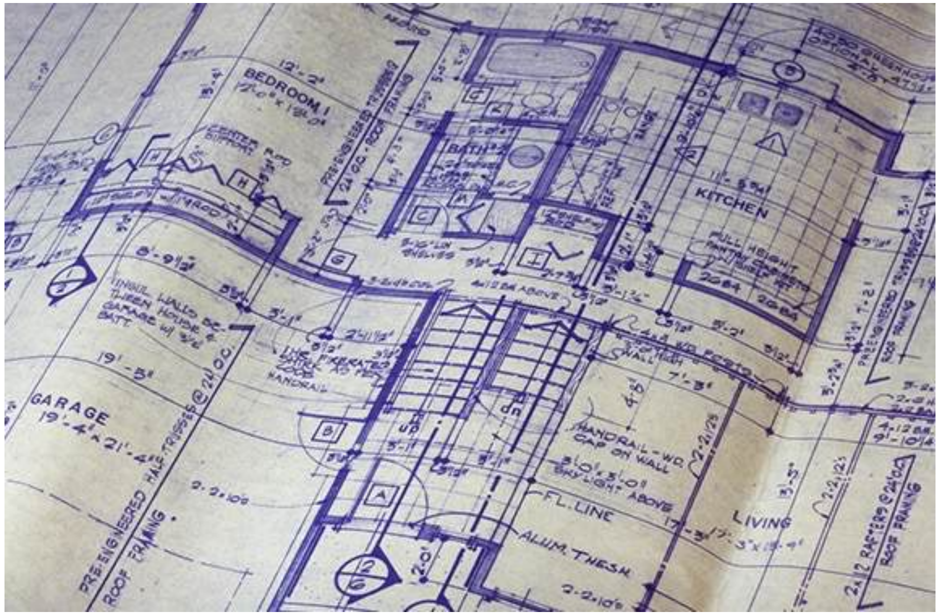
An analogy for Conceptual and Logical models

A Concept Model is like a sketch of a floor plan



Easy to understand, and provides enough detail for the homeowner to decide if the layout will work for them.

A Logical Data Model is like construction blueprints

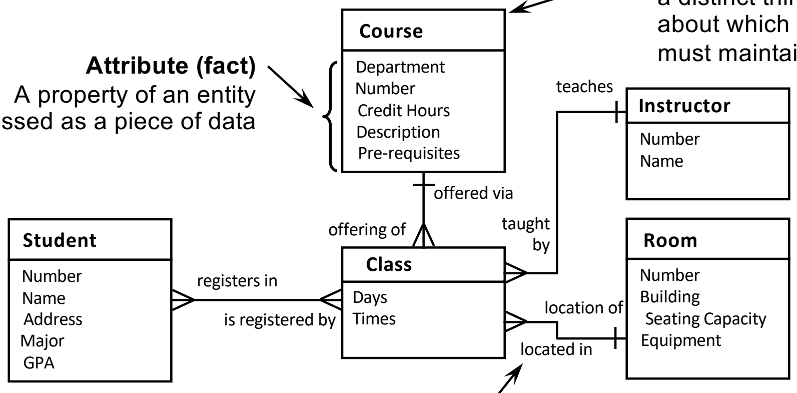


Requires specialised skills to interpret and provides enough detail (along with other design views and callouts) for the builder to construct the building.

What is a Concept Model / Business Object Model / Domain Model…?

- A *description of a business* in terms of
  - **things** it needs to maintain records of – *Entities*
  - **facts about those things** – *Relationships & Attributes*
  - **policies & rules** *governing those things and facts*
- Models a view of the **real world**, not a technical design (therefore, stable and flexible)
- Can be comprehended by mere mortals (at least initially)
- Graham Witt – "A narrative supported by a graphic"

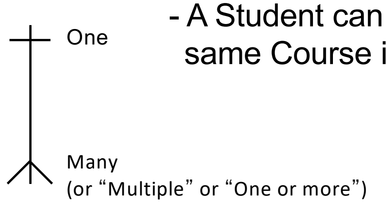
Graphic component



Entity (thing)
a distinct thing of interest about which the business must maintain information

Attribute (fact)
A property of an entity that can be expressed as a piece of data

Relationship (fact)
A named association between two Entities



"Things" first, data later!

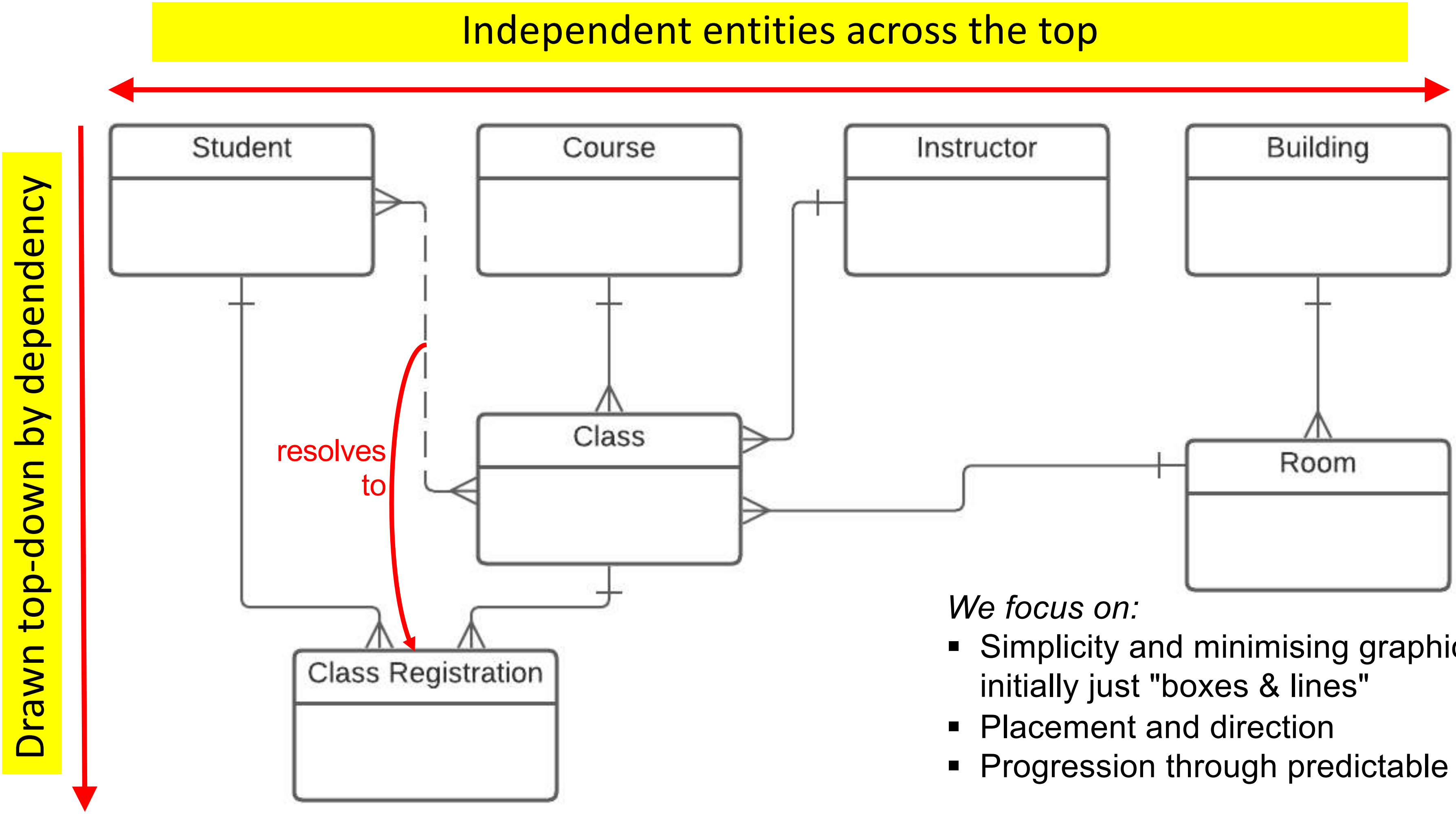
Narrative component

Student definition:
A Student is any person who has been admitted to the University, has accepted, and has registered in a course within a designated time. Faculty and staff members may also be Students.

Plus "Assertions" (policies & rules)
- Each Course is offered through one or more Classes
  Each Class is an offering of a single, specific Course
- Each Instructor teaches one or more Classes
- Each Class is taught by one Instructor
  (which may or may not be true…)

Many rules can't be shown on the diagram…
- A Student can not register in two Classes of the same Course in the same Academic Term

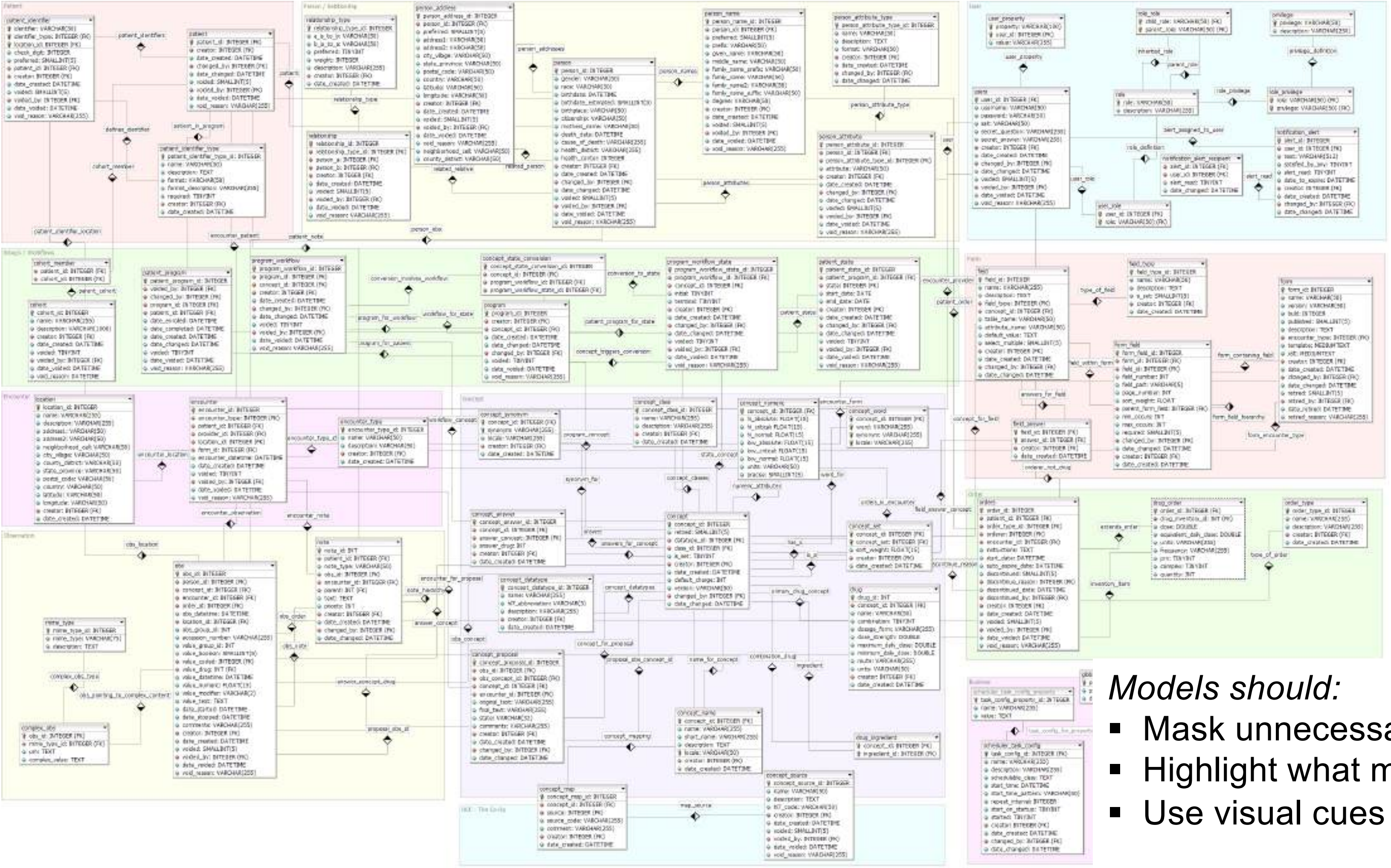
A better looking version of the model on the previous slide



We focus on:

- Simplicity and minimising graphic "widgets" - initially just "boxes & lines"
- Placement and direction
- Progression through predictable steps

There are lots of dubious models out there!



Models should:

- Mask unnecessary detail
- Highlight what matters
- Use visual cues consistently

The basics: ERA – *Entities*

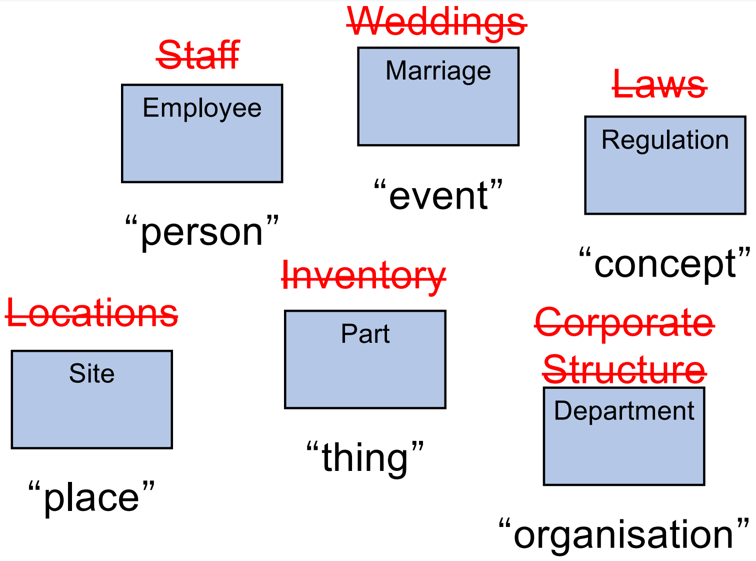
An *entity* is a distinct thing the business *needs* to know about - a *person, place, thing, event, concept,* or *organisation,* and…

- is named with a *singular noun* that implies a single instance
  - not a plural or collective noun, list, set, collection, report, etc.
  - we can discuss "one of them," e.g. "Weather" is not a good name
- has multiple occurrences (or instances)
- we *need* to and *can* keep track of (differentiate) each occurrence
- has *facts* that must be recorded, e.g.
  - *Student* attributes: Number, Name, Birth Date, Major, GPA, …
  - *Student* relationships: "majors in" *Subject*, "enrolls in" *Section*
- is acted on by *processes*, so they make sense in a "verb-noun" pair
- refers to the *essence*, not the implementation – *the most common error is to identify artifacts (forms, reports, spreadsheets, …) as entities!*

Named - a business-oriented noun / noun phrase

Defined - "What *is* one of these things?" or
"What do you mean by _________?"

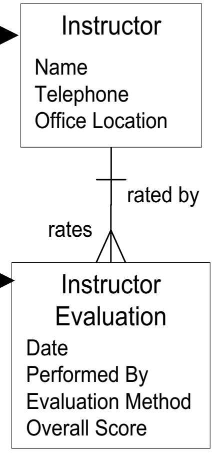
These are the ones our business partners often struggle with.



Two basic types

Independent
- can stand alone
- no relationships "on top" (no parents)

Dependent
- must have one or more parents – one or more relationships "on top" to parent(s)

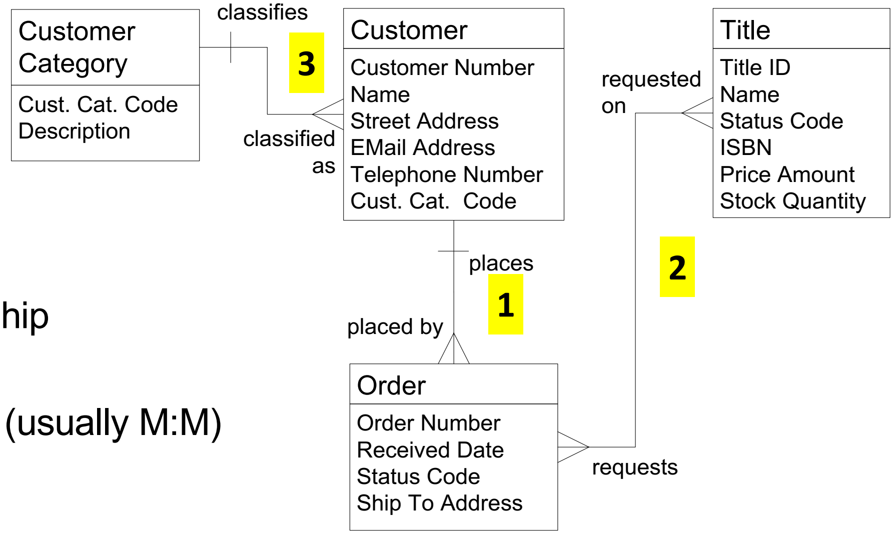


The basics – ERA – *Relationships*

An association between Entities that the business must keep track of

Named in both directions

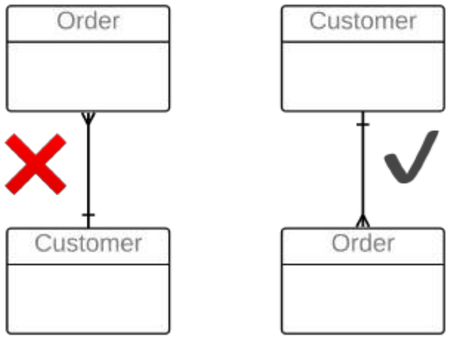
- verb-based phrase
- the line tells us they *are* related, the name tells us *how*



Different types of relationships

1. parent-child or characterising – “bottom to top” relationship from an entity to a dependent entity (1:M)
2. associating – “side to side” relationship between entities that are not dependent on one another (usually M:M)
3. classifying – “side to side” relationship from reference data to the classified entity (seldom shown in the Concept Model)

Dependency is shown top down – No Dead Crows

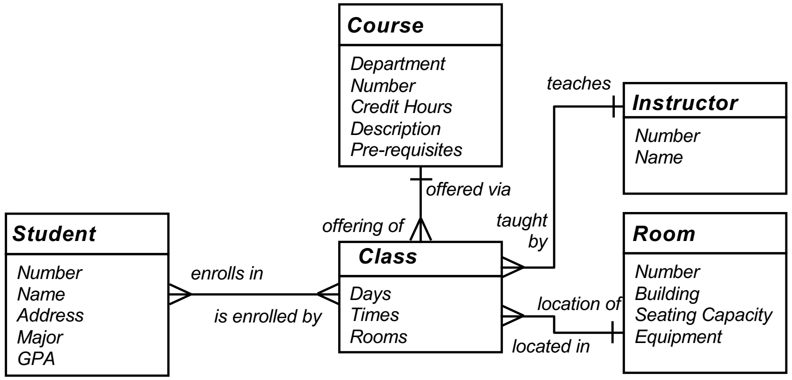


Relationships have rules

- cardinality – 1:1 (almost certainly wrong,) 1:M, M:M
- optionality – relationship *may be* present or *must be* present (not shown until later, in the logical model)

Relationships – state as assertions

1. You *must* state the relationship name as an assertion, in both directions (for clarity and confirmation)
2. Be clear on whether cardinality is “one” or “one or more” (don't worry about “may” and “must” at first)
3. *Emphatically* begin the assertion with the word “Each”
4. Try it on this model…



Note –
A Class is a scheduled offering of a Course during an Academic Time Period, e.g. a Semester or an Academic Year.
During an Academic Time Period there may be one or more Classes for a Course.
Each Class is held on specific Days (e.g. Monday & Wednesday,) at specific Times (e.g. 10:30-11:30,) in specific Rooms (e.g. AQ3100 & CC7232.)

Each Instructor teaches one or more Classes (Sounds good…)

Each Class is taught by one Instructor…

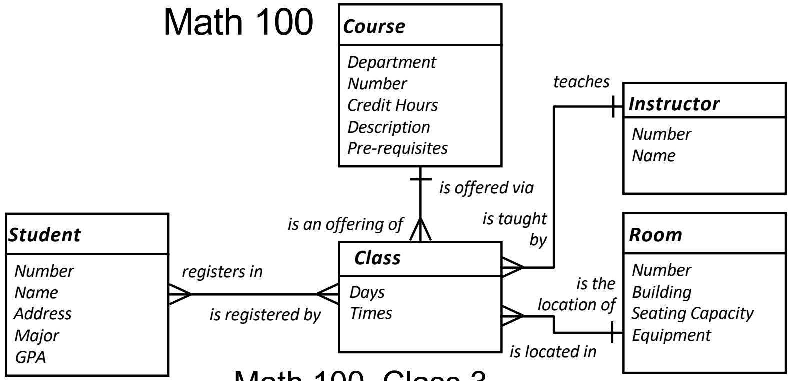
1. Student-Class
2. Course-Class
3. Instructor-Class
4. Room-Class

Which ones might be *incorrect?*

Discussion – state as assertions, identify incorrect ones

In some universities, Students in the same Class could be earning credit for *different* Courses – it could be a M:M relationship.

Math 100



Course
Department
Number
Credit Hours
Description
Pre-requisites

teaches

Instructor
Number
Name

is offered via

is an offering of

is taught by

Student
Number
Name
Address
Major
GPA

registers in

is registered by

Class
Days
Times

is the location of

is located in

Room
Number
Building
Seating Capacity
Equipment

Math 100, Class 3,
Spring Semester 2022

1. Student-Class
   Each Student *registers in* one or more Classes
   Each Class *is registered by* one or more Students ✓
2. Course-Class
   Each Course *is offered via* one or more Classes
   Each Class *is an offering of* one Course ? – depends on Policy
3. Instructor-Class
   Each Instructor *teaches* one or more Classes
   Each Class *is taught by* ~~one~~ One or More Instructors
4. Room-Class
   Each Room *is the location of* one or more Classes
   Each Class *is located in* ~~one~~ One or More Rooms

Each Class is taught by One or More Instructors. On what basis?

- team teaching
- backup
- replacement
- specialist
- guest lecturer
- lab assistant
- teaching assistant
- …

We are discovering reference data to describe an Instructor's Role.

All of this has an impact on the Business Process! It's easier to resolve these rules before working on the Process.

The basics: ERA *– Attributes*

A fact about an entity recorded as a piece of data.
If facts are needed about a relationship,
we will later (in the Logical Data Model) create an entity
that represents the relationship and records its facts

Like Entities, attributes are named and defined

Not every possible fact – just the ones we need

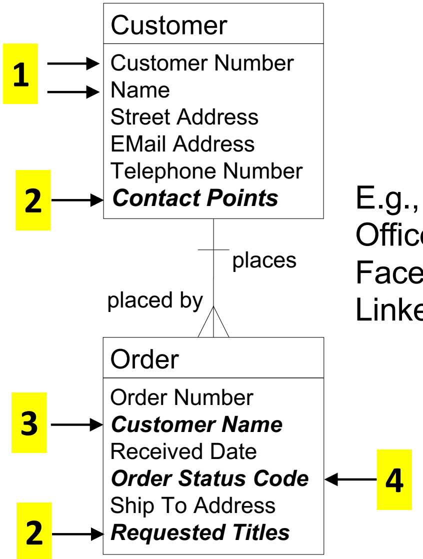
Have properties that we address during the transition from Concept Model to Logical Data Model

1. base or fundamental attribute
2. single-valued vs. multivalued – one attribute can have multiple values, *at* a time or *over* time
3. fundamental vs. redundant – the same value is recorded multiple times in different entities
4. “user-entered” vs. constrained – attribute can only come from a limited set, as in a drop-down list

Traditionally alphanumeric data; now includes richer types e.g., retinal scan image or voice audio clip

Eventually, in the logical model, an entity will contain only base / fundamental / *essential* attributes:

- an *essential fact* about that thing (entity)
- *not* multi-valued
- *not* redundant
  (a redundant attribute is an attribute that is really an essential fact about a *different* entity, so its value is recorded multiple times, redundantly)
- and *not* derived or calculated from other attributes; otherwise, clearly flagged "derived"



E.g., Mobile Number, Office Telephone Number. Facebook ID, LinkedIn ID, …

The details – Contextual, Conceptual, & Logical models

1 Contextual (Scope – Planner's View)

2 Conceptual (Overview – Owner's View)

3 Logical (Detail – Designer's View)

Agree on context or "big picture"

- The scope in terms of topics or subjects that are in or out, plus core terms and definitions
- May be a simple block diagram of topics/subjects, or primarily textual (a list)
- Optional – not necessary on smaller projects

My most plagiarised slide ever!

Agree on basic concepts and rules

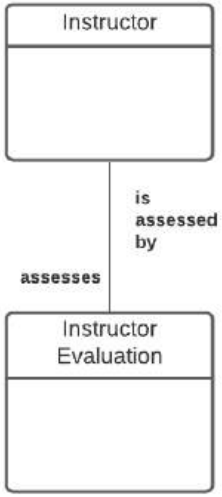
- Ensures everyone is using the same vocabulary and concepts before diving into detail
- Overview: main entities, attributes, relationships, rules
- Lots of M:M relationships
- Relationships show cardinality
- No keys
- Few or no reference entities
- Unnormalised – most M:M relationships unresolved, many attributes will be multi-valued, redundant, and non-atomic
- Verified directly by clients plus other techniques: Use Cases…
- A "one-pager"
- 20% of the modelling effort

Full detail for physical design

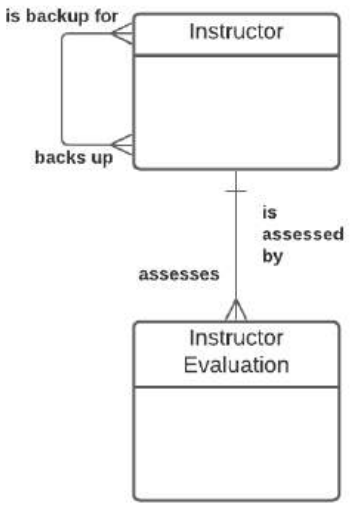
- Provides all detail for initial physical database design and requirements specification
- Detailed: ~ 5 times as many entities as the conceptual model
- M:M relationships resolved
- Relationship optionality added
- Primary, foreign, alternate keys
- Lots of reference entities
- Fully normalised – no multi-valued, redundant, or non-atomic attributes. All attributes defined and "propertised"
- Verified by other means: sample data, report mockups, scenarios, …
- May be partitioned
- 80% of the modelling effort

For reference – the Information Engineering symbol set

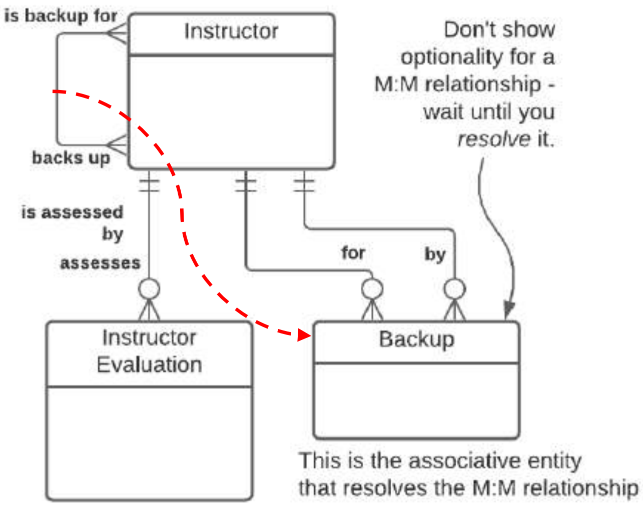
- This symbol set was refined and developed by Clive Finkelstein.
- Known in some tools as the "Martin IE" symbol set.
- Strengths are:
  - symbols are not "overloaded" – they explicitly convey only *one* idea.
  - can show as much or as little as needed in terms of rules.



The two entities are related - that's all this shows



There is a 1:M relationship from the parent entity (business object) to the child entity (business object.) Optionality is not shown.



Don't show optionality for a M:M relationship - wait until you *resolve* it.

This is the associative entity that resolves the M:M relationship

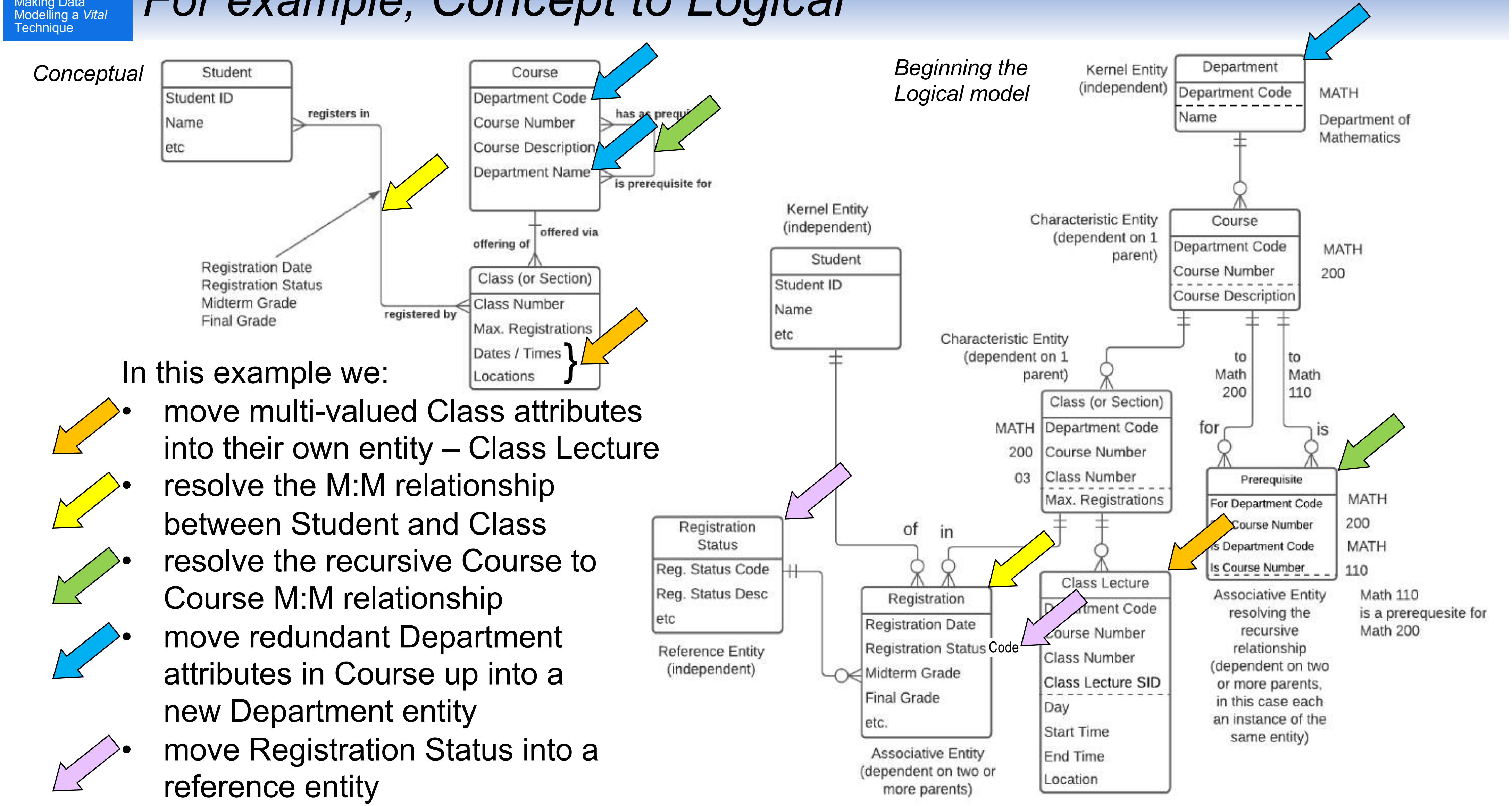
There is a 1:M relationship from parent to child, *optional* for the parent and *mandatory* for the child. (The parent *may* have a child, the child *must* have a parent.) This is by far the most common relationship in a logical model.

For reference – from Concept Model to initial Logical

The progression from conceptual to logical is largely based on identifying and dealing with three attribute characteristics

- Multi-valued - the attribute can have multiple different values for one instance of the entity, either "at a time" or "over time"
  E.g., "Employee Name" if aliases or previous names are tracked
  - move it **down** to the "many" end of a 1:M relationship into a characteristic entity
  - if it's a fact about a M:M relationship between entities, move it down to the "many" end of a 1:M relationship into an associative entity
  - this puts the data structure into 1st Normal Form – 1NF
- Redundant - the same attribute value is recorded multiple times, in different entity instances, possibly inconsistently
  E.g., "Company Name" in a "Department" entity
  - move it **up** to the "one" end of a M:1 relationship
    to one of the parent (or higher) entities (2nd Normal Form – 2NF)
  - You might have to create a new parent entity where none existed before
- Constrained - a descriptive attribute needs to be restricted to a set of standard (or "allowable") values to improve integrity and reporting
  E.g., "Employee Type"
  - move it **out** to the "one" end of a M:1 relationship
    to a reference or other related entity (3rd Normal Form - 3NF)

For example, Concept to Logical



In this example we:

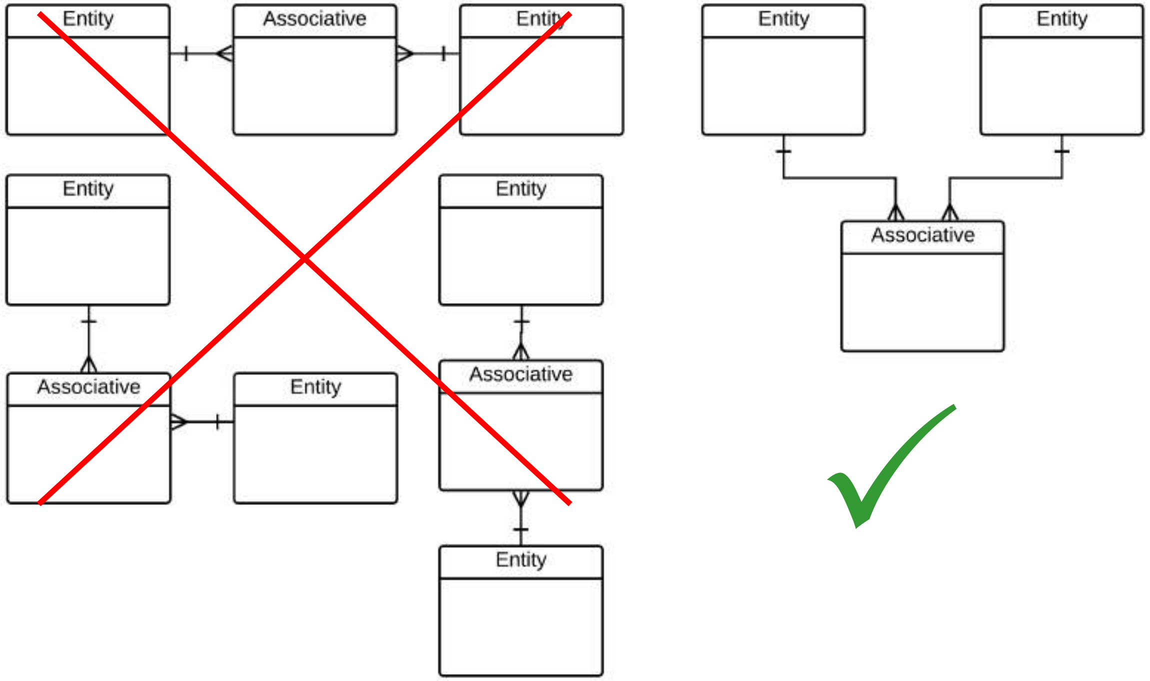
- move multi-valued Class attributes into their own entity – Class Lecture
- resolve the M:M relationship between Student and Class
- resolve the recursive Course to Course M:M relationship
- move redundant Department attributes in Course up into a new Department entity
- move Registration Status into a reference entity

Diagramming – consistency is a virtue

People pick up data modelling without training if you…

- treat it as a natural way to describe a business, not a new technique being imposed on them
- draw the same kinds of things the same way every time

E.g., when drawing an associative entity…

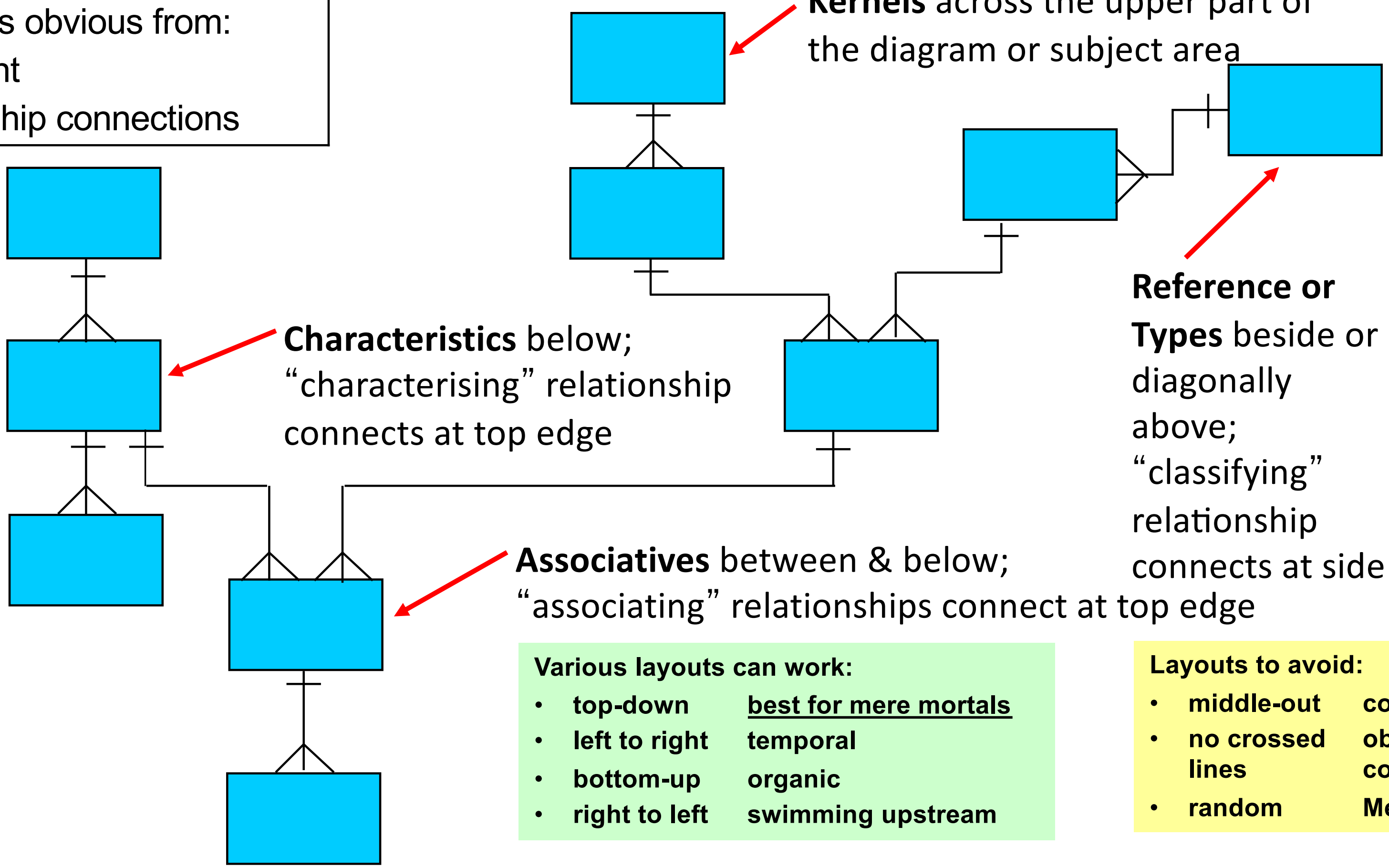


Graphic guidelines – the "no dead crows" principle

! *Key point*

Entity type is obvious from:

- Placement
- Relationship connections



Kernels across the upper part of the diagram or subject area

Characteristics below; "characterising" relationship connects at top edge

Reference or Types beside or diagonally above; "classifying" relationship connects at side

Associatives between & below; "associating" relationships connect at top edge

Various layouts can work:

top-down	**<u>best for mere mortals</u>**
left to right	**temporal**
bottom-up	**organic**
right to left	**swimming upstream**

Layouts to avoid:

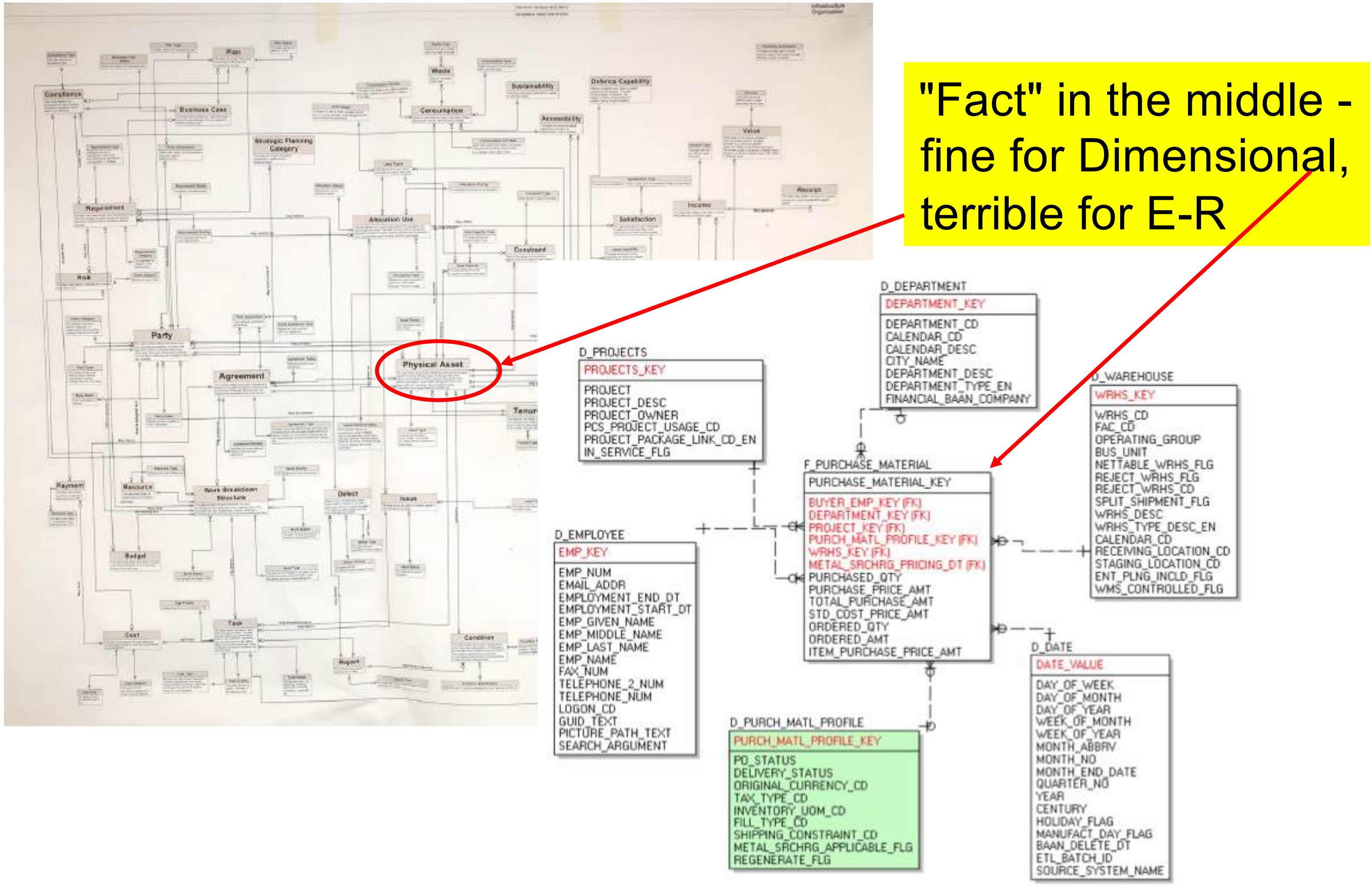
middle-out	**cosmic**
no crossed lines	**obsessive compulsive**
random	**Mensa-only**

Note! What works for Dimensional Models doesn't for E-R Models

A common error –
"the most important entity should go in the centre of the diagram."

An excellent model *structurally*, but very difficult to follow –
no sense of direction.

Concept Models / E-R Models should be drawn top-down by dependency.



"Fact" in the middle - fine for Dimensional, terrible for E-R

Identifying Entities – three common errors

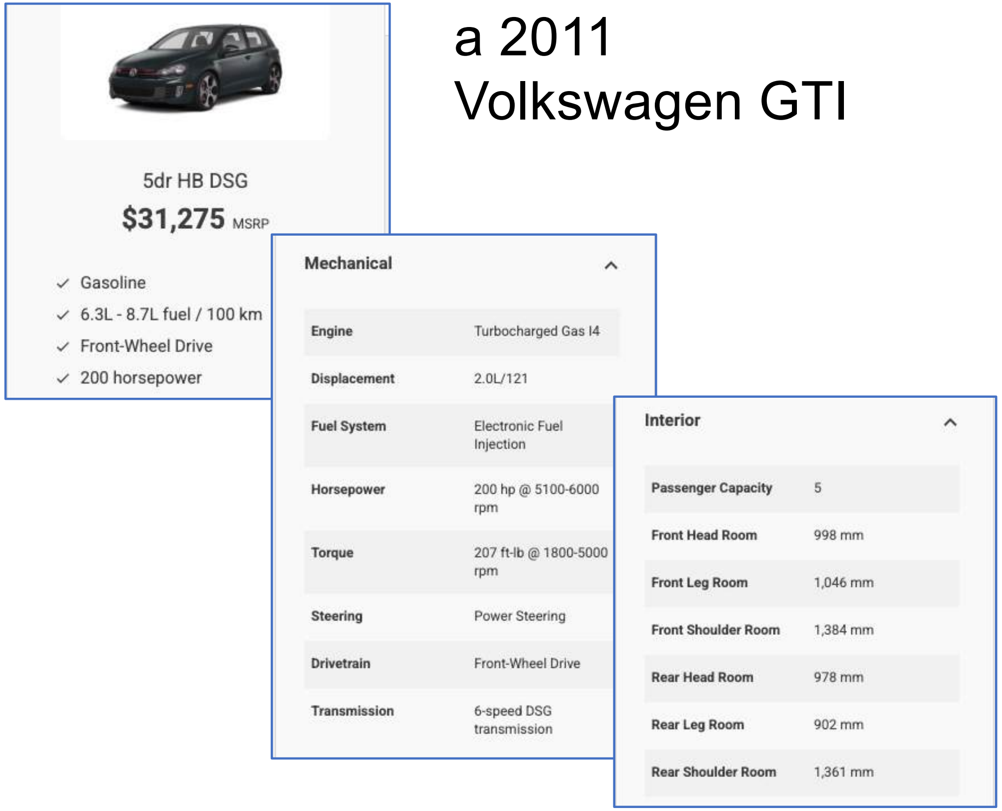
1. Treating an “artifact” (a spreadsheet, report, web page, form, etc.) as an Entity –
   an Entity is a fundamental, singular thing with no reference to *implementation* –
   Artifacts reflect implementation (form, DB, spreadsheet, list, …)
   and contain attributes from
   - *multiple different* Entities or
   - *multiple instances of the same* Entity
   e.g., *“Admission Request Form”* or *“Orders Summary Spreadsheet”*
   or *“Daily Call Log” or “Materials List Fax”* or *“Class Roster”* or *“Course List”* or…

2. Identifying an Entity that exists in the real world,
   but whose *instances* can't be uniquely identified
   e.g., *“Transit System Passenger” or "Event Attendee"*

3. The “types vs. instances” problem – failing to clarify if the Entity deals with
   types of things (or *categories* or *kinds* or *classes* of things)
   vs. specific *instances* of things
   e.g., “*Test” –* is this a *type* of Test, or a *specific instance* of a Test?
   more examples coming…

Types vs. Instances – a common error

Specifications for a type of vehicle – a 2011 Volkswagen GTI



5dr HB DSG

$31,275 MSRP

- ✓ Gasoline
- ✓ 6.3L - 8.7L fuel / 100 km
- ✓ Front-Wheel Drive
- ✓ 200 horsepower

Mechanical

Engine	Turbocharged Gas I4
Displacement	2.0L/121
Fuel System	Electronic Fuel Injection
Horsepower	200 hp @ 5100-6000 rpm
Torque	207 ft-lb @ 1800-5000 rpm
Steering	Power Steering
Drivetrain	Front-Wheel Drive
Transmission	6-speed DSG transmission

Interior

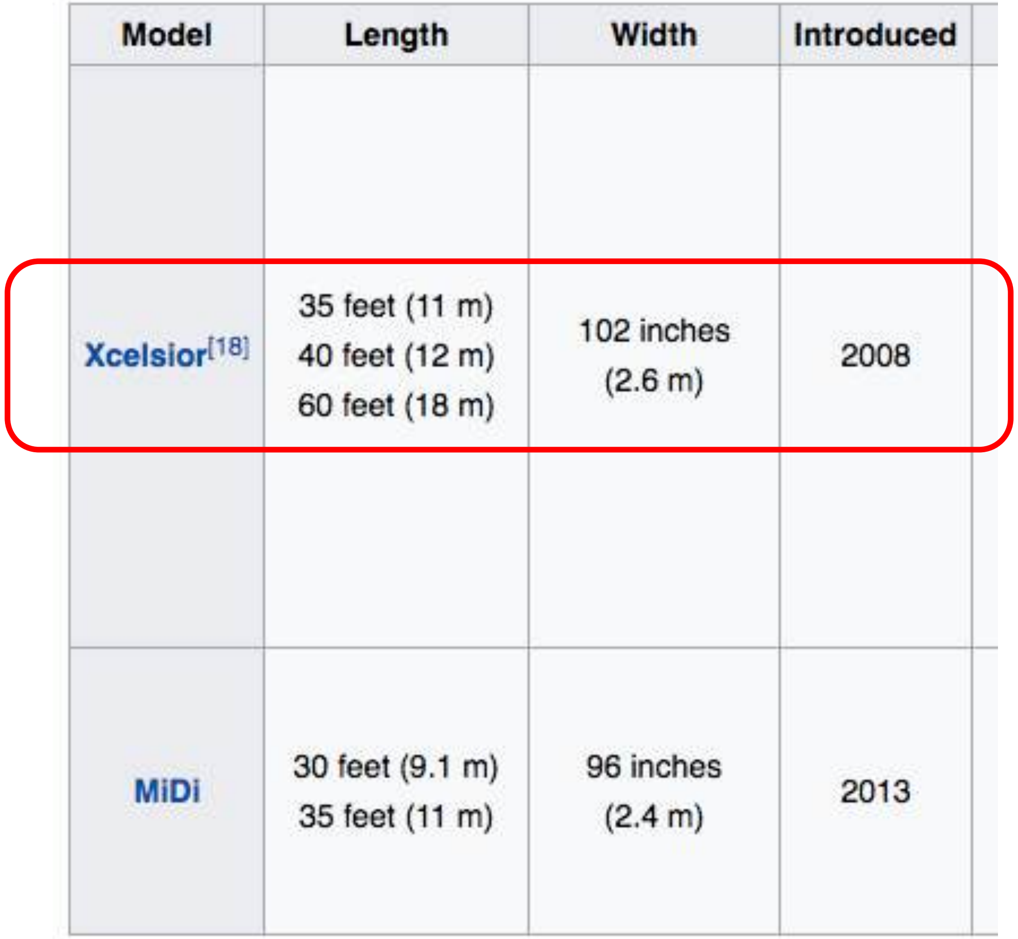
Passenger Capacity	5
Front Head Room	998 mm
Front Leg Room	1,046 mm
Front Shoulder Room	1,384 mm
Rear Head Room	978 mm
Rear Leg Room	902 mm
Rear Shoulder Room	1,361 mm

A "type" entity – Vehicle Make/Model

Alec's 2011 Volkswagen GTI
An "instance" entity – Vehicle

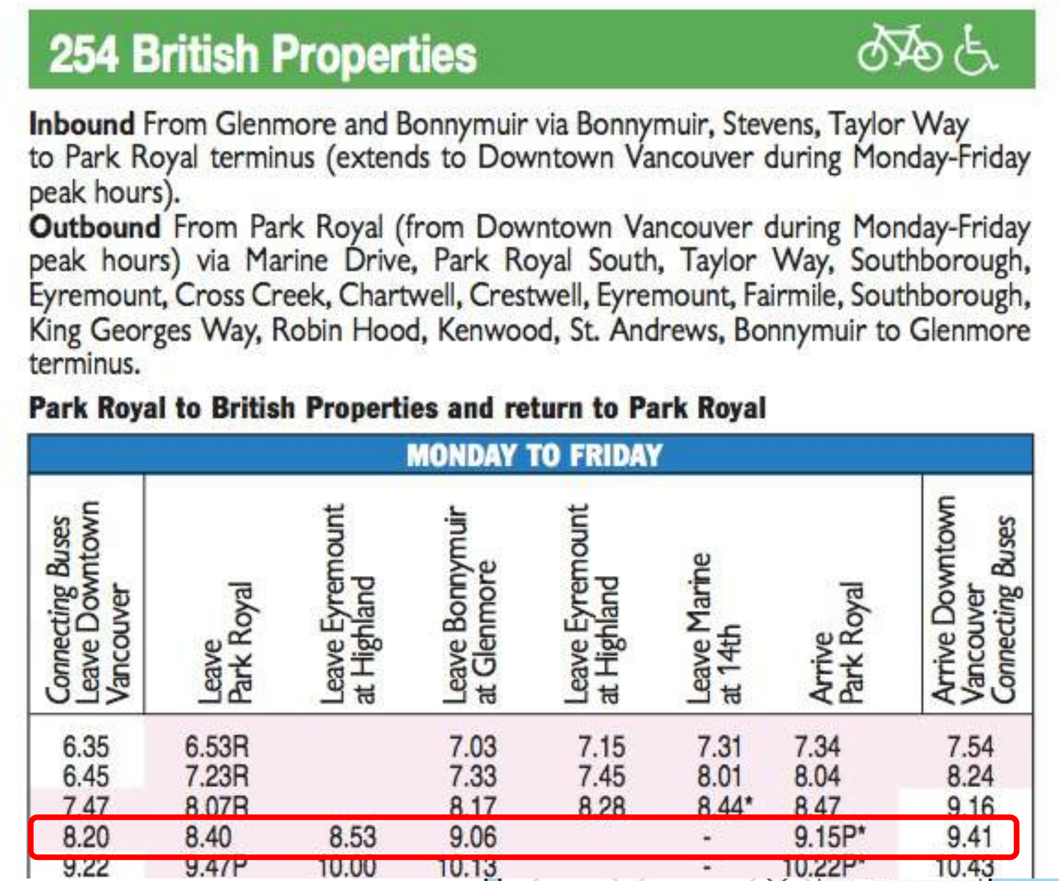
Types vs. Instances – "What do you mean by a Bus?"

A category of Bus – a "meta-Type?"
(transit, articulated, intercity, minibus, …)
A Make and Model of Bus – a Type?
An individual Vehicle? – an Instance?



Model	Length	Width	Introduced
Xcelsior[18]	35 feet (11 m) 40 feet (12 m) 60 feet (18 m)	102 inches (2.6 m)	2008
MiDi	30 feet (9.1 m) 35 feet (11 m)	96 inches (2.4 m)	2013

“What do you mean by a Bus?”



254 British Properties

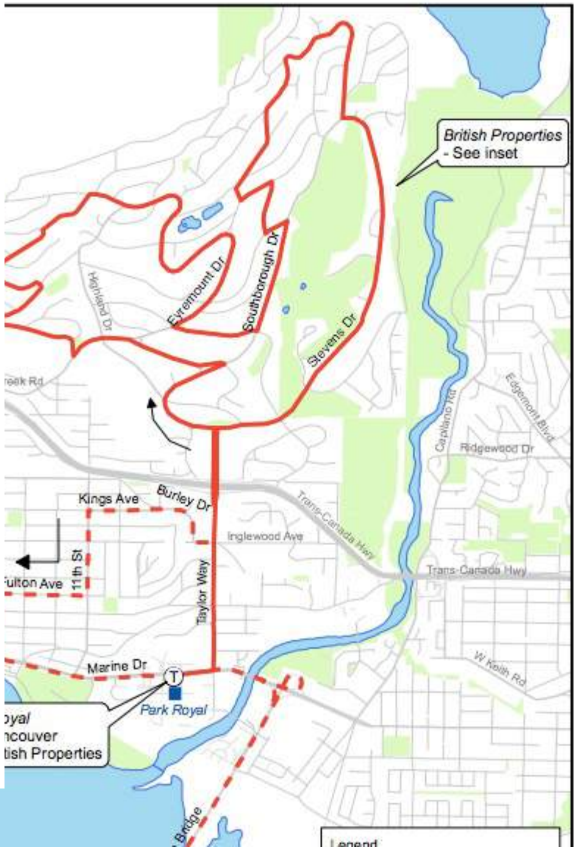
Inbound From Glenmore and Bonnymuir via Bonnymuir, Stevens, Taylor Way to Park Royal terminus (extends to Downtown Vancouver during Monday-Friday peak hours).

Outbound From Park Royal (from Downtown Vancouver during Monday-Friday peak hours) via Marine Drive, Park Royal South, Taylor Way, Southborough, Eyremount, Cross Creek, Chartwell, Crestwell, Eyremount, Fairmile, Southborough, King Georges Way, Robin Hood, Kenwood, St. Andrews, Bonnymuir to Glenmore terminus.

Park Royal to British Properties and return to Park Royal

MONDAY TO FRIDAY

Connecting Buses Leave Downtown Vancouver	Leave Park Royal	Leave Eyremount at Highland	Leave Bonnymuir at Glenmore	Leave Eyremount at Highland	Leave Marine at 14th	Arrive Park Royal	Arrive Downtown Vancouver *Connecting Buses*
6.35	6.53R		7.03	7.15	7.31	7.34	7.54
6.45	7.23R		7.33	7.45	8.01	8.04	8.24
7.47	8.07R		8.17	8.28	8.44*	8.47	9.16
8.20	8.40	8.53	9.06		-	9.15P*	9.41
9.22	9.47P	10.00	10.13		-	10.22P*	10.43



A Bus Route?
A Bus Route Scheduled Departure
An instance of a Bus Route Scheduled Departure?

Never be afraid to ask “What do you mean by…?”

Discussion – good Entity or not?

Which of the following might ***not*** be valid entities?
And if not, *why* not?

- Transcript
- Student
- Building
- Student Directory
- Faculty Member
- Instructor History
- Department
- Course
- Organisation Chart
- Prerequisite List
- Payment
- Student Body
- Class Roster
- Scholarship
- Faculty
- Assistant Dean
- Admission Date
- Phillips Building
- Registration
- Section
- Course Catalogue
- Physics
- Class
- Professor
- Admission Request Form

And a bonus… Time

Discussion – good Entity or not?

Which of the following might ***not*** be valid entities?
And if not, *why* not?

✗ Transcript
a report

✓ Student

✓ Building

✗ Student Directory
a report

✓ Faculty Member

✗ Instructor History
a list, "history" is not singular, and a history of *what?*

✓ Department

✓ Course

✗ Organisation Chart
a visual report

✗ Prerequisite List
a list

✓ Payment

✗ Student Body
not singular

✗ Class Roster
a report

✓ Scholarship

✓ Faculty

✗ Assistant Dean
a Job Title

✗ Admission Date
an attribute

✗ Phillips Building
an instance

✓ Registration

✓ Section

✗ Course Catalogue
a report

✗ Physics
an instance

✓ Class

✗ Professor
a Job Title

✗ Admission Request Form
a form (artifact)

✗ Time
not a distinct thing ("what is a *time?")*
but can you think of any time-related entities?

Entity definition basics

Definitions must focus on what a single instance is:

- Not “how they're used” or “how they're created” or “why we care” or “how the process works” or “interesting problems and tidbits” etc.
- They simply answer the question “What is *one* of these things?”

Key Point

“What is one of these things?”

The most useful questions:

“Can anyone think of examples that might surprise someone else – that is, anomalies or potential sources of confusion?” E.g., to define *Customer…*

- “In our area, other divisions are treated as customers”
- “We record recipients of charitable donations as customers.”

“Could we list some examples?” e.g.,
Rita Smith, Acme Auto, Ministry of Finance, homeowners… (aha!)

“Does this deal with “kinds of things” or “specific things?”

- “kind” - Customer Category vs. “specific” – an individual Customer
- if it's a specific thing, still ask if there are recognised types (e.g., Personal, Corporate, Government; Lead, Prospect, Active)

Entity definition – bad example then a good format

~~**Customer**~~
~~We have a variety of Customers that operate in multiple geographies, and these must be tracked in order to consolidate purchasing statistics and enable our rating process to identify our best Customers.~~

Entity definition format:

1. A description of which real-world things will be included in scope.
   This might be developed from a list of standard "thing types" – person, organisation, request, transfer, item, location, activity, etc.
   Be sure to identify any specific inclusions ("This includes..." or "This is...")
2. Illustrate with examples:
   - 5 – 10 sample instances
   - diagrams or scenarios
   - illustrations such as reports or forms
3. Interesting points – anomalies, synonyms, common points of confusion, etc.
   May include specific exclusions ("This excludes..." or "This is not...")

Customer
1. A Customer is a person or organisation that is a past, present, or potential user of our products or services.

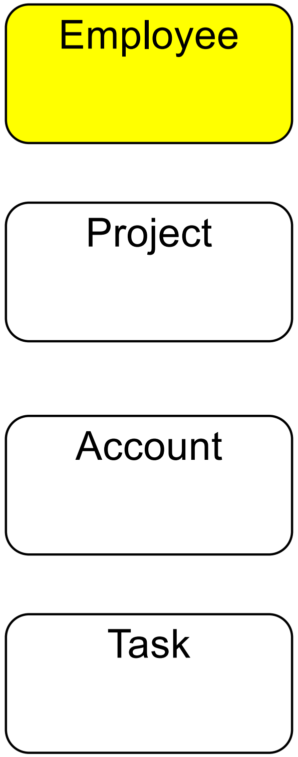
2. Current examples include Solectron (contract manufacturer,) Cisco Systems (OEM,) Arrow Electronics (distributor,) Best Buy (retailer,) M&P PCs (assembler,) and individual consumers.

3. Excludes the company itself when we use our own products or services but includes cases where the Customer doesn't have to pay (e.g., a charity.)

Discussion – starting an Entity definition

*“Can anyone think of examples that might surprise someone else –
that is, anomalies or potential sources of confusion."
E.g., how could we legitimately have different ideas what “Employee" means?*

-
-
-
-
-
-
- …



Employee

Project

Account

Task

Discussion – starting an Entity definition

“Can anyone think of examples that might surprise someone else – that is, anomalies or potential sources of confusion."
E.g., how could we legitimately have different ideas what “Employee" means?

F/T vs. P/T?

Only IS Department?

Include management,
or only individual contributors?

Still in recruitment (an applicant)?

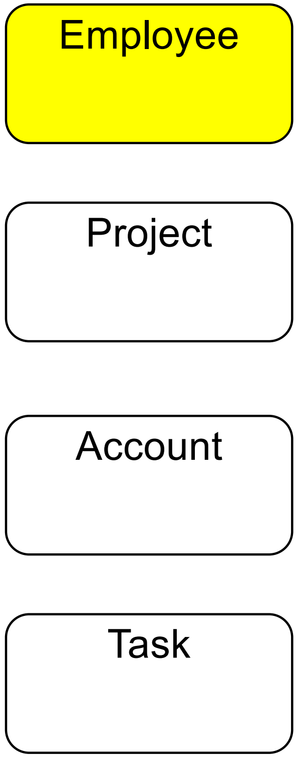
Onboarded? on probation? active? retirees?

Include contractors, student interns, vendor staff, etc.?

Volunteers?

A type of worker (DBA or tester) or a specific person?

A robotic, automated, or AI agent?



Employee

Project

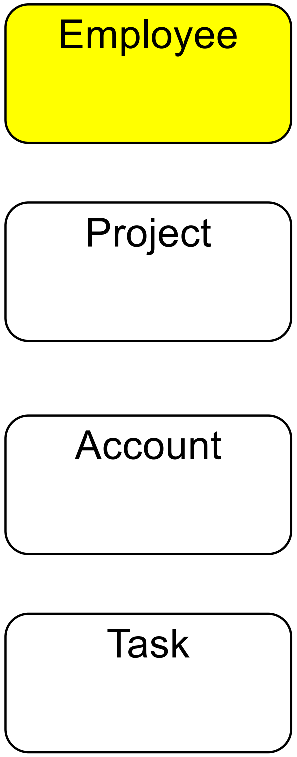
Account

Task

Starting an Entity definition

*“Can anyone think of examples that might surprise someone else –
that is, anomalies or potential sources of confusion."
E.g., how could we legitimately have different ideas what “Employee" means?*

F/T vs. P/T?	– *Both*
Only IS Department?	– *No*
Include management, or only individual contributors?	– *Yes, everyone*
Still in recruitment (an applicant)?	– *No*
Onboarded? on probation? active? retirees?	– *Yes, all*
Include contractors, student interns, vendor staff, etc.?	– *Yes, all*
Volunteers?	– *Yes*
A type of worker (DBA or tester) or a specific person?	– *No, only a specific person*
A robotic, automated, or AI agent?	– *No, only a real person*



Defining the Entity "~~Employee~~" – "Worker"

Definition format:

1. A description of which real-world things are within in scope, and any specific inclusions (“This *includes*…” or “This *is*...”)

2. Illustrate with examples – 5 to 10 sample instances or types

3. Interesting points – anomalies, synonyms, common points of confusion, etc.
May include specific exclusions
(“This *excludes*…” or “This *is not*...”)

Worker (renamed from Employee):

A *Worker* is a person, whether or not directly employed by *the company,* but with some sort of employment contract or arrangement, who has been or may be assigned to a Project.

Worker includes:

- Full or Part-time Employees who have been onboarded, including Probation, Active, Seconded, Suspended, Retired…
- Contractors
- Consultants
- Student Interns
- Vendor Staff Persons
- Company Owners and Managers

Key points:

- "Worker" was chosen as the entity name because it is more generalised than "Employee."
- A Worker may not necessarily be billable on a Project, e.g., a non-chargeable Subject Matter Expert or Volunteer
- Worker excludes:
  - Job Roles, e.g., DBA or Technical Writer
  - Robotic, Automated, or AI Agents (this might change)

Another example – starting an entity definition for Task

“Can anyone think of examples that might surprise someone else – that is, anomalies or potential sources of confusion."
E.g., how could we legitimately have different ideas what “Task" means?

-
-
-
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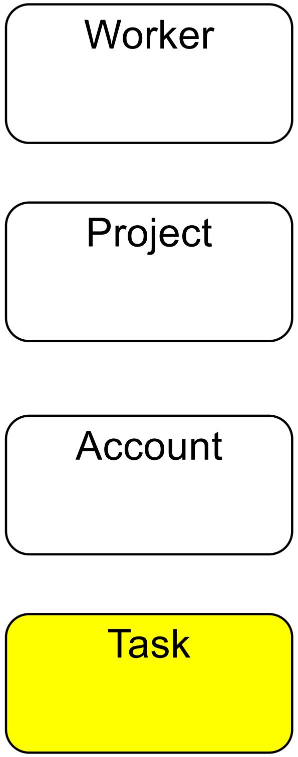
-



Another example – starting an entity definition for Task

"Can anyone think of examples that might surprise someone else – that is, anomalies or potential sources of confusion."
E.g., how could we legitimately have different ideas what "Task" means?

Key points that typically arise:

- A *type* of Task or a *specific* Task?
- Part of a *specific* Project or used across *multiple* Projects?
- Produces a specific *deliverable* or *state*?
- Time-bounded or ongoing?
- Performed by *one* Worker or *one or more* Workers?
- …

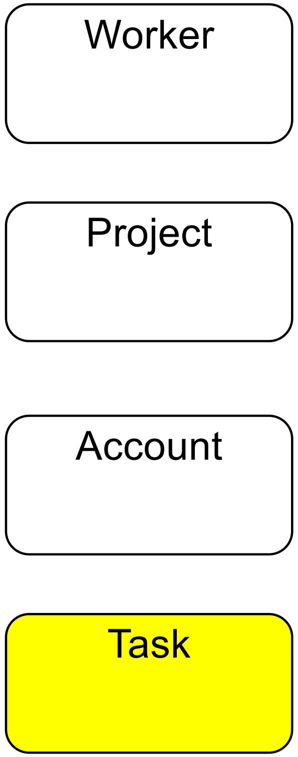
A ***Task*** is a specific, time-bounded, unit of work, within a single Project, intended to be performed by one or more Workers, that produces an intended deliverable or achieves a specific state.

Examples:

- Code *Place Order* service
- Test *Place Order* service

Excludes:

- types of Tasks
- ongoing (non time-bounded) activities such as management or administration

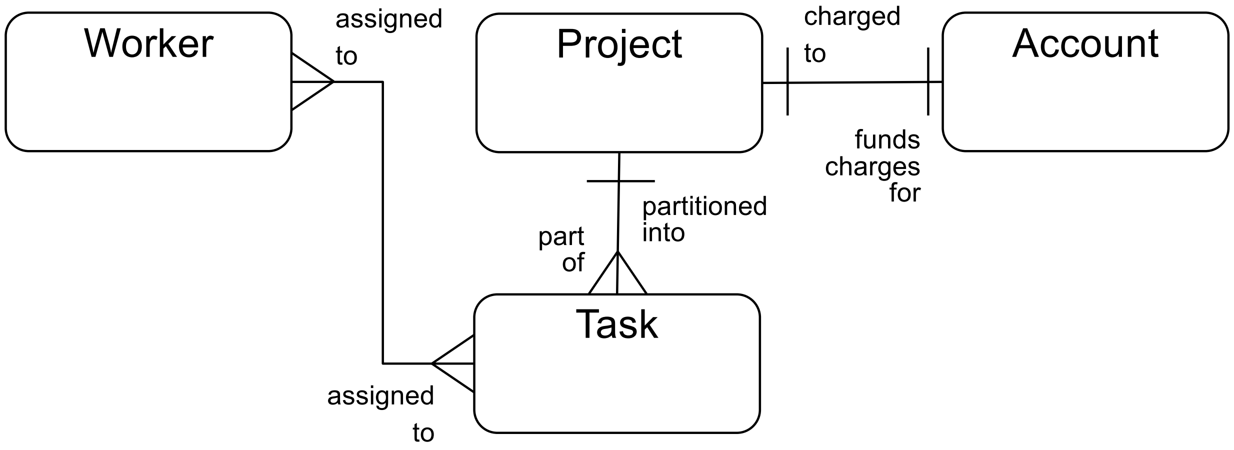

Worker

Project

Account

Task

Now we have definitions – it's "safe" to draw the ER model



First arrange entities top-down by dependency.

Then add relationships with a verb-based phrase.

Then add cardinality (1:1, 1:M, M:M.)

Don't forget the four Ds of Concept Modelling

1 Definition

- "What *is* one of these things?"
- List common and unusual instances
- "Are there any known anomalies?"
- "What are the potential differences of opinion?"

2 Dependency

- "What type of entity is this?"
- "What other entity does it depend on?"
- Essentially
  - is it a free-standing thing?,
  - is it a type of thing?,
  - is it repeating detail about some other thing?

3 Detail

- Don't dive into detail – keep it in its place!
- GEFN!* HPDL!**

**Good enough for now!*
***Hard part, do later!*

4 Demonstration

- Assertions / narrative rules
- Sample data values or instances
- Scenarios or use cases
- Props (e.g., report layouts or common documents)

Other courses for analysts by Alec Sharp

Working With Business Processes – *Process Change in Agile Timeframes* 2 days

Business processes matter, because business processes are how value is delivered. Understanding how to work with business processes is now a core skill for business analysts, process and application architects, functional area managers, and even corporate executives. But too often, material on the topic either floats around in generalities and familiar case studies, or descends rapidly into technical details and incomprehensible models. This workshop is different – in a practical way, it shows how to discover and scope a business process, clarify its context, model its workflow with progressive detail, assess it, and and transition to the design of a new process by determining, verifying, and documenting its essential characteristics. Everything is backed up with real-world examples, and clear, repeatable guidelines.

Business-Oriented Data Modelling – *Useful Models in Agile Timeframes* 2 days

Data modelling was often seen as a technical exercise, but is now known to be essential to other initiatives such as business process change, requirements specification, Agile development, and even big data, analytics, and data lake implementation. Why? – because it ensures a common understanding of the things – the entities or business objects – that processes, applications, and analytics deal with. This workshop introduces concept modelling from a non-technical perspective, provides tips and guidelines for the analyst, and explores entity-relationship modelling at contextual, conceptual, and logical levels using techniques that maximise client involvement.

Working With Business Processes Masterclass – *Aligning Process Work with Strategic, Organisational, and Cultural Factors* 3 days

This 3-day interactive workshop combines the core content from two highly-rated classes by Alec Sharp – “Working With Business Processes” and “Advanced Business Process Techniques.” This structure is popular because it gets both new and experienced practitioners to the same baseline on Claritiq’s unique, agile, and ultra-practical approach to Business Process Change. First, it shows how to effectively communicate Business Process concepts, discover and scope a business process, assess it and establish goals, and model it with progressive detail. Then, it shifts to advanced topics – specific, repeatable techniques for developing a process architecture, encouraging support for change, and completing a feature-based process design. The emphasis is always on ensuring business process initiatives are aligned with human, social, cultural, and political factors, and enterprise mission, strategy, goals, and objectives.

Business-Oriented Data Modelling Masterclass – *Balancing Engagement, Agility, and Complexity* 3 days

Our most popular workshop! This intensive 3-day workshop combines the core content from two popular offerings by Alec Sharp – “Business Oriented Data Modelling” and “Advanced Data Modelling.” First, the workshop gets both new and experienced modellers to the same baseline on terminology, conventions, and Clariteq’s unique, business-engaging approach. We ensure a common understanding of what a data model *really* is, and maximising its relevance. Then, we provide intense, hands-on practice with more advanced situations, such as the enforcement of complex business rules, handling recurring patterns, satisfying regulatory requirements to model time and history, capturing complex changes and corrections, and integrating with dimensional modelling. Always, the philosophy is that a data model is a description of a business, not of a database, and the emphasis is on engaging the business and improving communication.

Model-Driven Business Analysis Techniques – *Proven Techniques for Processes, Applications, and Data* 3 days

Simple, list-based techniques are fine as a starting point, but only with more rigorous techniques will a complete set of requirements emerge, and those requirements must then be synthesised into a cohesive view of the desired to-be state. This three-day workshop shows how to accomplish that with an integrated, model-driven framework comprising process workflow models, a unique form of use cases, service specifications, and business-friendly data models. This distinctive approach has succeeded on projects of all types because it is “do-able” by analysts, relevant to business subject matter experts, and useful to developers. It distills the material from Clariteq’s three, two-day workshops on process, data, and use cases & services.

Thank you – stay in touch!

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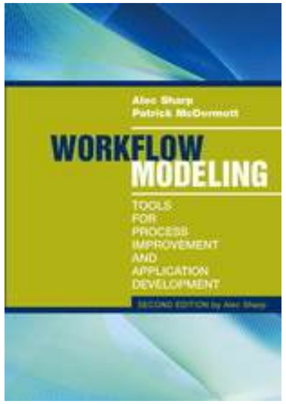

And most of all, if you have questions or comments…
don't be shy – send me a note!