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

A one-day (-ish) workshop developed by
Alec Sharp and Clariteq Systems Consulting Ltd.
for University Medical Center Groningen
arranged by Adept Events

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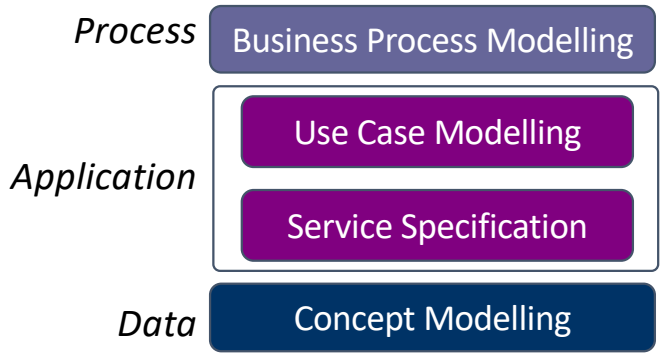
Instructor / course developer background…

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

- 40+ years experience as an independent consultant:
  - Business Process Change – discover, model, analyse, and design/redesign processes
  - Application Requirements Specification
  - Data Modelling and Management My roots!

    +
  - Facilitation & Organisational Change
  - Project Recovery

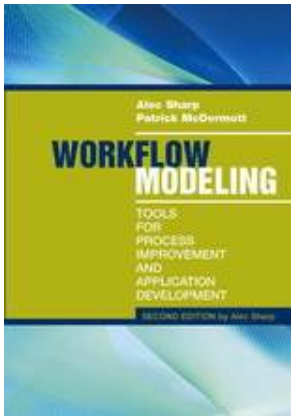


- Consulting, teaching, speaking globally (pre-pandemic)

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

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

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

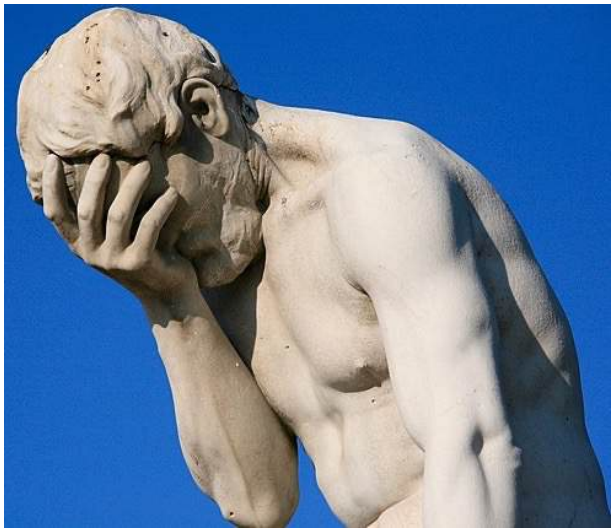


A "Top Ten" list of what we'll cover…

★ Topics

- Concept Modelling – what is it, where did it go wrong, what's new?
- Case study – using a Concept Model to discover Use Cases, User Stories, Business Services, and other requirements
- "Essential" models – critical for Business Analysis
- Concept Modelling within a Business Analysis framework
- Critical distinctions among Contextual, Conceptual, and Logical Models
- Data model principles and components – “ERA”
- The transition from Conceptual to Logical
- Graphic guidelines and the importance of consistency
- Developing definitions without angst or friction
- Another case study (as time permits) of bottom-up modelling

Data Modelling – out of favour for a while, but things are getting better!



"We don't need data modelling because..."

- "We're going Client-Server!" (~1986)
- Agile ("We'll ~~refactor~~ rehacktor as necessary!")
- Packaged software / COTS
  ("The vendor has seen it all and has this figured out!")
- Big Data ("It's schema-less!") and IoT
- Data Science/Analytics
  ("The algos will discover all the connections!")
- Data Lake, Data Mesh, Data Lakehouse, … ("Fill it and they will come!")
- …and many other Silver Bullets that will *Save The Day!*
  (Chat GPT, Gen AI, LLM, … anyone?)

And then, starting ~ 5 years ago:

- "Could you build a 'Data Modelling for Data Scientists' class?"
- At a public workshop …
  "We aren't building a Data Lake, we're building a Data *Swamp!*"

What actually is a Concept Model / Business Object Model

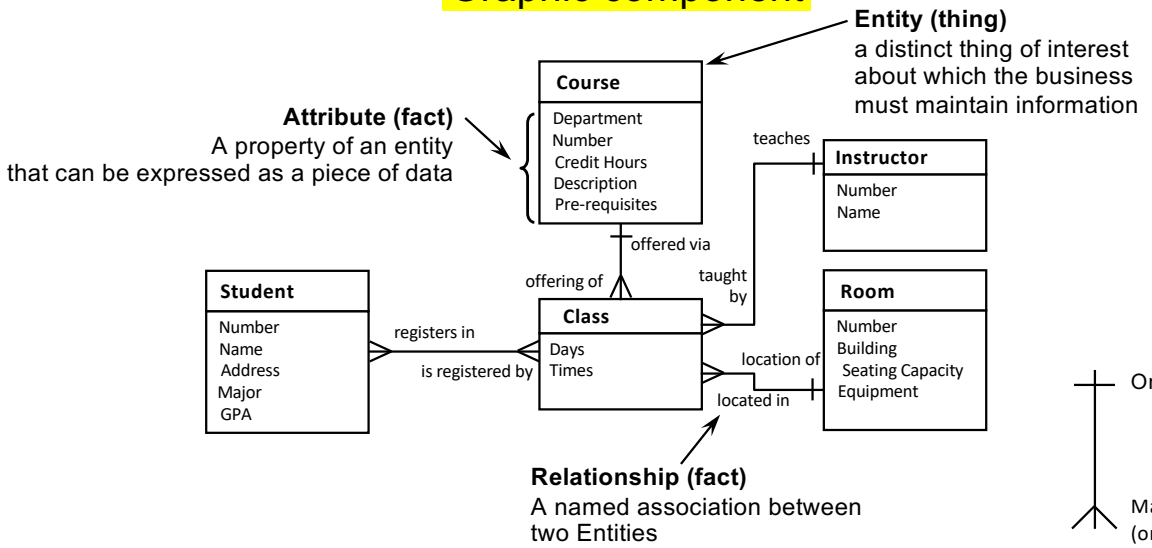
- A *description of a business* in terms of
  - **things** it needs to maintain records of – *Entities*
  - **facts about those things** – *Relationships & Attributes*
  - **policies & rules** *governing those things and facts*
- Models a view of the **real world**, not a technical design (therefore,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

"Things" first, data later!

Narrative component

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

Graphic component

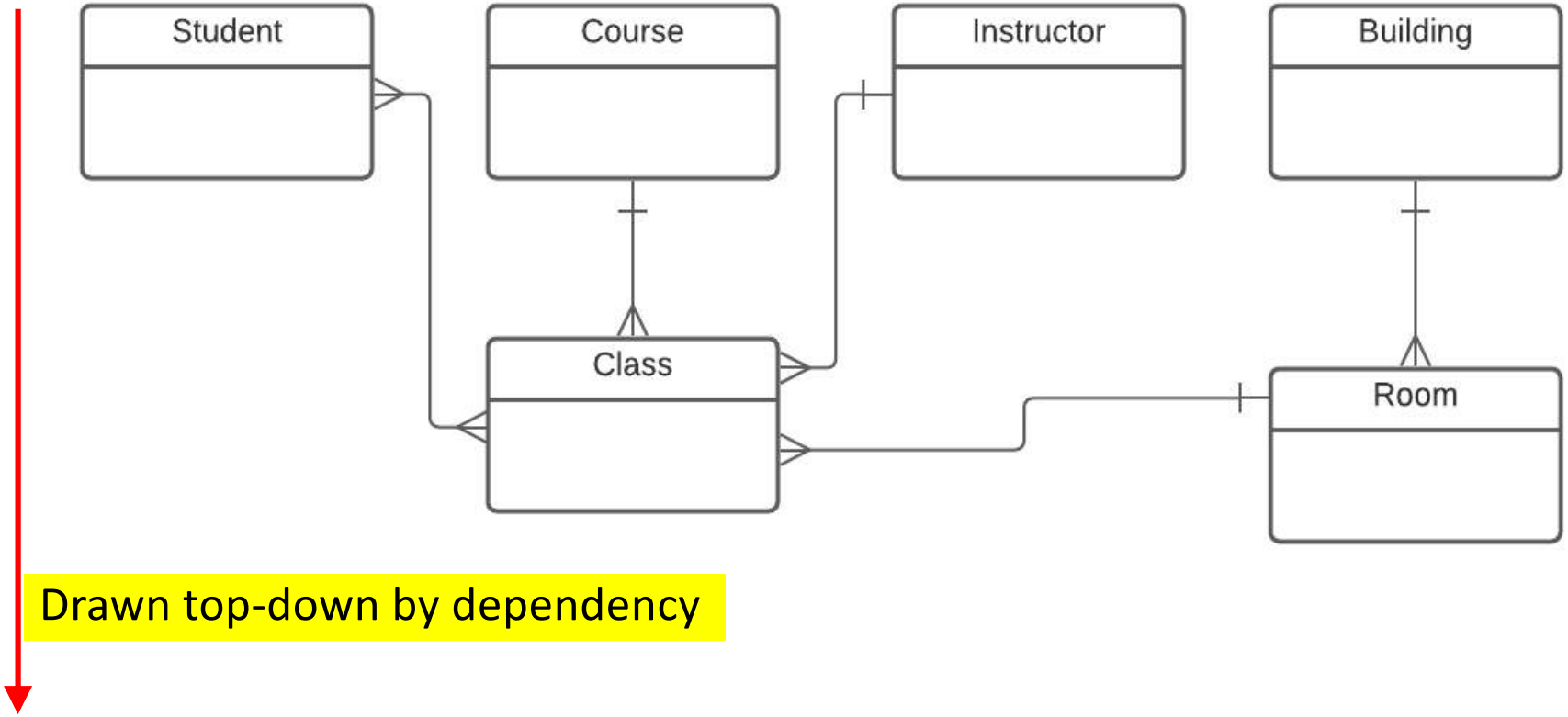


Plus "Assertions" (policies & rules)
- Each Course is offered through one or more Classes
  Each Class is an offering of a single, specific Course
- Each Instructor teaches one or more Classes
- Each Class is taught by one Instructor
  (which may or may not be true…)

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

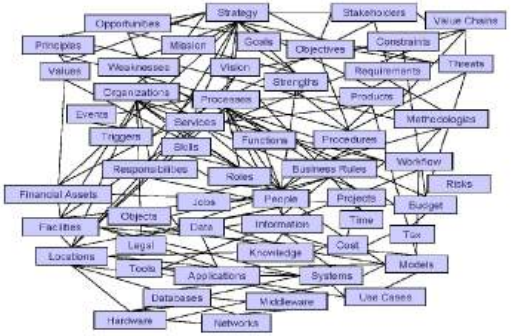
A better looking version of the model on the previous slide

Independent Entities at the top



Drawn top-down by dependency

A few central ideas about Concept Modelling…



- Was discouraged by confusing *concept modelling or data modelling* with *database design – this is changing!*

- Less commonly called "data modelling" because initially “data” is not the issue – we model:
  - the “things” / objects / concepts the business cares about:
    - terms and definitions – ***language first!***
    - policies and rules
  - “things first, data later”

- A concept model provides a great platform for:
  - requirements discovery
    (and getting beyond the dreaded "Business Requirements Document"
  - package selection
  - business process change

Case study from our Working With Business Processes Masteclass

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!

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

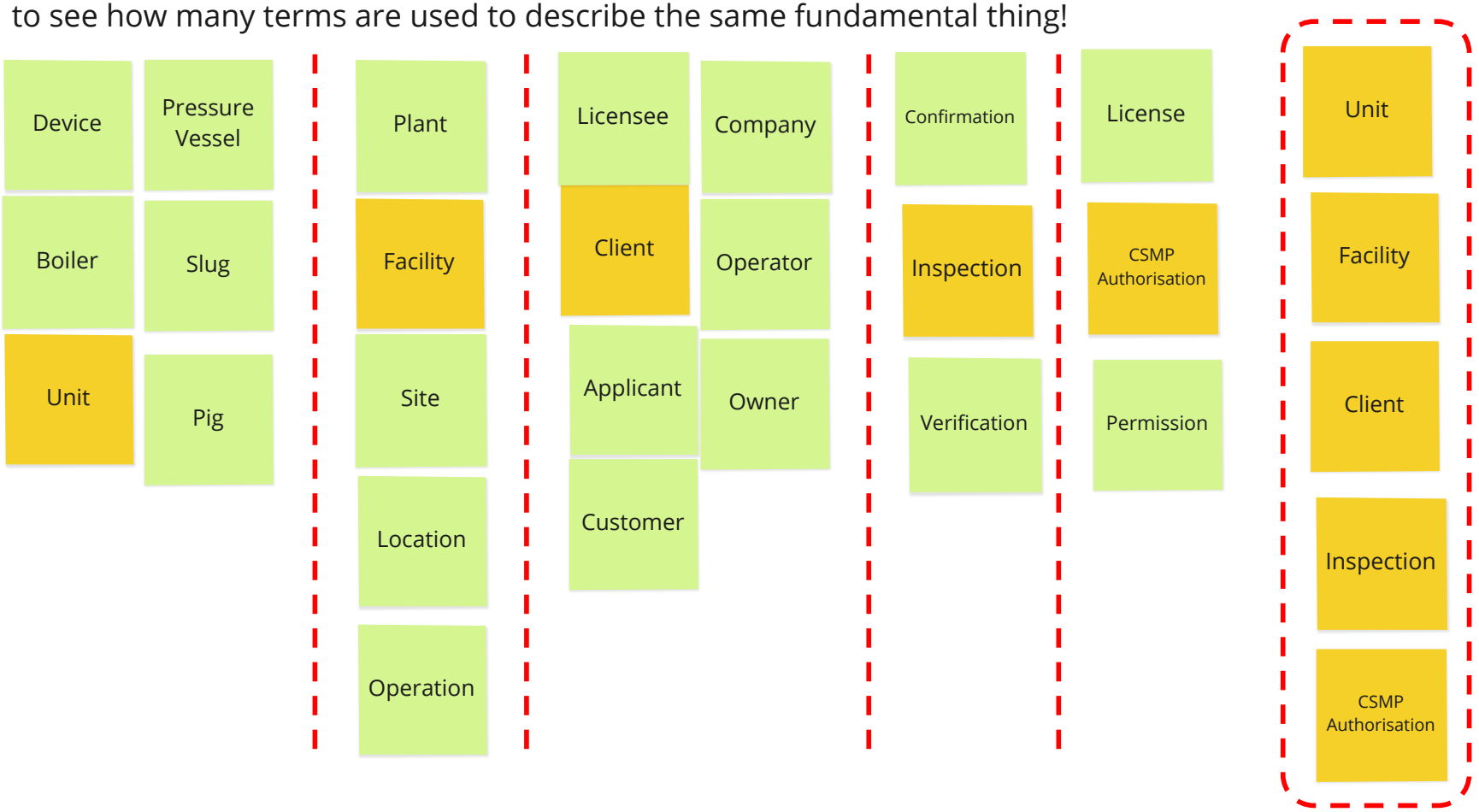
Always start with terminology (the “things”)

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" – an entity in a Concept Model.

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

Review from an example on Miro – Terminology Analysis

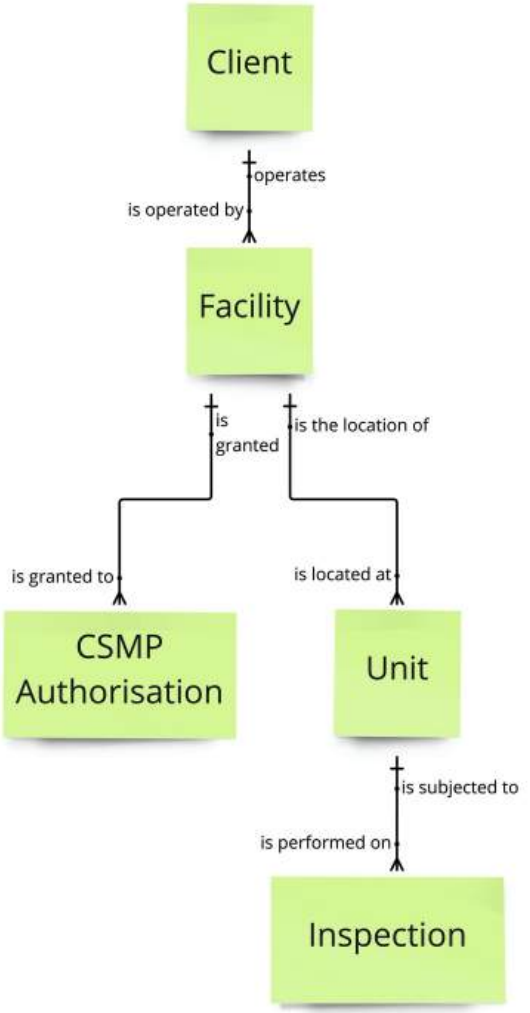
Terminology analysis (continued):
Let's arrange these terms into columns of synonyms. It's always a surprise for the business to see how many terms are used to describe the same fundamental thing!



Then, we developed a quick definition for each term. More on that later.

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

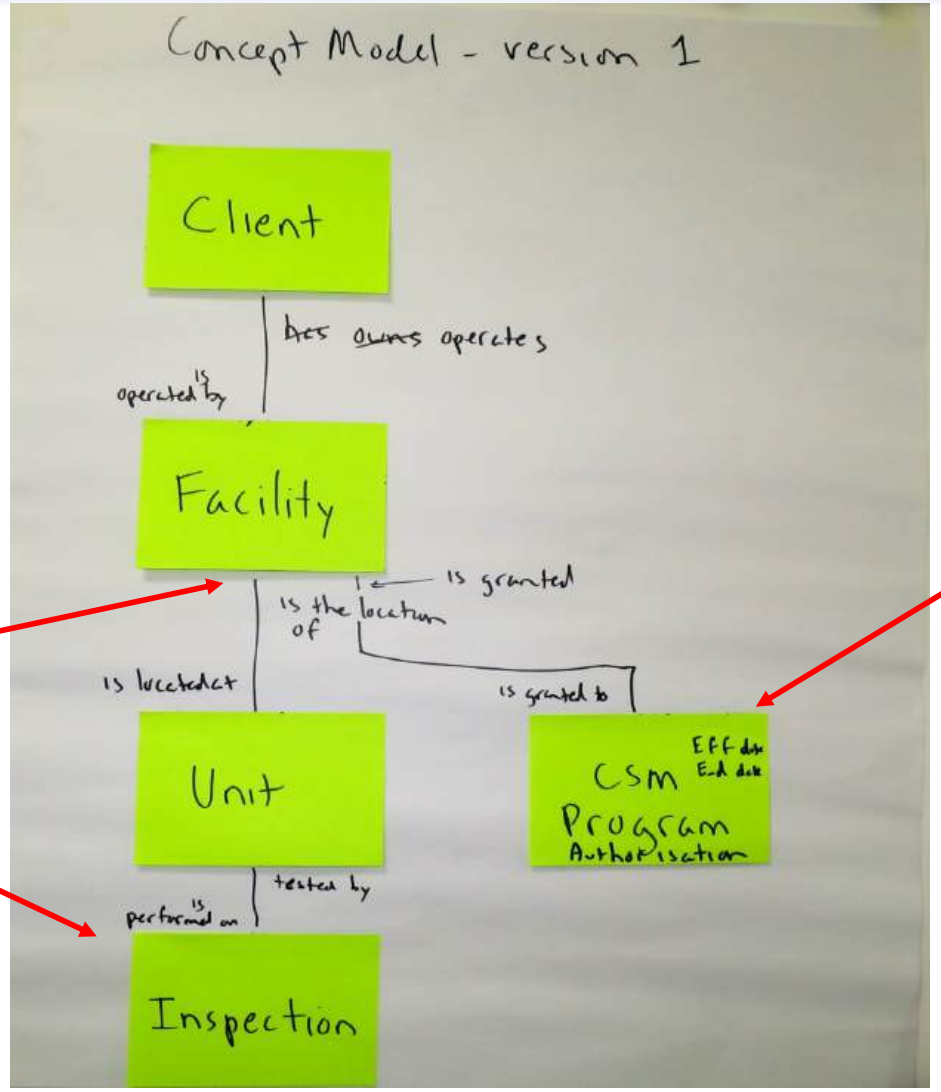
1. We arranged the entities / business objects by dependency
2. Then we drew relationship lines
3. Then we added a relationship name in each direction
4. Only then did we state (in words) the cardinality (1:1, 1:M, M:M) and then update the diagram with hash marks (⫞) and crowsfeet (⅄)



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?

What do we issue the Authorisation to?

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 ___

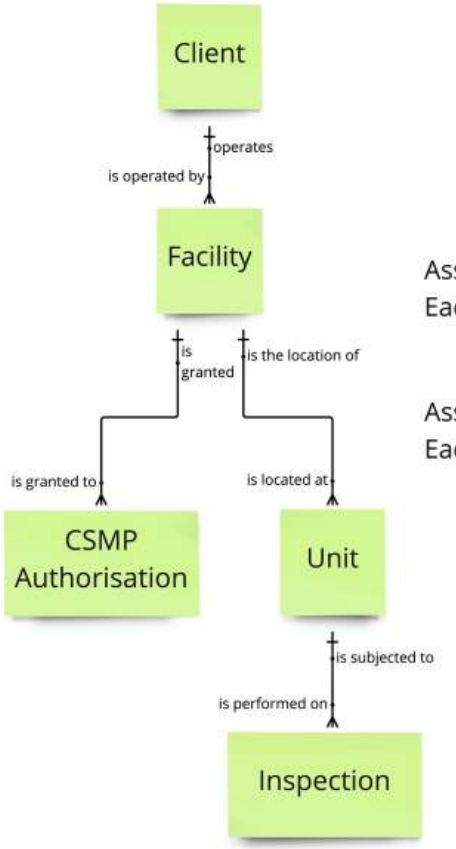
Assertion:
Each Facility is the location of ___

Assertion:
Each Unit is located at ___

Assertion:
Each CSMP Authorisation is granted to ___

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.

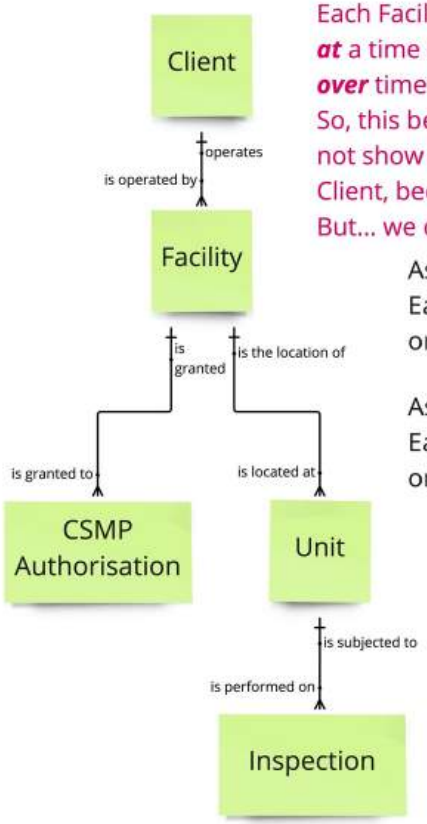
Assertion:
Each Client operates
one or more Facilities

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

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

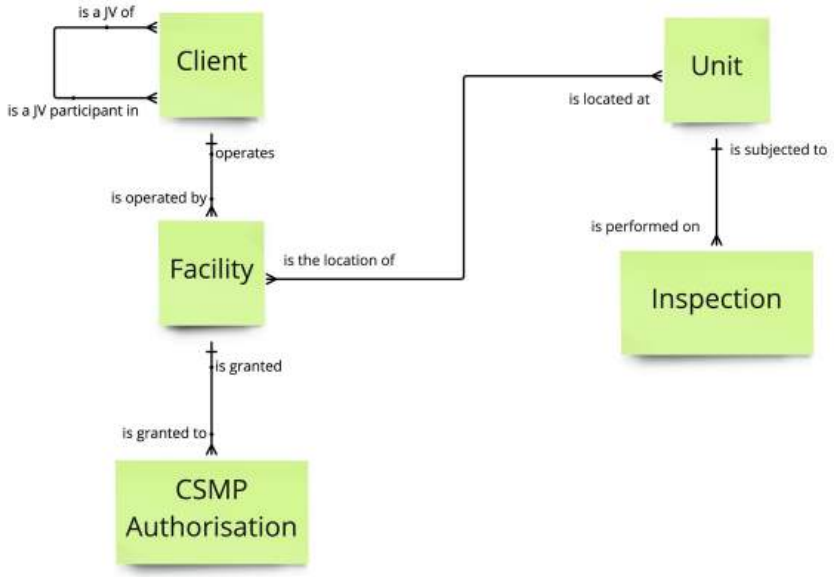
Assertion:
Each Unit is located at
one Facility

Assertion:
Each Unit is subjected to
one or more Inspections

Assertion:
Each Inspection is performed on
one Unit

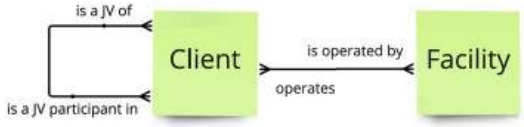
Concept Model Version 2; revised from challenging Assertions

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

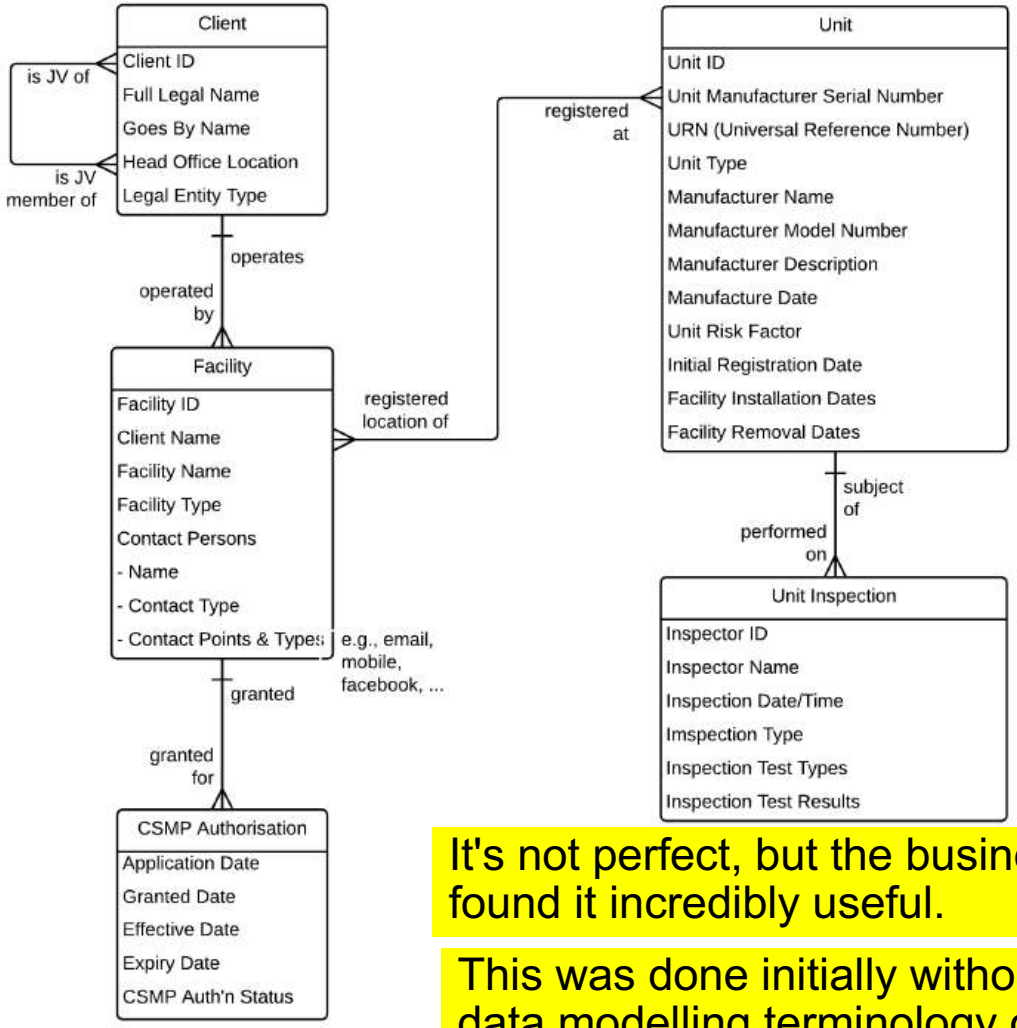


Note:
You don't always get what you *want* or what you think is the *right* thing in Concept Modelling. In this case the client (the Regulator) said they always wanted a Facility to be operated by ONE AND ONLY ONE Client.
If a Facility was operated by multiple Clients, they would require the Clients 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?"



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

- Is there one CSMP per Client, per Facility, or some other basis?
- Do Units frequently relocate, or even turn up at another Client?
- What is inspected – the Facility or the Unit?
- Does the CSMP cover all or some Units at a Facility?
- …and MANY more…

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

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

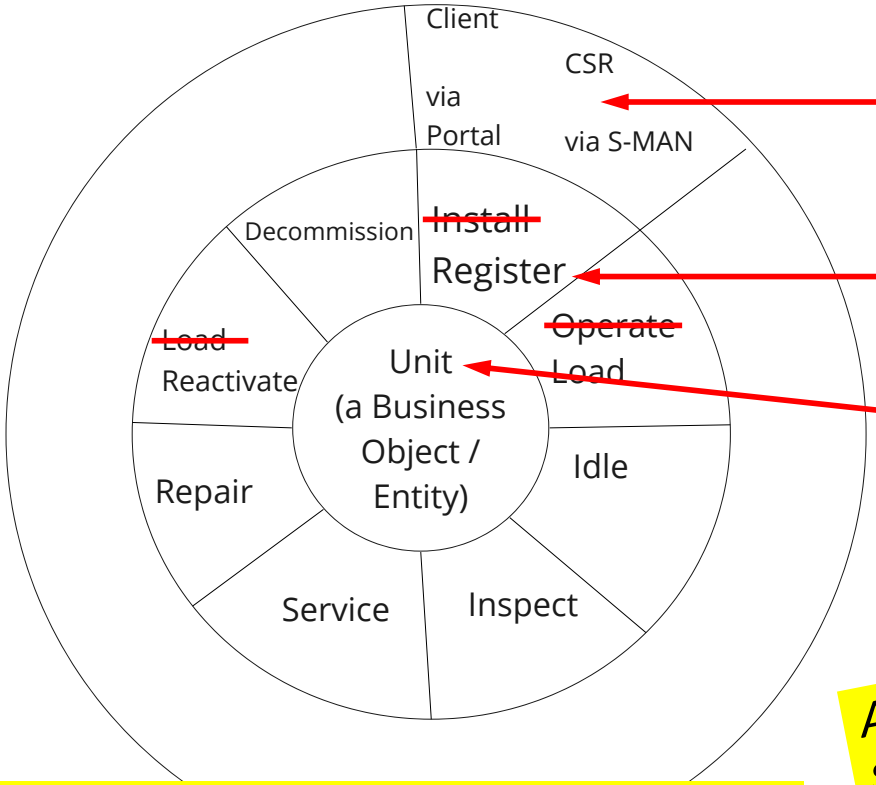
Model took ~90 minutes

Identify Services (Events) then Use Cases / User Stories

Finally, we'll identify the Services (verb - noun pairs) we need, and the Use Cases / User Stories by which the Services will be accessed

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

- ...
- ...
- ...
-



Who needs access to each Service, and How?

Use Case	*Use Case or User Story - add Who and How*
Service Specification (Events)	*Service (or Event) - add a Verb to the Noun*
Concept Model	*Entity or simply a "thing" - a core Noun*

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

Supports *Service-Oriented Business Analysis*

Summary – what an analyst can do with a Concept Model?

First, clarify language. (A platform)

Second, establish policies and rules.

And then, identify events and services, e.g.,
A **Unit** is…

- Registered (requiring the service “Register Unit”)
- Loaded (requiring the service “Load Unit”)
- Idled (requiring the service “Idle Unit”)
- Reactivated (requiring…)
- Repaired
- Inspected
- Relocated
- Retired
- …

These are the essential capabilities. In Business Analysis, "essential" means **what** with no reference to **who** or **how**

Something I always do when evaluating/selecting COTS S/W

We did the same for Client, Facility, CSM Program, …

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 use cases and services

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*

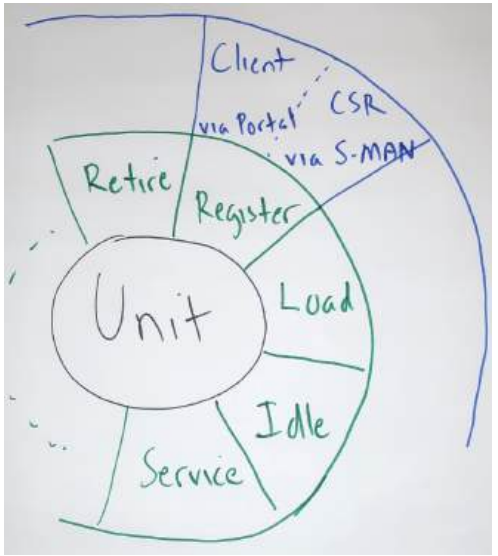
- CSR will select "spreadsheet" of all Units covered by CSMP app
- S-MAN will highlight all that can proceed immediately
- For each category of Units requiring intervention…

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.

One Business Service, one or more Use Cases

	Who	What (the Service – verb + noun)	How
		One Service	
Multiple Use Cases	Client	Register Unit	via Portal
	Customer Service Rep (CSR)	Register Unit	via S-MAN (the ERP)
	Client	Register Unit	via Mobile App
	???	Register Unit	???



What is the value of documenting the Service only *once?*
("One Service available through multiple channels.")

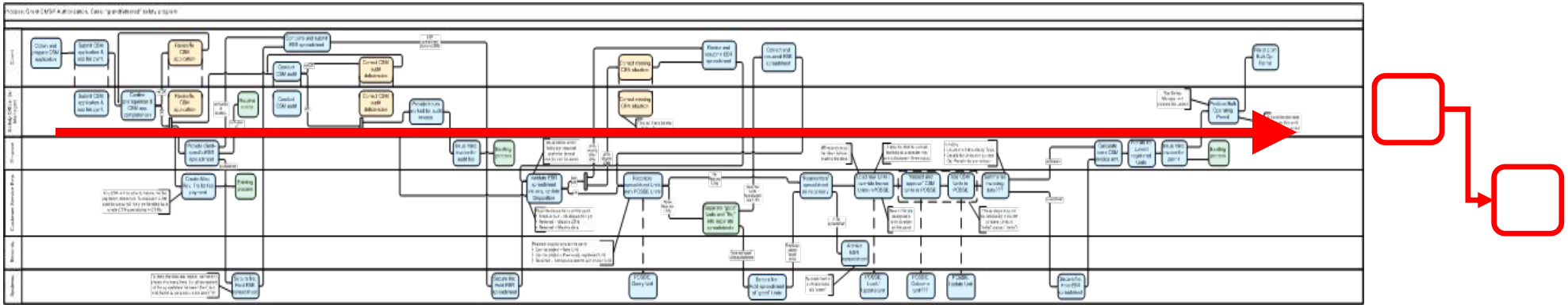
- re-use of the asset, and therefore higher consistency
- better chance of getting it right – higher value from less effort
- if it's implemented as a single service, easier maintenance – it's in ONE place.

Why would we make a *single* Service available via *multiple* Use Cases?

- different actors need different "navigation and hand-holding,"
  e.g., casual vs. expert users
- different technology platforms have different capabilities,
  e.g., mobile phone vs. touch-screen kiosk

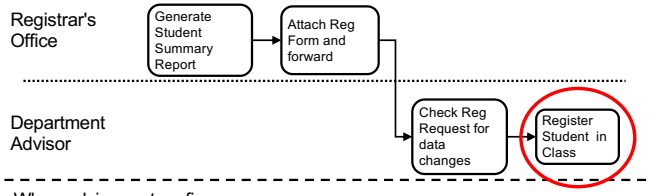
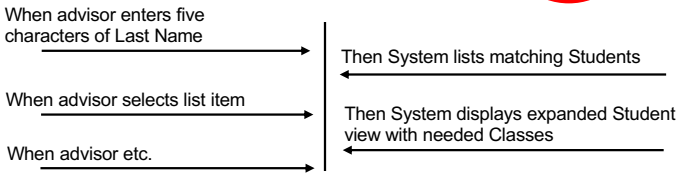
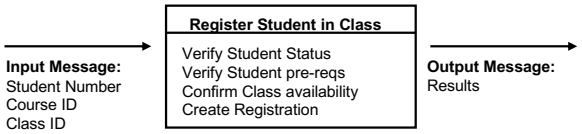
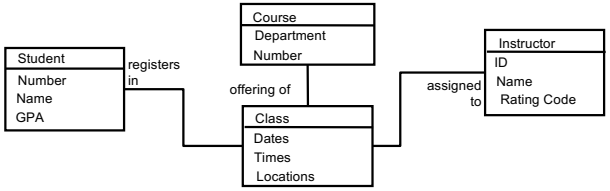
Mission accomplished! Conclusions:

- "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!***

Our framework for Business Analysis

Framework Layer		Technique sample	What it covers
Goals	*Business 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
Process	*Business Process*		✓ ***Process Model*** - shows "what" in a Scope Model, then "who & how" in a Workflow Model – the steps done by the actors in the process
Application	*Presentation Services (user interface)*		✓ ***Use Case*** – models how an actor interacts with a system to obtain (trigger) a service, typically to complete a step in a process
	Business Services (rules & logic)		✓ ***Service Specification*** - describes a service – a package of rules and logic – that is triggered to complete or respond to a business event
Data	*Data Mgmt. Services (databases)*		✓ ***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.

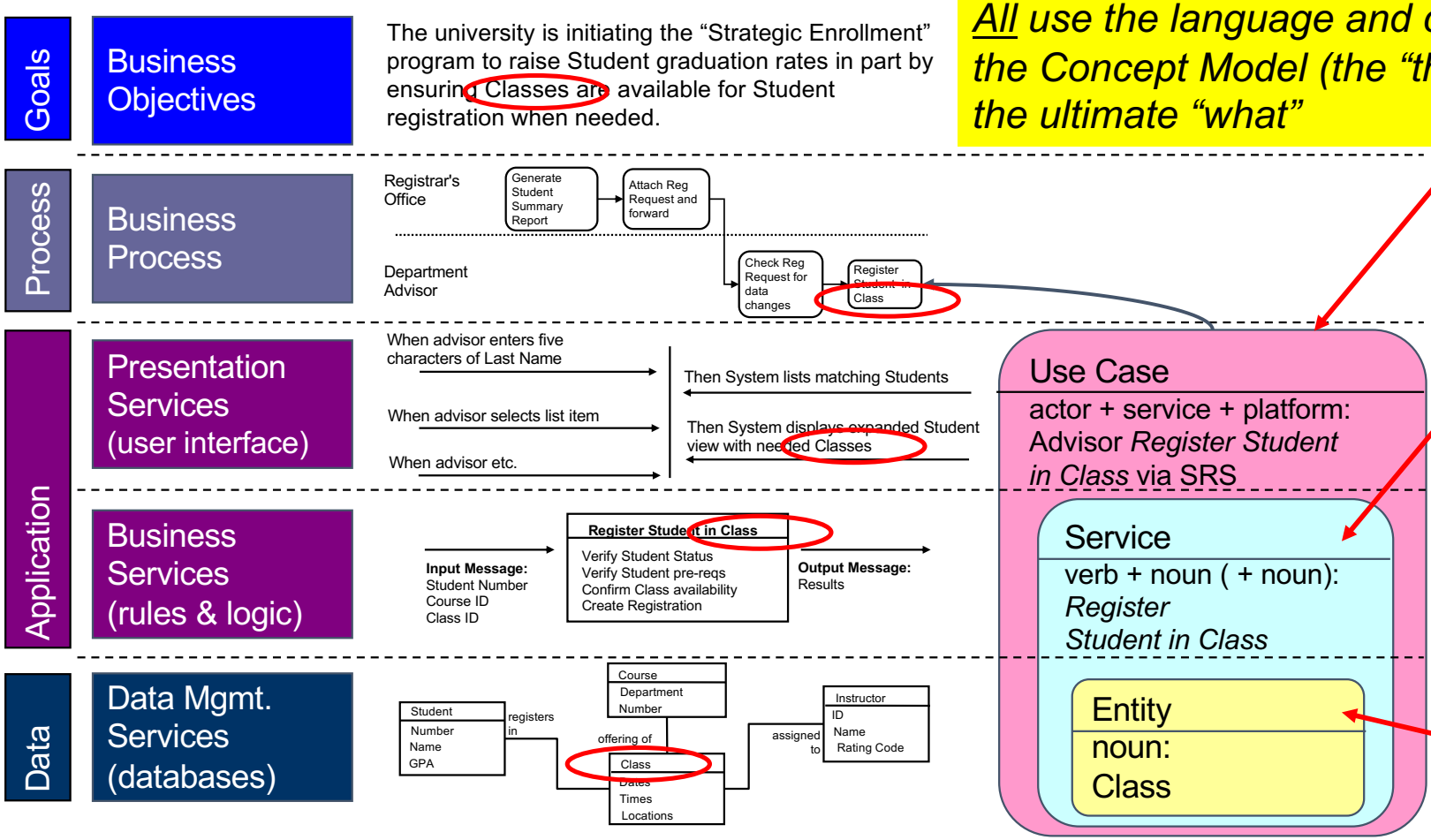
This is not a sequence!

Business Process: gives great *context* for *Business Analysis*

Use Cases and Services: where we capture *Functional Requirements*

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

Key point! Everything relies on the Concept Model



All use the language and constraints of the Concept Model (the "thing model") – the ultimate "what"

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

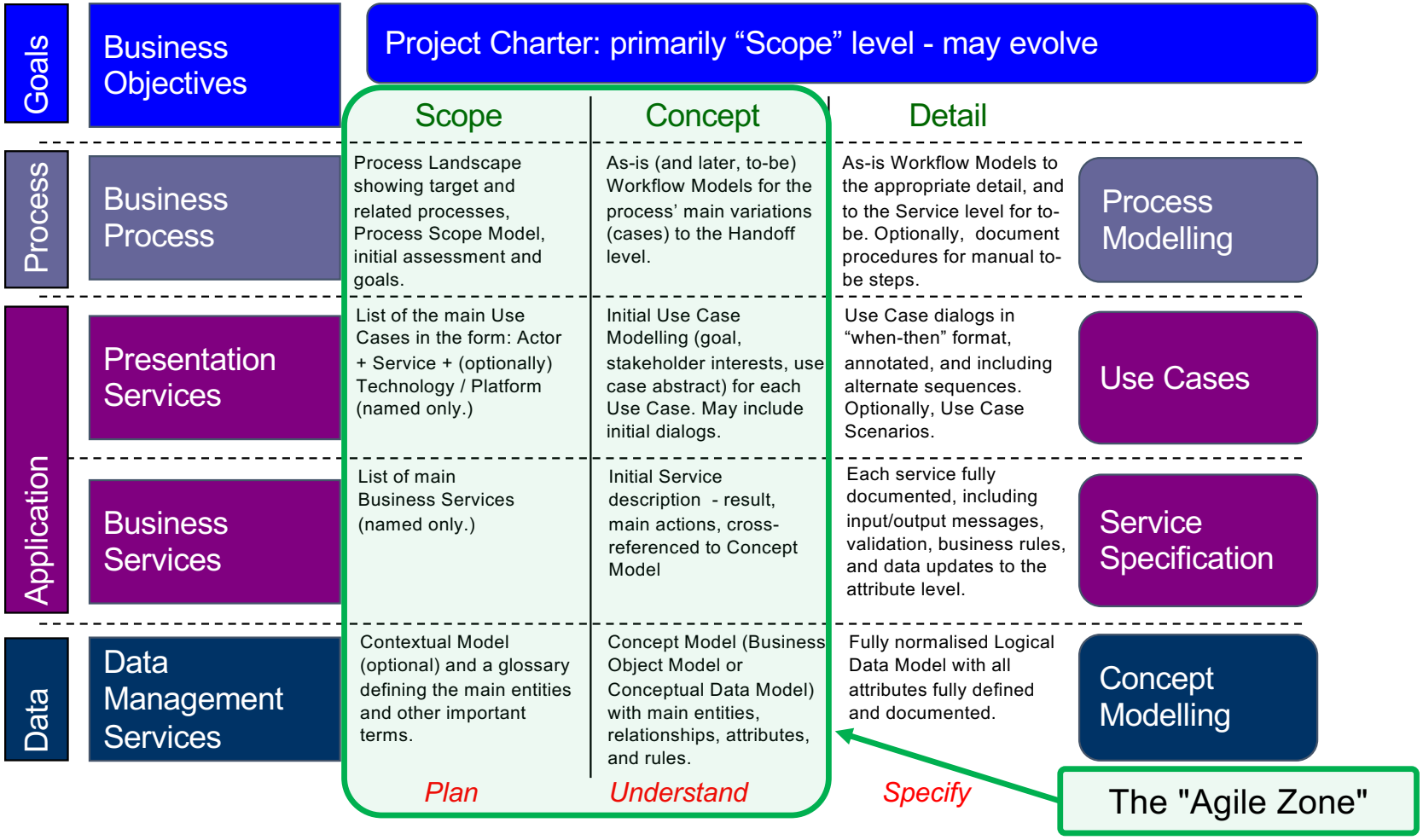
Verb-Noun pairs:
- The *Services* (event-handlers) that are at the heart of a *Service Oriented Architecture.*
- *Also* "building blocks" of Business Processes

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 and Agile

Clariteq framework for analysis and architecture



The basics: ERA – *Entities*

A distinct thing about which the enterprise must maintain facts in order to operate.

Criteria –

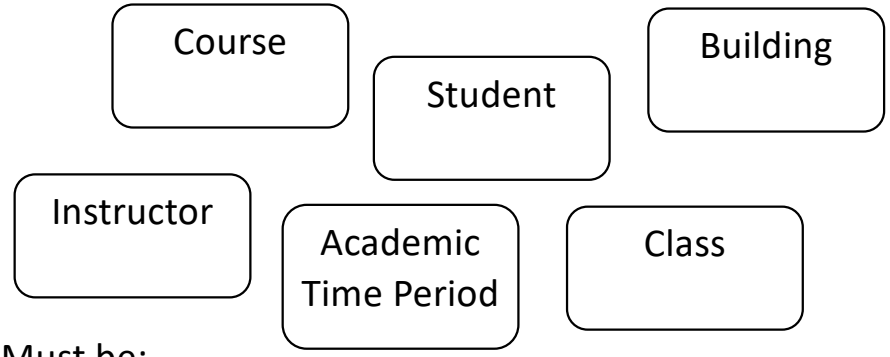
- *singular noun* – we can talk about *one of them* ("Employee," not "Staff")
- *multiple* instances
- must *need to* and be *able to* keep track of *each* instance
- has *facts* (attributes & relationships) that must be recorded
- makes sense in a *"verb-noun"* pair
- *NOT* an *artifact* like a spreadsheet or report

Fundamental to business analysis.
Entities are the things

- processes act on
- applications manipulate
- databases record
- BI & reporting tools provide info about

Two basic types:

- independent – can stand alone
- dependent – must have one or more parents

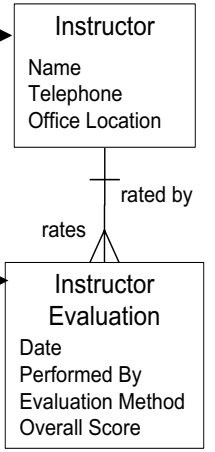


Must be:

- named: business-oriented noun / noun phrase
- defined: "What is one of these things?" or "What do you mean by _____?"

Independent
- "strong"
- no relationships "on top" (no parents)

Dependent
- "weak"
- one or more relationships "on top" (to parent(s))



Naming and definition – the essence of Concept Modelling

Organisations need a *common language* more than ever…

- Data integration (data lake, data mesh, data fabric, data virtualisation, data warehouse, operational data store, …)
- Mergers/acquisitions/partnerships/…
- Business analysis – most requirements can't be stated without using a term from the Concept Model
- Performance measures, e.g., KPIs

Note – it often works best if you don't start by talking about *Concept Modelling* or *Data Modelling…*

JUST DO IT.

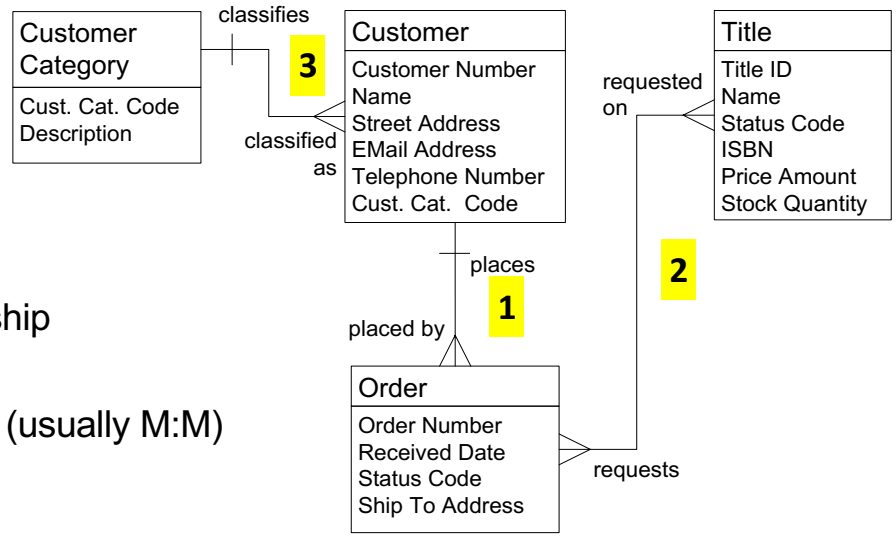
"Now! That should clear up a few things around here!"

The basics – ERA – *Relationships*

An association between Entities that the business must keep track of

Named in both directions

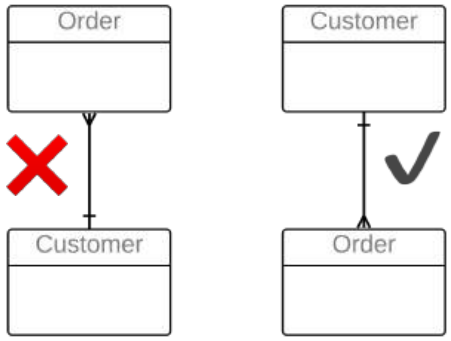
- verb-based phrase
- the line tells us they *are* related, the name tells us *how*



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

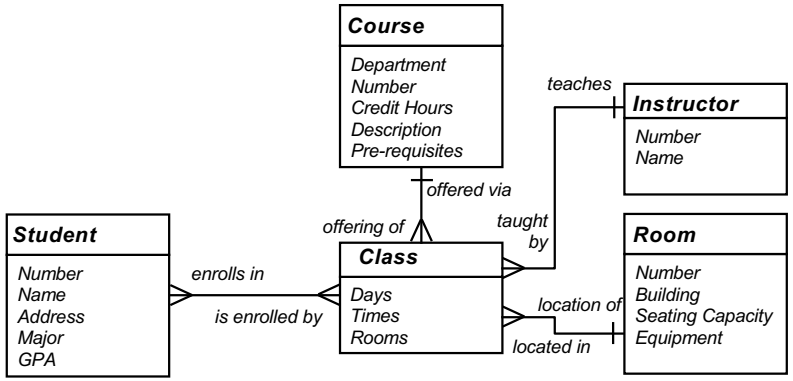


Relationships have rules

- 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…)

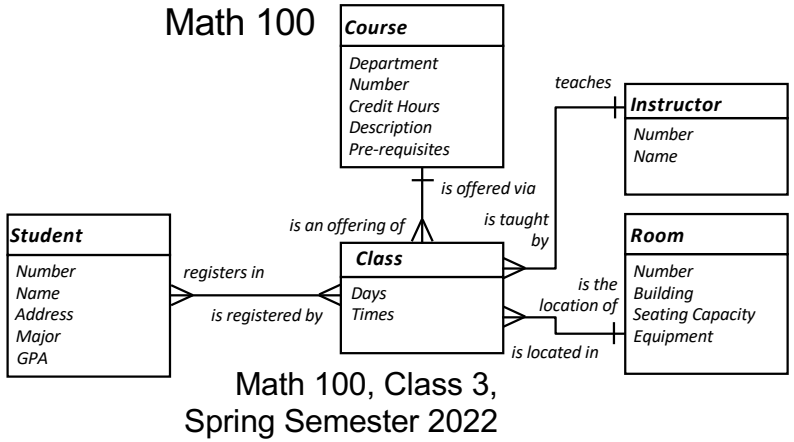
Each Class is taught by one Instructor…

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.



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

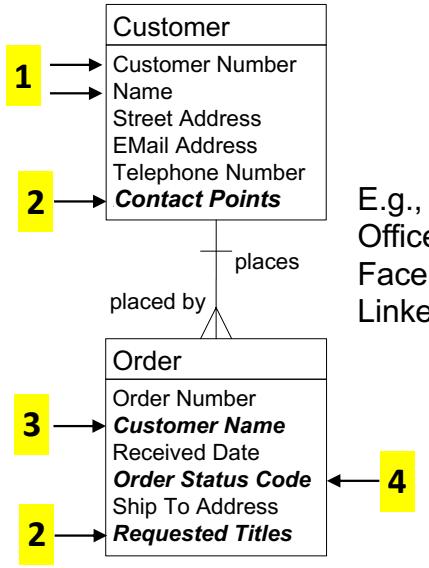
Have properties that we address during the transition from Concept Model to Logical Data Model

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, 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, …

Starting a Concept Modelling assignment

Don't begin with a lecture on data modelling

"Before we begin our data modelling session, let's go over some key points about data modelling. First, *an Entity is any uniquely identifiable person, place, thing, event, concept, or organisation of interest to the enterprise about which facts may be recorded.* Any questions? I didn't think so…"

"Before I begin my speech, let's cover a few of the basic rules of grammar. *A noun is any...* "

If you **avoid** starting with the theory and practice…

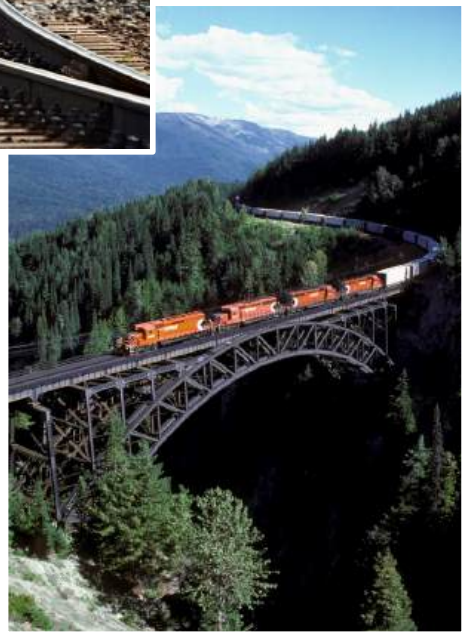
Modelling sessions go better ✓

Allows use of concept modelling in non-typical situations ✓

If you can, don't even call it "data modelling"

Painful but useful learning experience

The assignment –
facilitating a Concept Modelling session for a railway's *Track & Structures* group



I began by explaining data modelling...
"An entity is a uniquely identifiable person, place, thing, event, ..."
Bad idea!!!
"I can't stand you IT guys!"

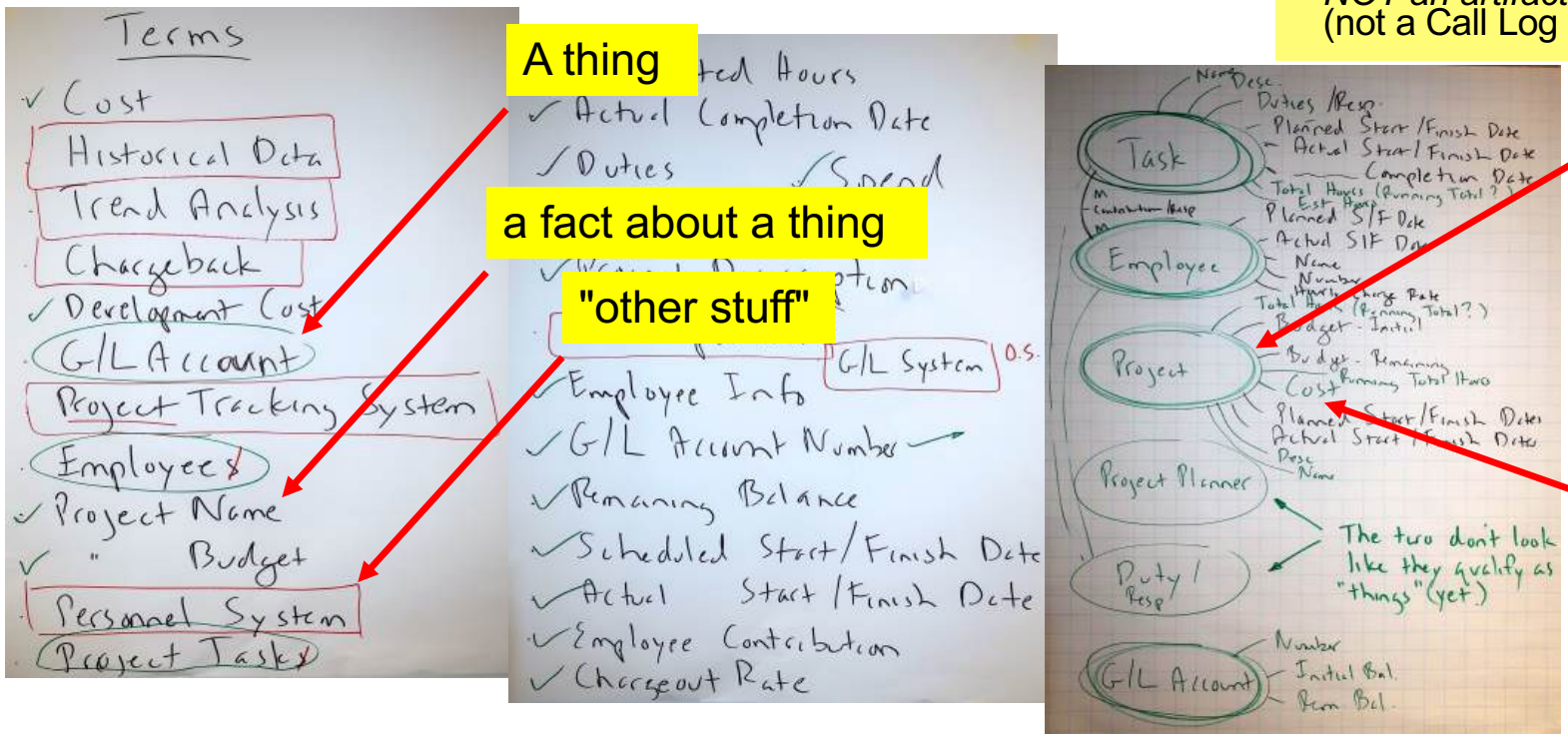
It all begins with language

"Why don't you learn *our* language?" *"Fair point!"*

- Brainstormed over 200 terms –
  Track, Structure, Line, Siding, Mileboard, Segment, Sector, Route, …
- Oh-oh... *"Now what?" An idea!*
- Is this "a thing, a fact about a thing, or other stuff?"
- Here's a Project Management example…

Introduce "thing criteria" as necessary:

- *singular noun* – can talk about *one of them* (*Worker* not *Staff*, *Item* not *Items*)
- *multiple* instances
- must *need to* and be *able to* track *each* instance (uniquely identify each)
- has *facts* that must be recorded
- *NOT an artifact* like a spreadsheet or report (not a Call Log or Worker Directory or…)



Track & Structures were VERY happy with the 40 entity concept model *they* built.

General advice – start with language (nouns!)

Gary Larson on Concept Modelling

I use "terminology analysis" – starting with the nouns – at the outset of most projects, no matter what type of project.

Starting a data model bottom-up

1) Interview business representatives about their area:
   mandate and activities, goals and objectives, issues and opportunities,
   needs and wants, likes and dislikes, etc....

   Nod sympathetically but ignore it all (almost!)

   Instead, capture "terms" – anything that goes by a name.

2) Later, write each term on a large Post-it

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"

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

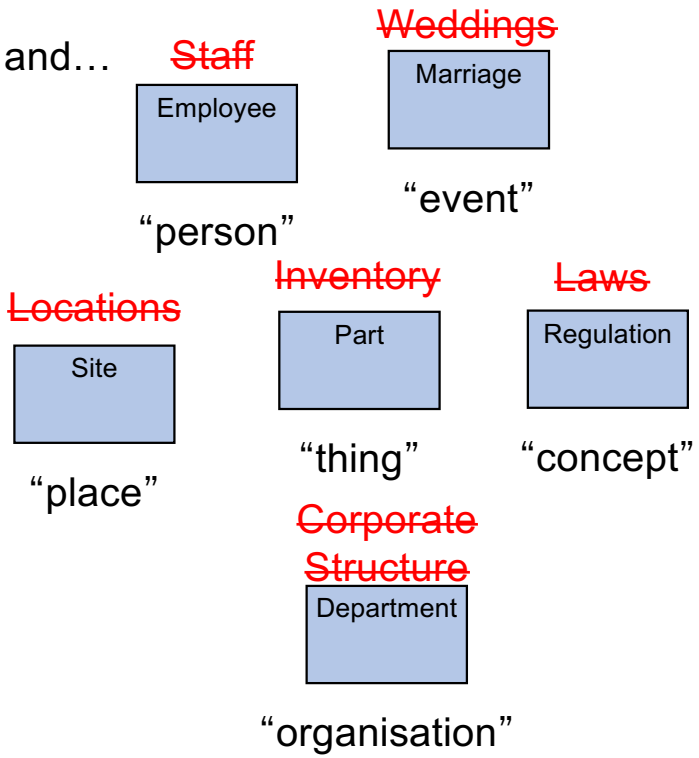
"Other stuff" includes:

- Metrics
- Organisations, departments, jobs, roles, …
- Processes, functions, activities, tasks, …
- Systems, tools, equipment, mechanisms, …
- Reports, forms, screens, queries, …
- Other – too vague, only one instance,
  a "fact of life," not a thing we track, etc.

Entities – more specific criteria

An *entity* is a distinct thing the business *needs* to know about,
often described as 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"
- has *multiple occurrences* (or instances)
  - *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 ("What, not who or how") –
  the most common error is to identify artifacts (forms, reports, spreadsheets, …) as entities!



Let's look at some common errors…

Identifying Entities – four common errors

1. Treating an “artifact” (a spreadsheet, report, web page, form, etc.) as an Entity – an Entity is a fundamental thing – *“what”* – with no reference to *“who or how.”*
   Artifacts typically contain attributes from *multiple* Entities
   e.g., *“Admission Request Form”* or *“Orders Summary Spreadsheet”*
   or *“Daily Call Log”* or *“Class Roster” or “Materials List Fax”* or…

2. 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., “*Vehicle”*
   (An example of this is coming up.)

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

4. Identifying Entities that are simply too vague, or are just a "fact of life;"
   that is, the name doesn‘t imply a single *instance*
   e.g., *“Weather”* or *"the Environment"* or *"the Economy"* or *"Society"*

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).

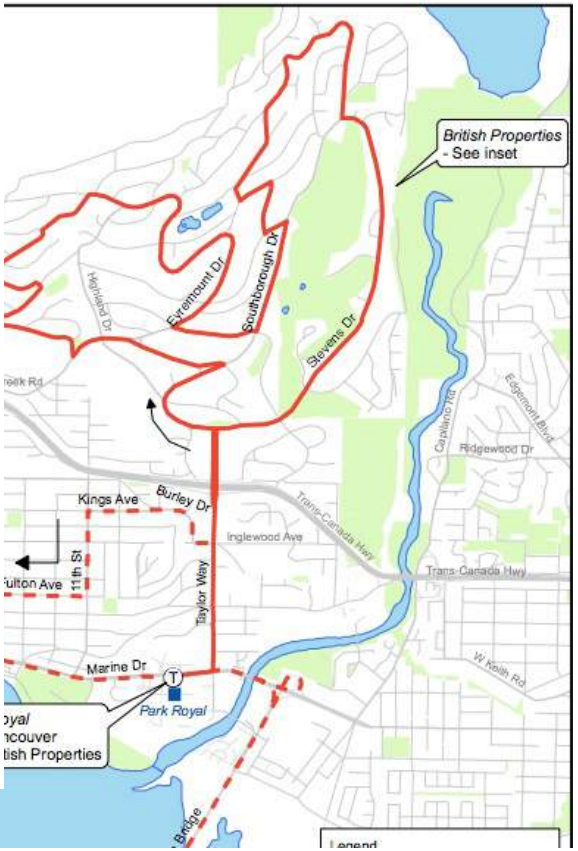
Outbound From Park Royal (from Downtown Vancouver during Monday-Friday peak hours) via Marine Drive, Park Royal South, Taylor Way, Southborough, Eyremount, Cross Creek, Chartwell, Crestwell, Eyremount, Fairmile, Southborough, King Georges Way, Robin Hood, Kenwood, St. Andrews, Bonnymuir to Glenmore terminus.

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

254 British Properties



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?

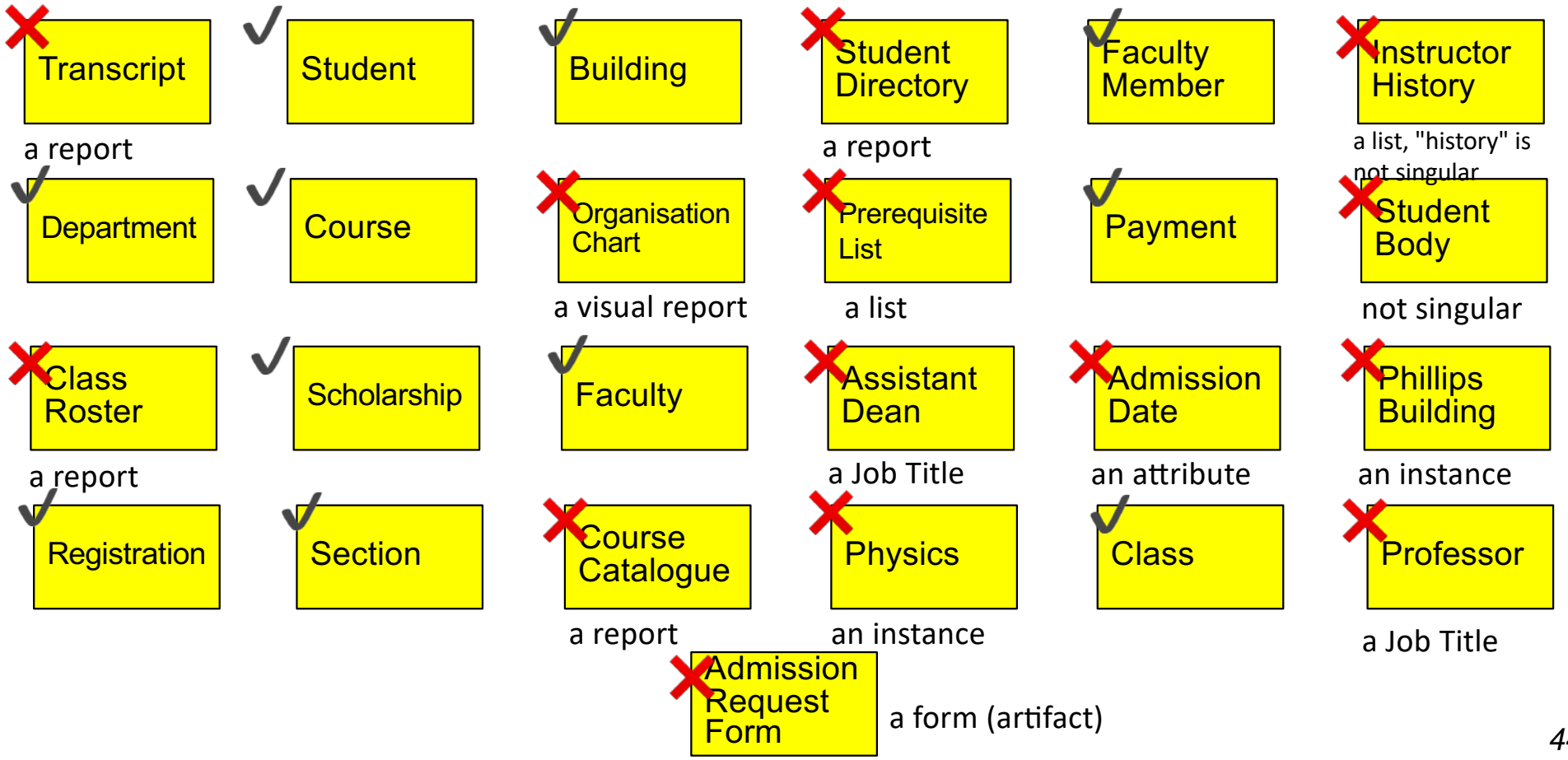
Which of the following might ***not*** be valid entities?
And if not, *why* not?

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

Discussion – good Entity or not?

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



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?”

- 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.

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.)

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…")

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?

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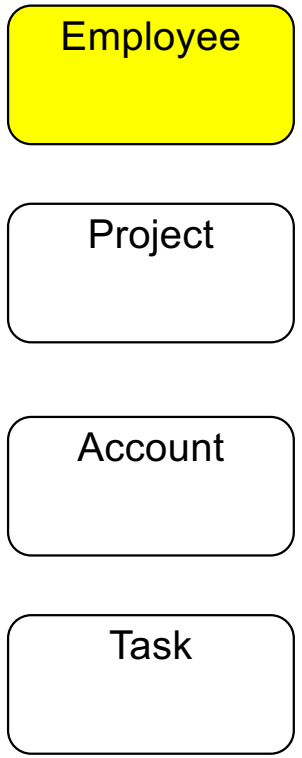
- ...



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)?

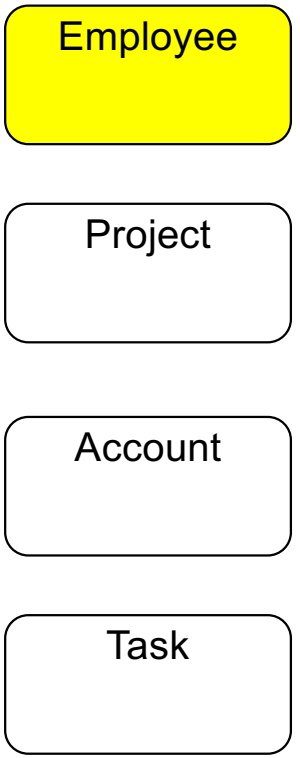
Onboarded? on probation? active? retirees?

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

Volunteers?

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

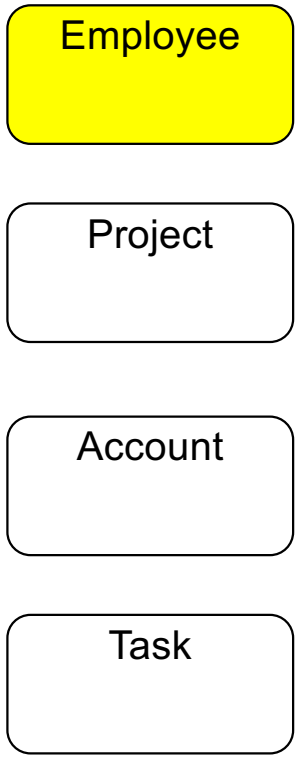
A robotic, automated, or AI agent?



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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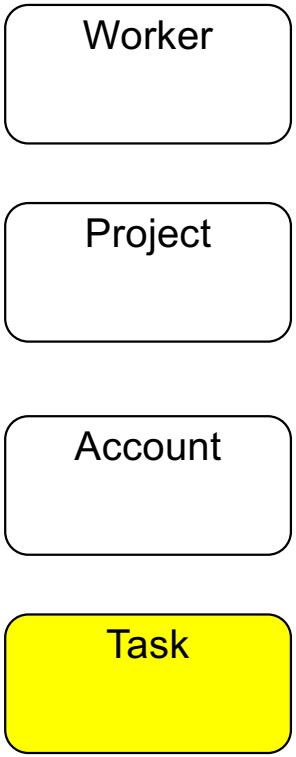


Another example – starting an entity definition for Task

"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?
- …

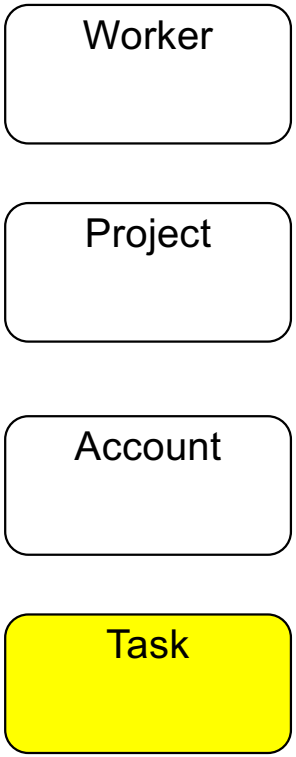
A ***Task*** is a specific, time-bounded, unit of work, within a single Project, intended to be performed by one or more Workers, that produces an intended deliverable or achieves a specific state.

Examples:

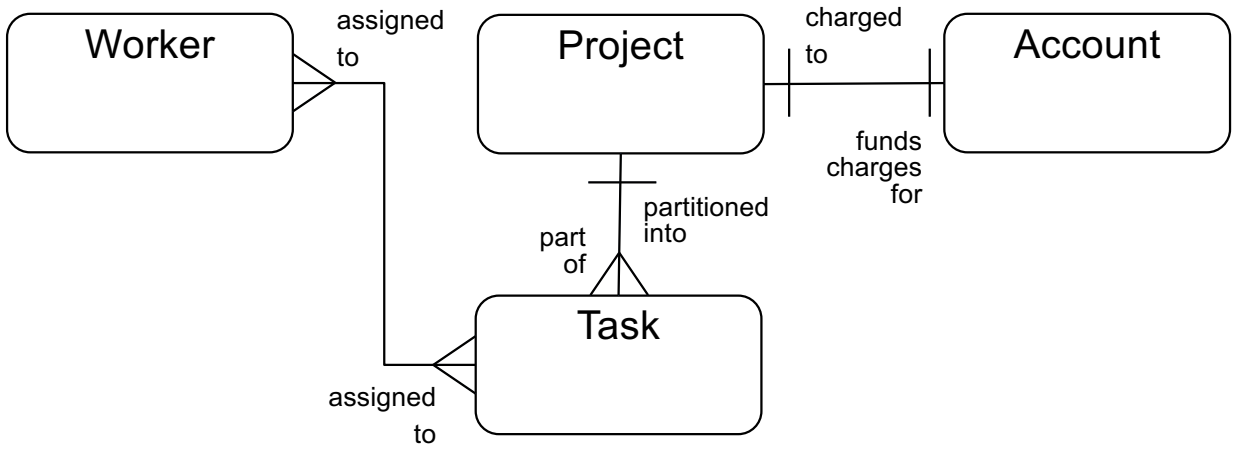
- Code *Place Order* service
- Test *Place Order* service

Excludes:

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



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



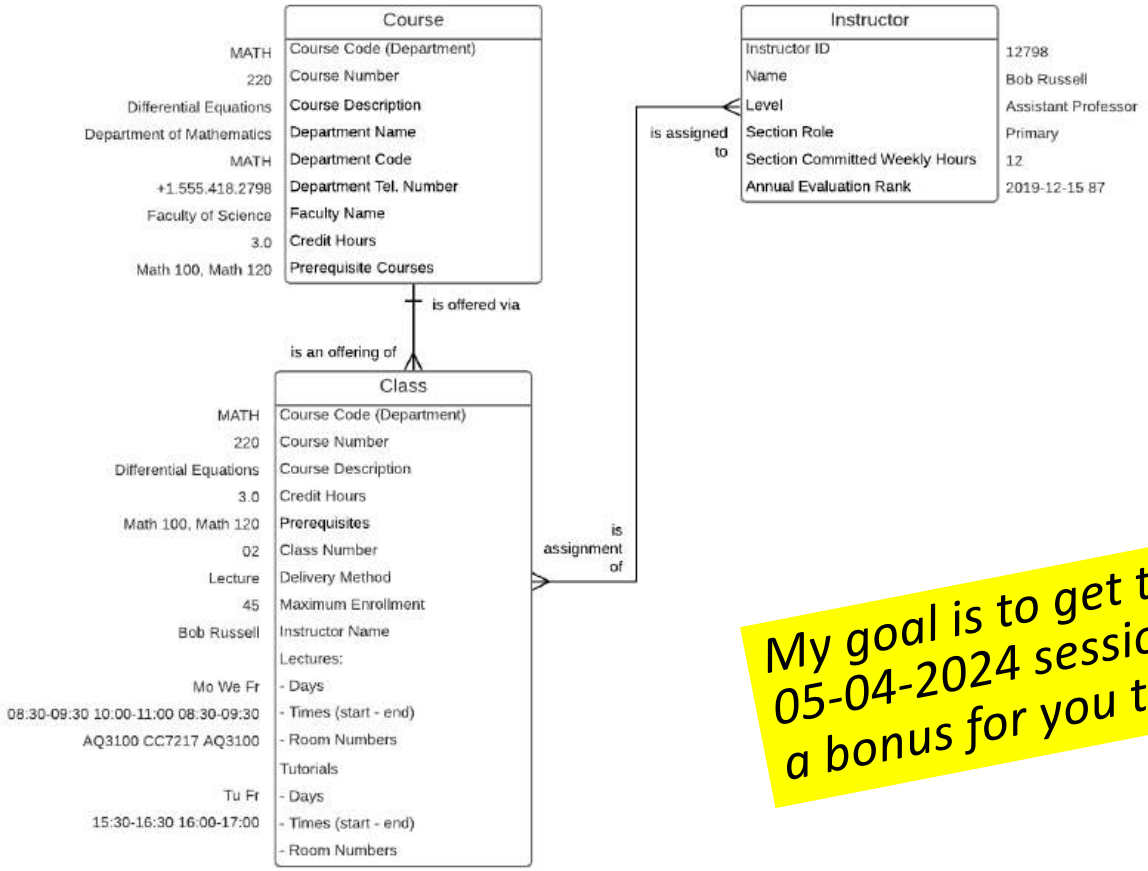
First arrange entities top-down by dependency.

Then add relationships with a verb-based phrase.

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

"Demonstrate the Data"

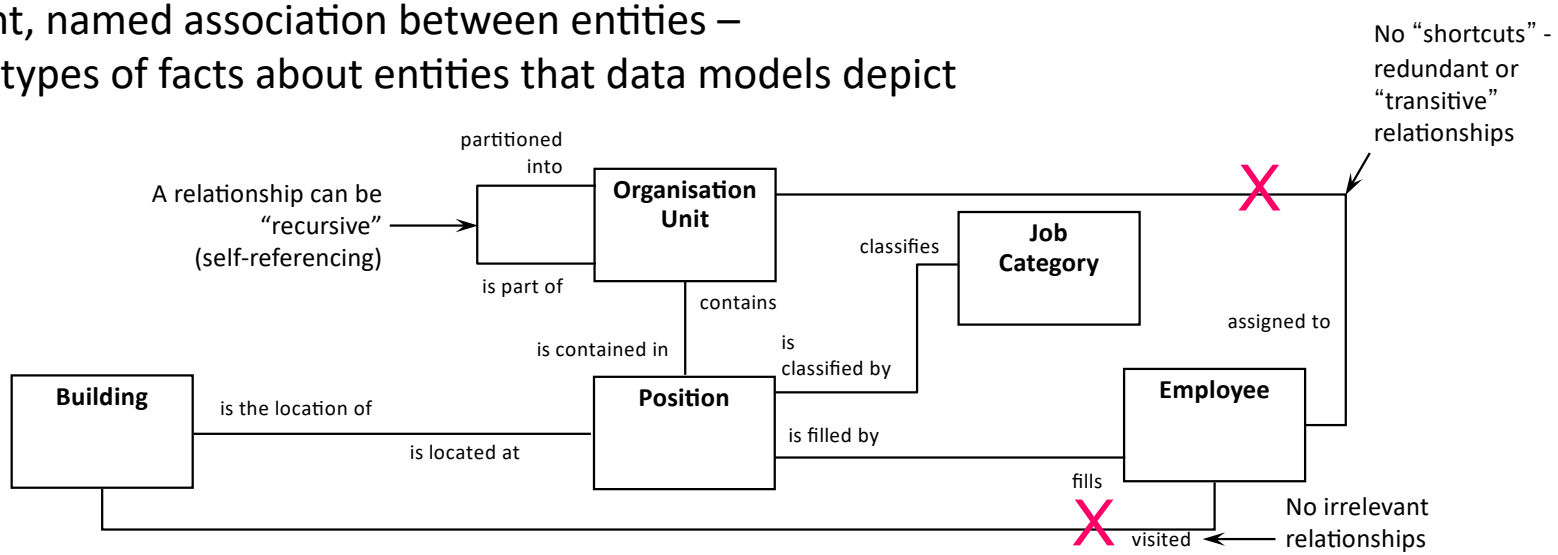
In addition to Entity definitions, it can be helpful to show sample data values on an E-R Diagram.



My goal is to get this far during our 05-04-2024 session – everything else is a bonus for you to look at on your own

Relationships – a few more points

A significant, named association between entities –
one of the types of facts about entities that data models depict



Guidelines

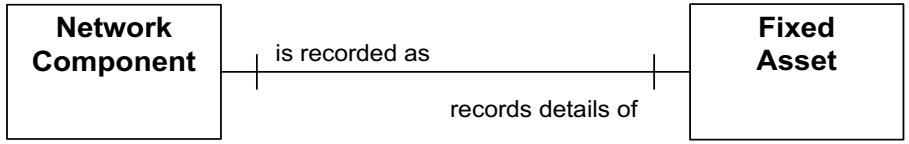
- named with a descriptive, verb-based phrase – not "has" or "is related to"
  (the line tells us they *are* related; the name tells us *how*)

- named in both directions – try to use the same root word at both ends
  (e.g., "classifies" and "is classified by")

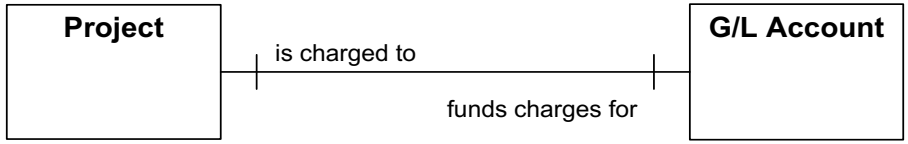
- the complete name reads like a sentence (noun verb noun) –
  "Position is classified by Job Category"

1:1 relationships – almost always an error!

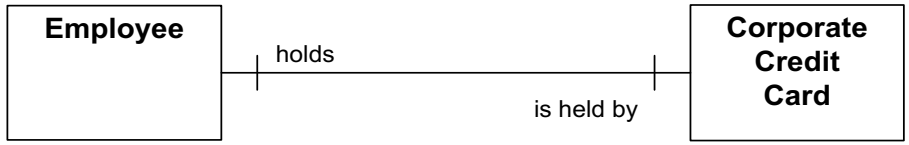
- Note – a 1:1 relationship might be necessary in the Physical Database Design
  e.g., "Fixed Asset" records financial data about a "Network Component" but they are in two separate systems (the G/L System and the Configuration Management System) connected by a 1:1 relationship



- ✘ Incorrect analysis
  e.g., Project costs are probably prorated across *many* Accounts



- ✘ Failing to account for changes over time
  e.g., an Employee may hold only *one* Credit Card at a time, but *many over time,* and we virtually always want history.
  The most common written constraint in Concept Modelling is
  "one at a time but many over time."



Phase 2 of three phases in data modelling

1) Establish initial Concept Model

- Focus is on developing a core set of entities:
  - named
  - defined
  - minimally attributed
  - bound by basic rules and relationships
  - placed on an ERD
- Might start bottom-up: brainstorm details then synthesising “up”
- Might start top-down: build a contextual model, then flesh out required details analysing “down”
- Experiment w. alternatives
- Refine the contextual model, if you had one.

2) Develop initial Logical Data Model

- Focus shifts to attribute rigor and structure when going to the logical level
- First check attributes for:
  - completeness
  - necessity
  - name and definition
  - placement
- Resolve attributes that are:
  - multi-valued
  - redundant
  - constrained
- Continue experimenting with alternate structures
- Refine conceptual model

3) Refine & extend Logical Data Model

- Focus is on refinement, and validation via new requirements using…
- …an event-based approach: fast and easy…
- …or full business analysis:
  - process workflow model
  - use cases (external)
  - service specs (internal)
  - profiling existing data
  - informational needs
- Resolve attributes that are semantically overloaded, non-atomic, or derived
- Document attribute properties and validation
- Specify identifiers
- Refine conceptual model

Script: from conceptual to initial logical

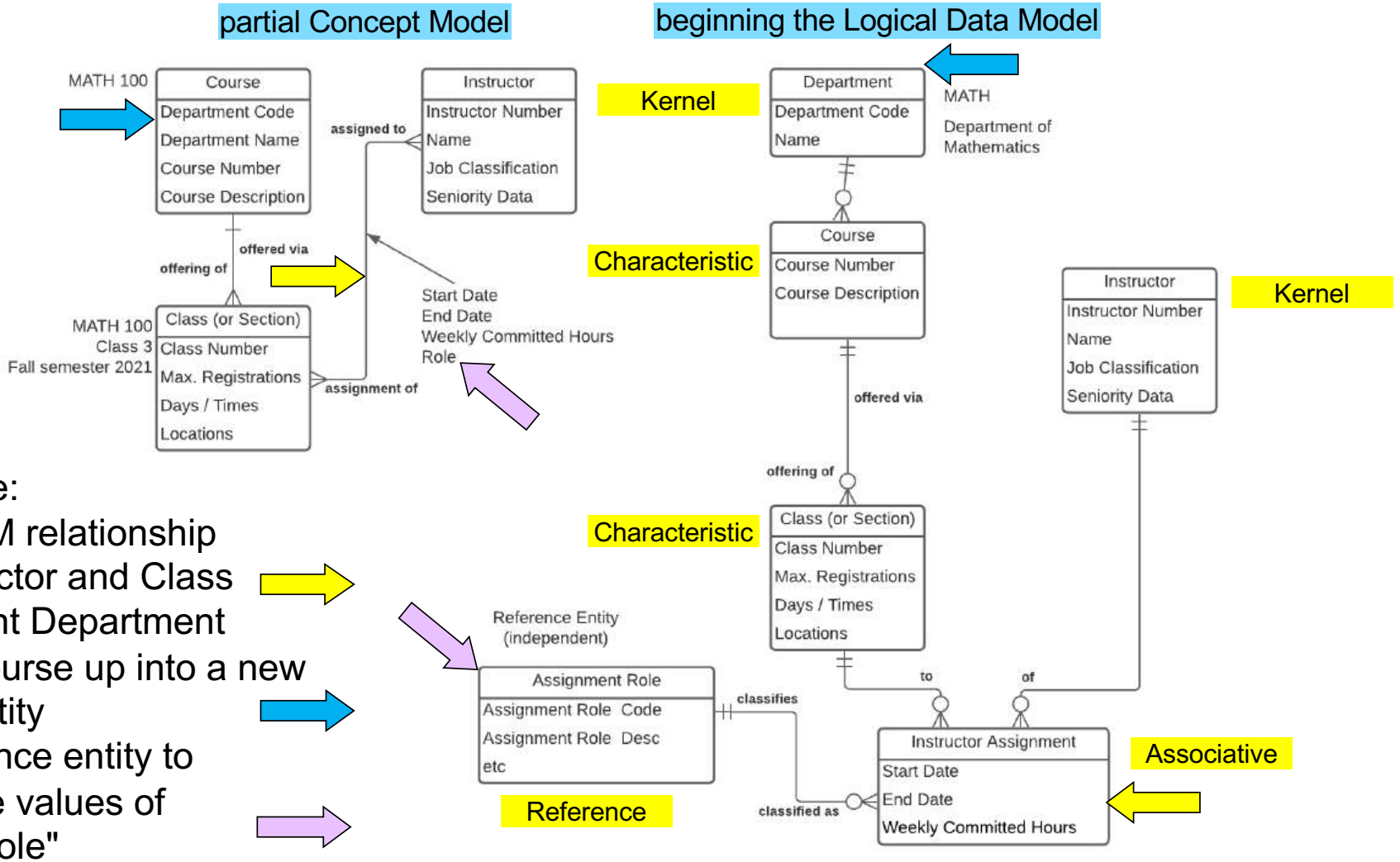
The progression from conceptual to logical is largely based on identifying and dealing with three attribute characteristics

- 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)

Simple example – from Concept Model to Logical Data Model

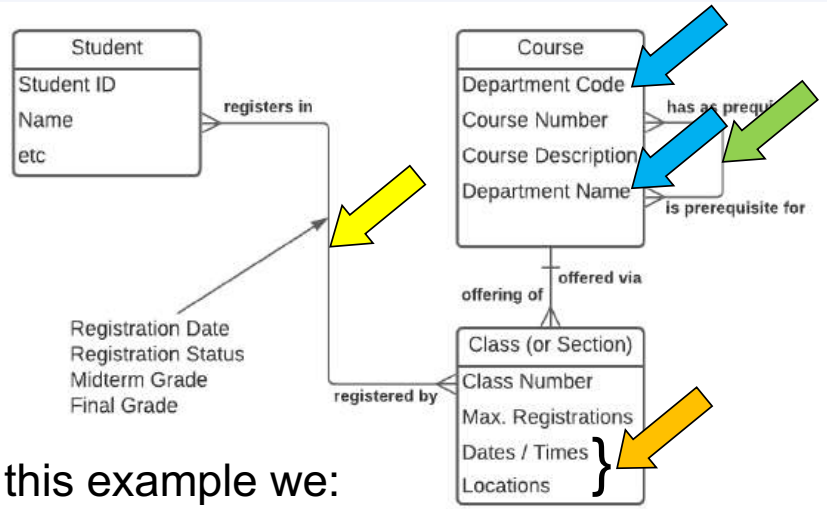


In this example we:

- resolve the M:M relationship between Instructor and Class
- move redundant Department attributes in Course up into a new Department entity
- create a reference entity to standardise the values of "Assignment Role"

Richer example – Conceptual to Logical, drawn top-down

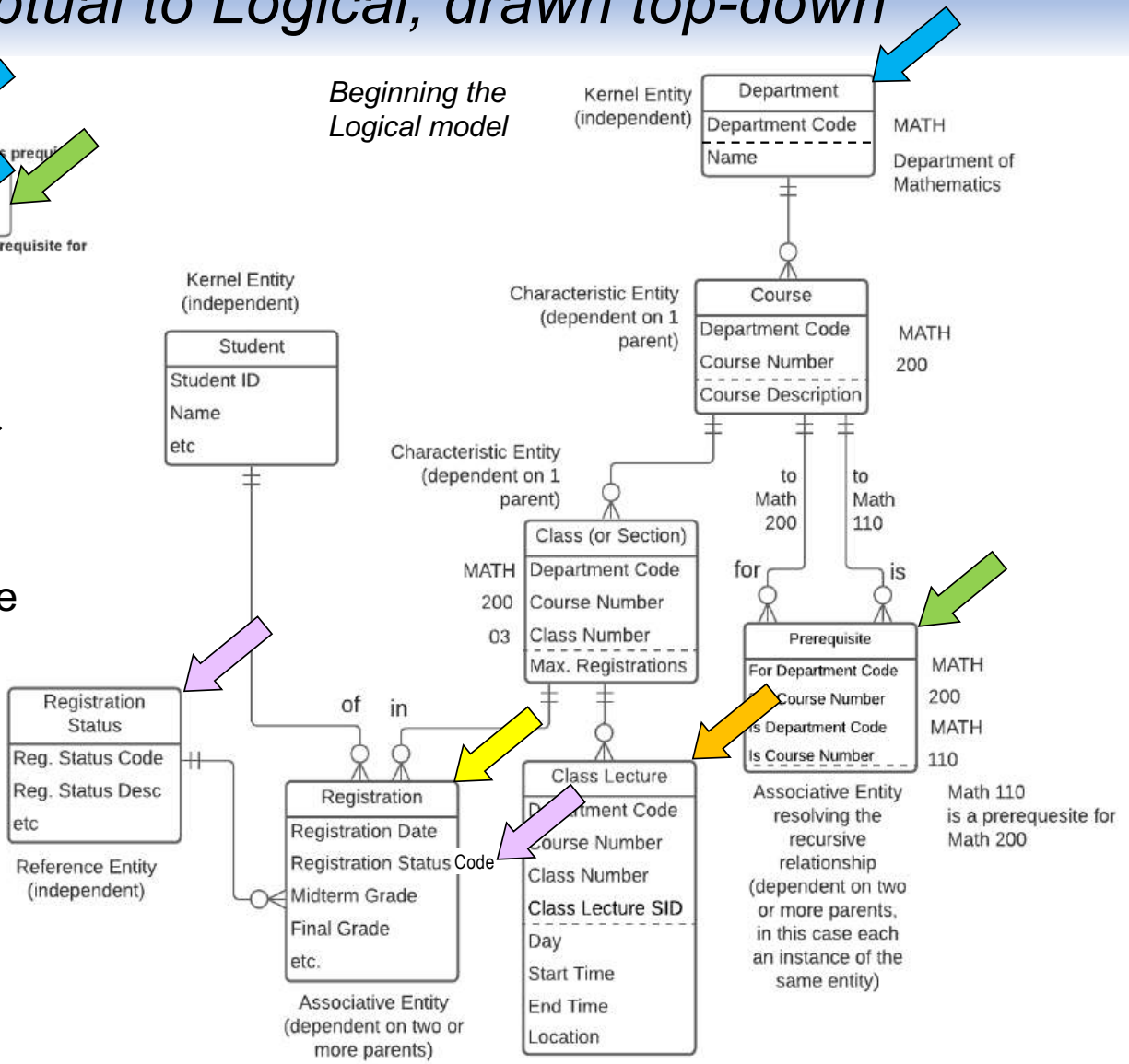
Conceptual



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

Beginning the Logical model



Summary – three types of data models

Different levels of detail support different perspectives

1 Contextual (Scope)

- ✓ *Context model*
- ✓ Agreement on "big picture," context, and some vocabulary
- ✓ A block diagram of "subject areas," higher level than individual entities
- ✓ Shows the scope or "footprint"
- ✓ Optional – not useful on smaller projects

2 Conceptual (Overview)

- ✓ *Concept Model*
- ✓ Agreements on basic concepts, vocabulary, and rules

3 Logical (Detail)

- ✓ *Logical Data Model*
- ✓ Complete detail for physical design

Some important differences

- ✓ Main ("recognisable") entities only - a singular noun used daily
- ✓ Main attributes only, many are non-atomic
- ✓ M:M relationships
- ✓ Doesn't show keys
- ✓ Not normalised
- ✓ A "one-pager"

- ✓ All granular entities – many too detailed to come up daily
- ✓ All attributes included, all are atomic
- ✓ All M:M resolved
- ✓ Shows primary & foreign keys
- ✓ Fully normalised
- ✓ Five times as many entities

For review: specifics – contextual, conceptual, logical

1 Contextual (Scope)

Agree 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 diagram ever!

2 Conceptual (Overview)

Agreement on basic concepts and rules

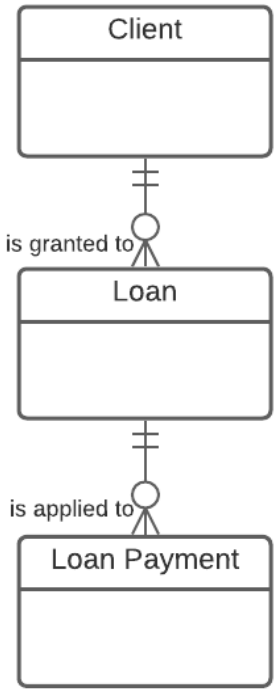
- Ensures everyone is using the same vocabulary and concepts before diving into detail
- Overview: main entities, attributes, relationships, rules
- Lots of M:M relationships
- Relationships show cardinality
- No keys
- Few or no reference entities
- Unnormalised – most M:M relationships unresolved, 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

3 Logical (Detail)

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

Future-proofing – "Challenge the Ones"

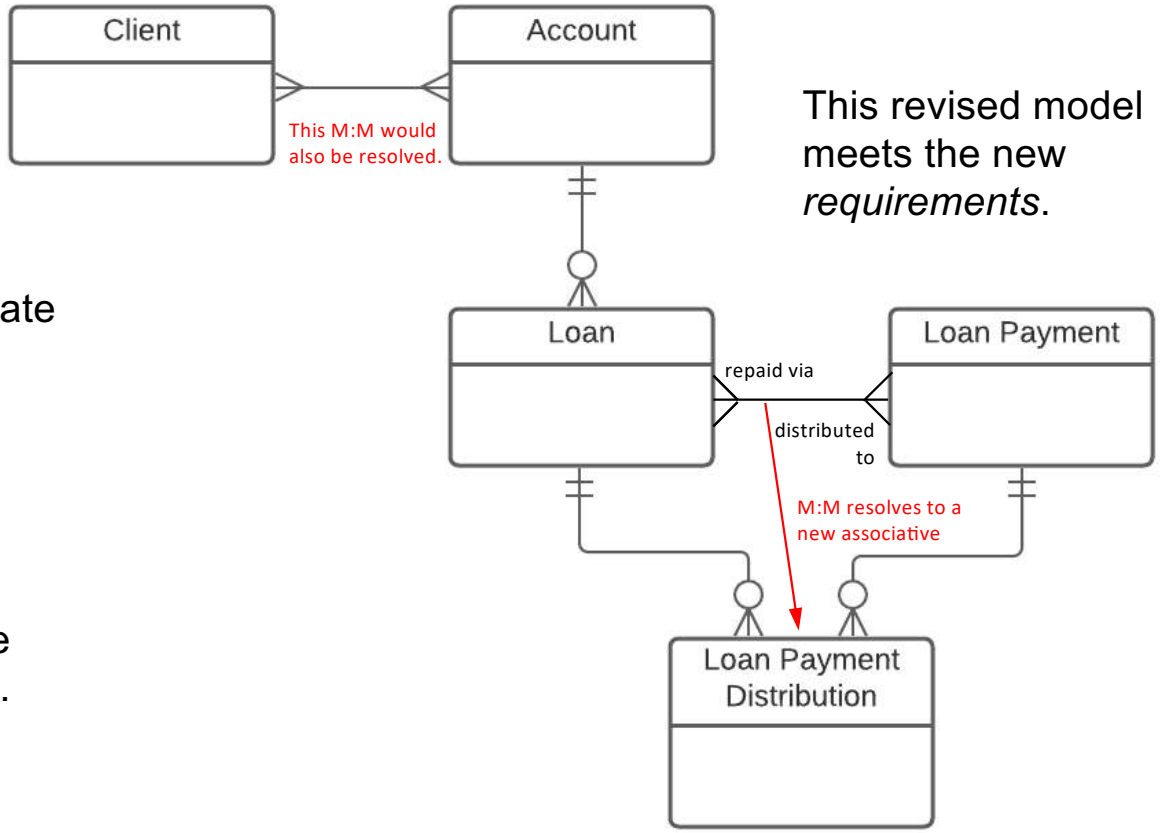


A Loan is granted to one and only one Customer – *really?*

No – multiple Clients can participate in a Loan via a shared Account. (A new *requirement*.)

A Loan Payment applies to one and only one Loan – *really?*

No – one Loan Payment could be distributed across multiple Loans. (A new *requirement*.)



This revised model meets the new *requirements*.

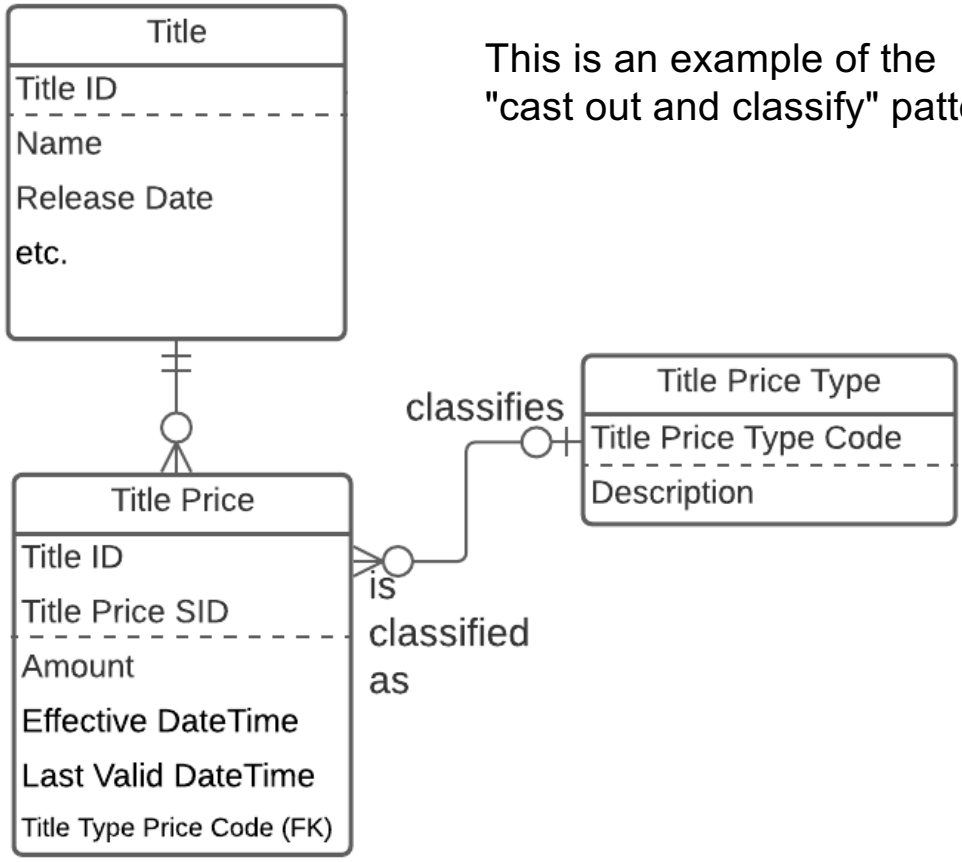
Future-proofing – "Avoid a fixed number of repeating attributes"

This model shows two types of Prices – List and Store.
Tomorrow a third will arise…
and a fourth and a fifth…

Data modellers only know three numbers –
0, 1, and Many.
We don't recognise 2.

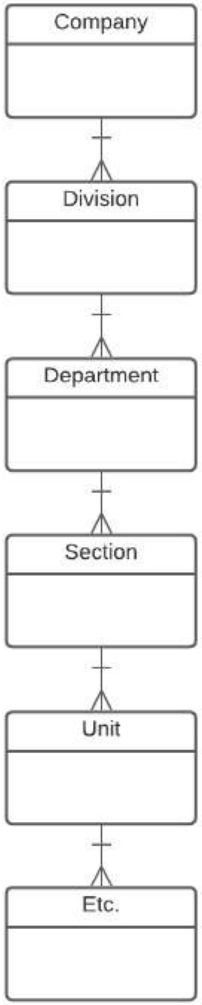
This revised model offers greater flexibility and supports richer queries.

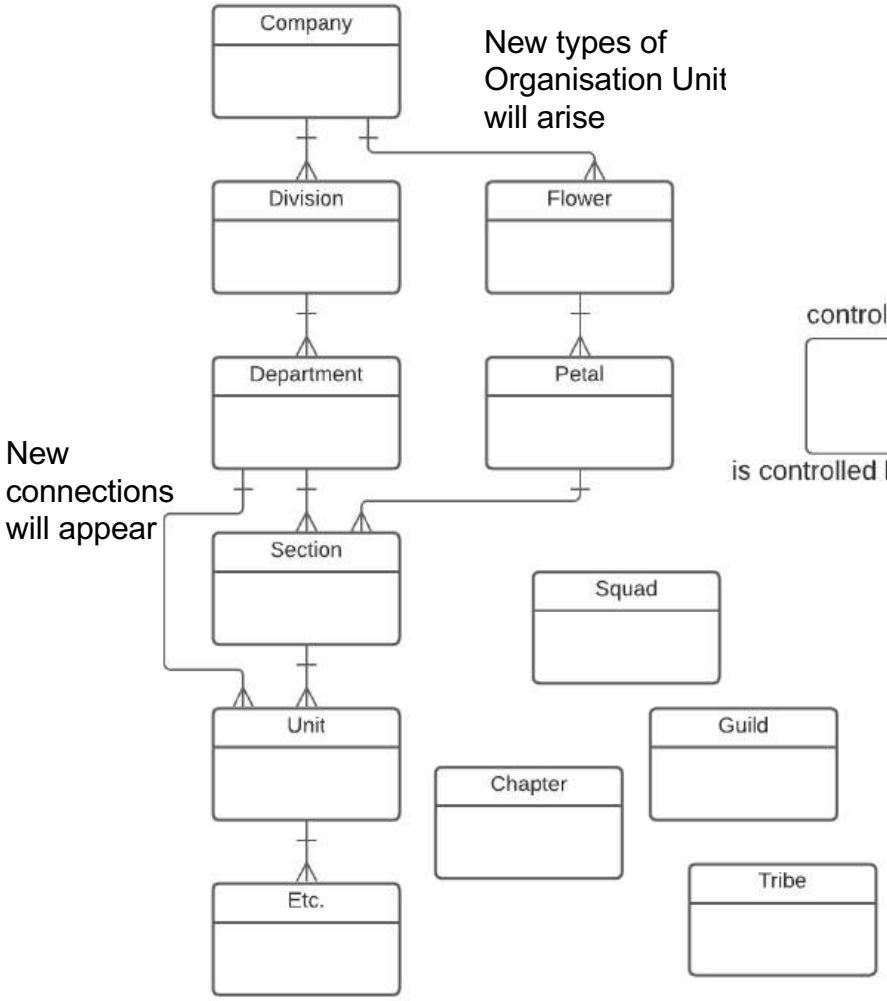
This is an example of the "cast out and classify" pattern.



Future-proofing – "Avoid fixed hierarchies"

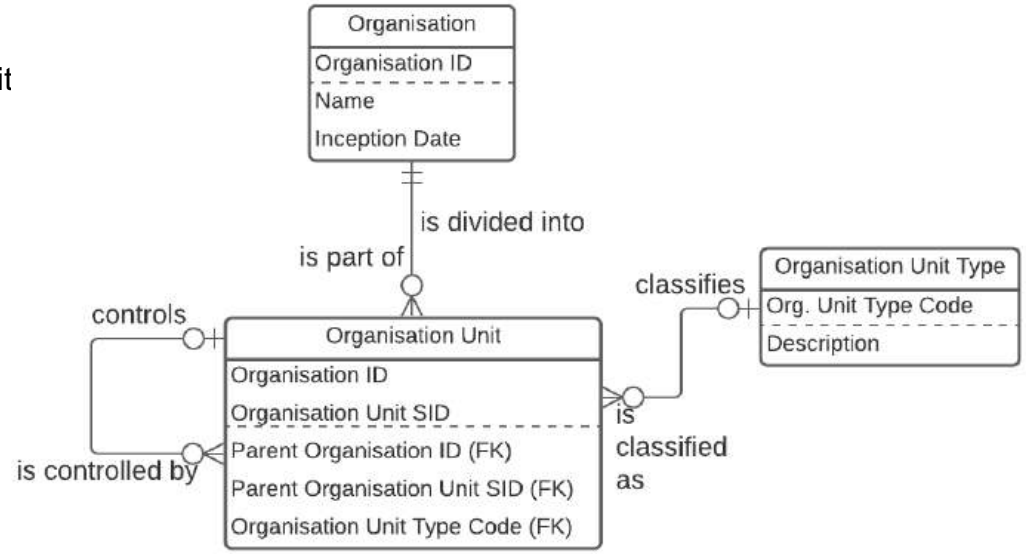
If we implement this model, what will go wrong?





New types of Organisation Unit will arise

New connections will appear



This revised model is *far* more flexible.

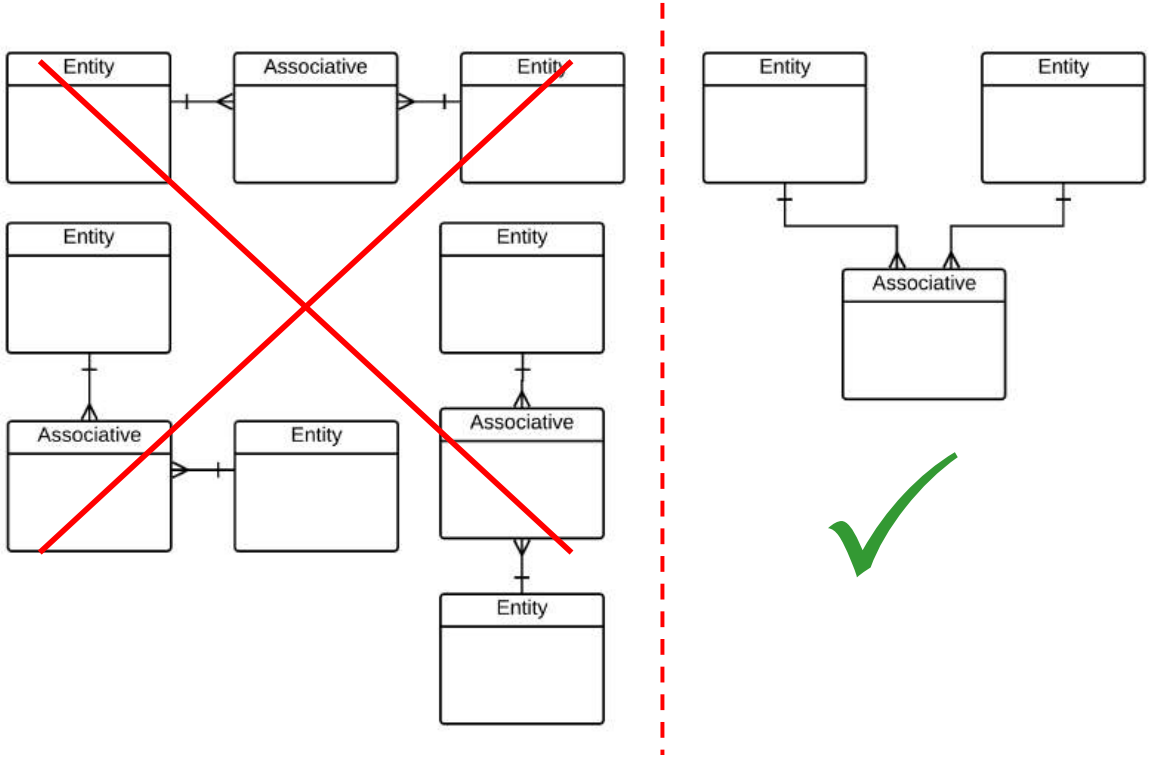
This is an example of the "generalise, recur, and classify" pattern.

Drawing the model – consistency is a virtue

People pick up data modelling without training if you…

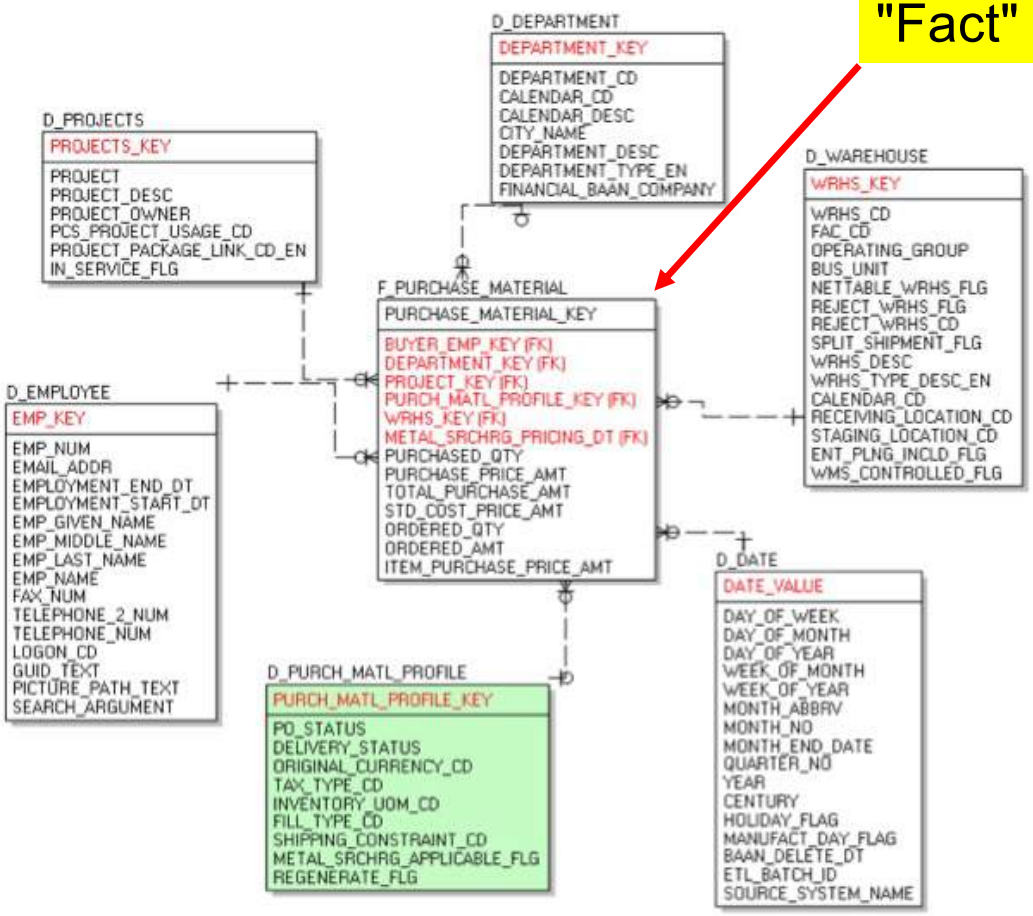
- treat it as a natural way to describe a business, not a new technique being imposed on them
- draw the same kinds of things the same way every time

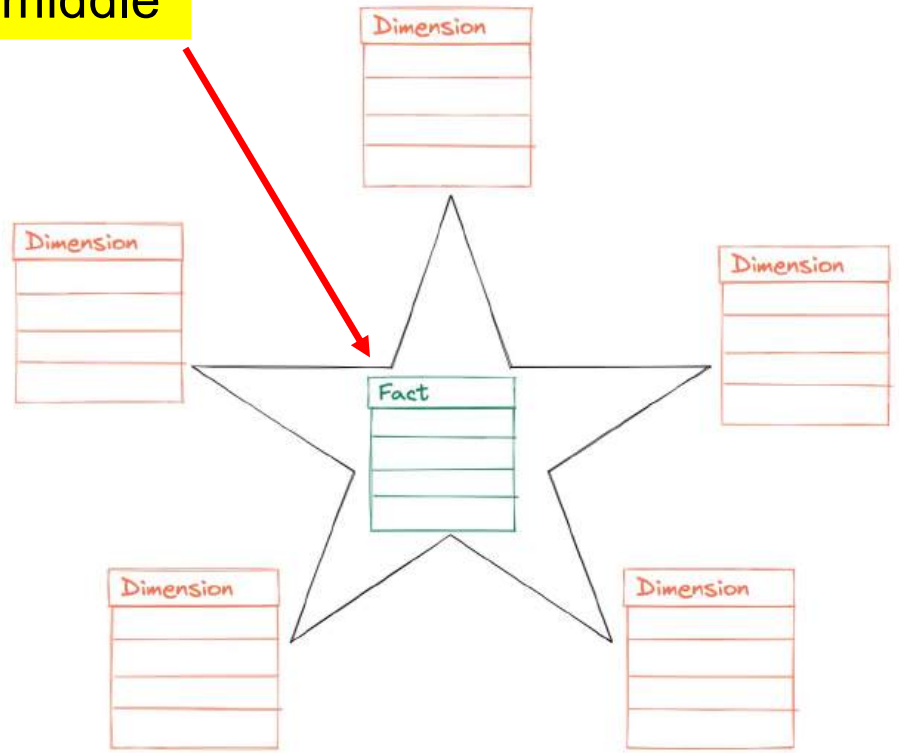
E.g., when drawing an associative entity…



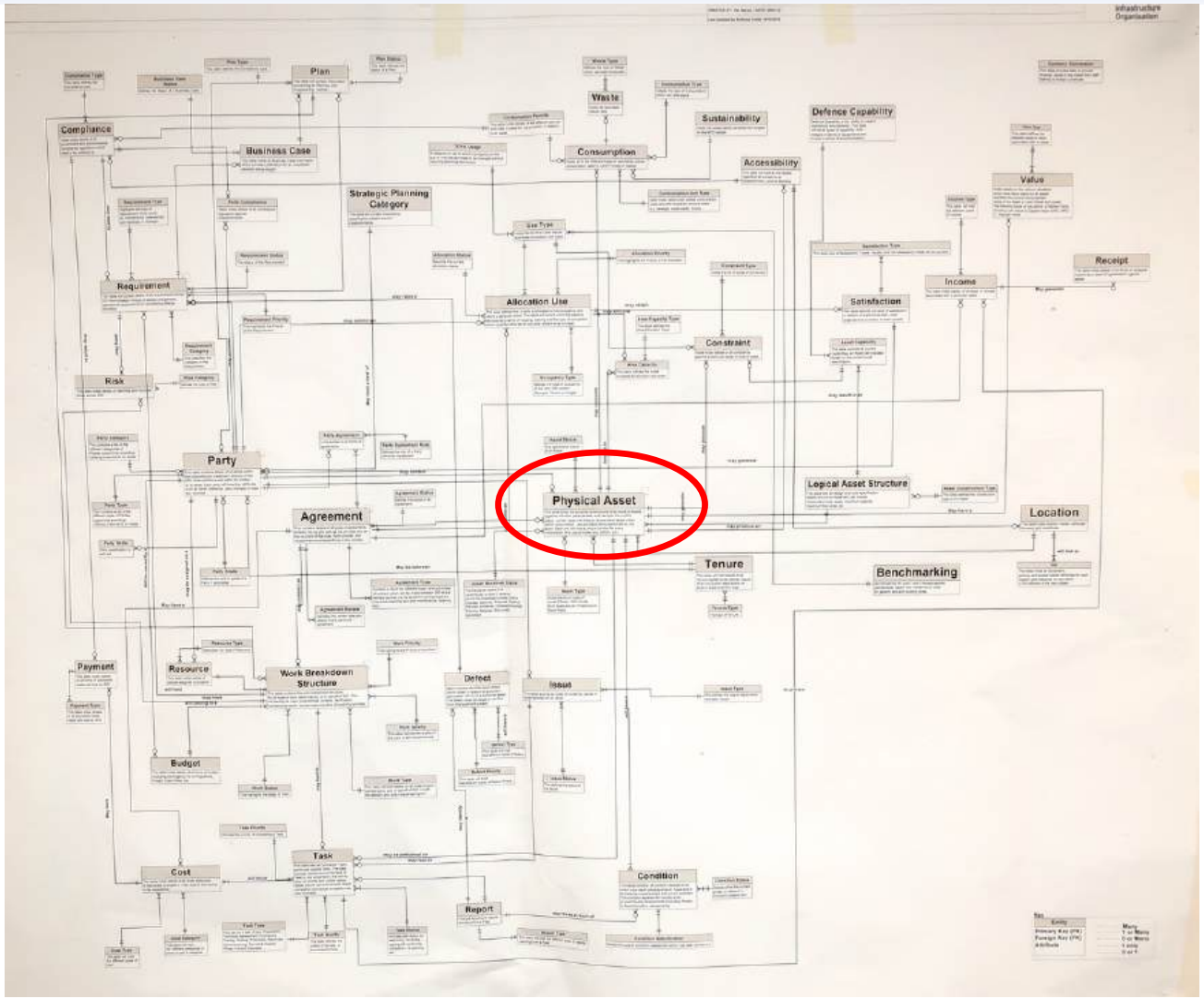
Dimensional / Star Schema models – "middle-out"

"Fact" in the middle





"Middle-out" – a terrible strategy for ER / Concept Modelling

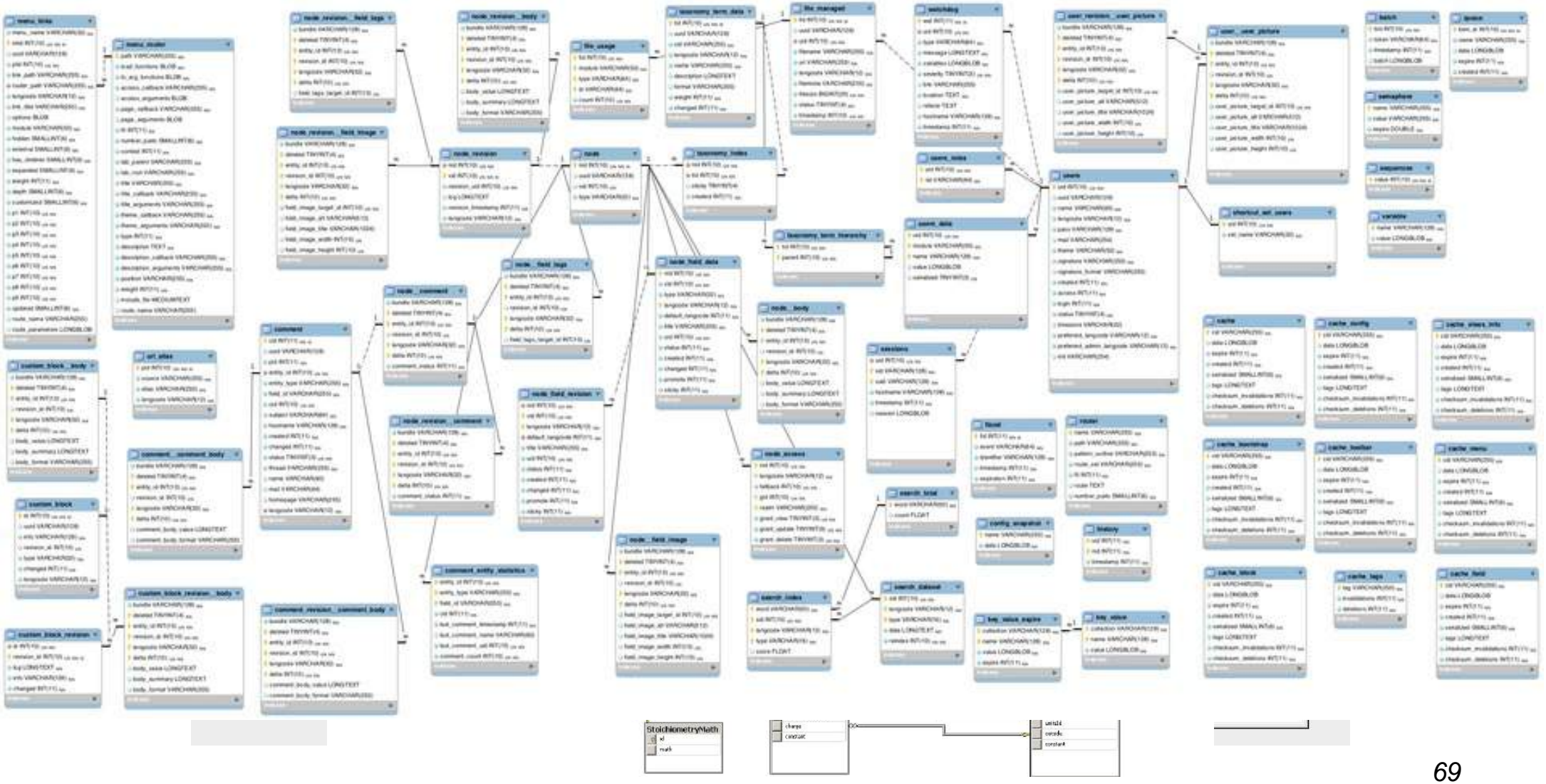


A common error – *"the most important entity should go in the centre of the diagram."*

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

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

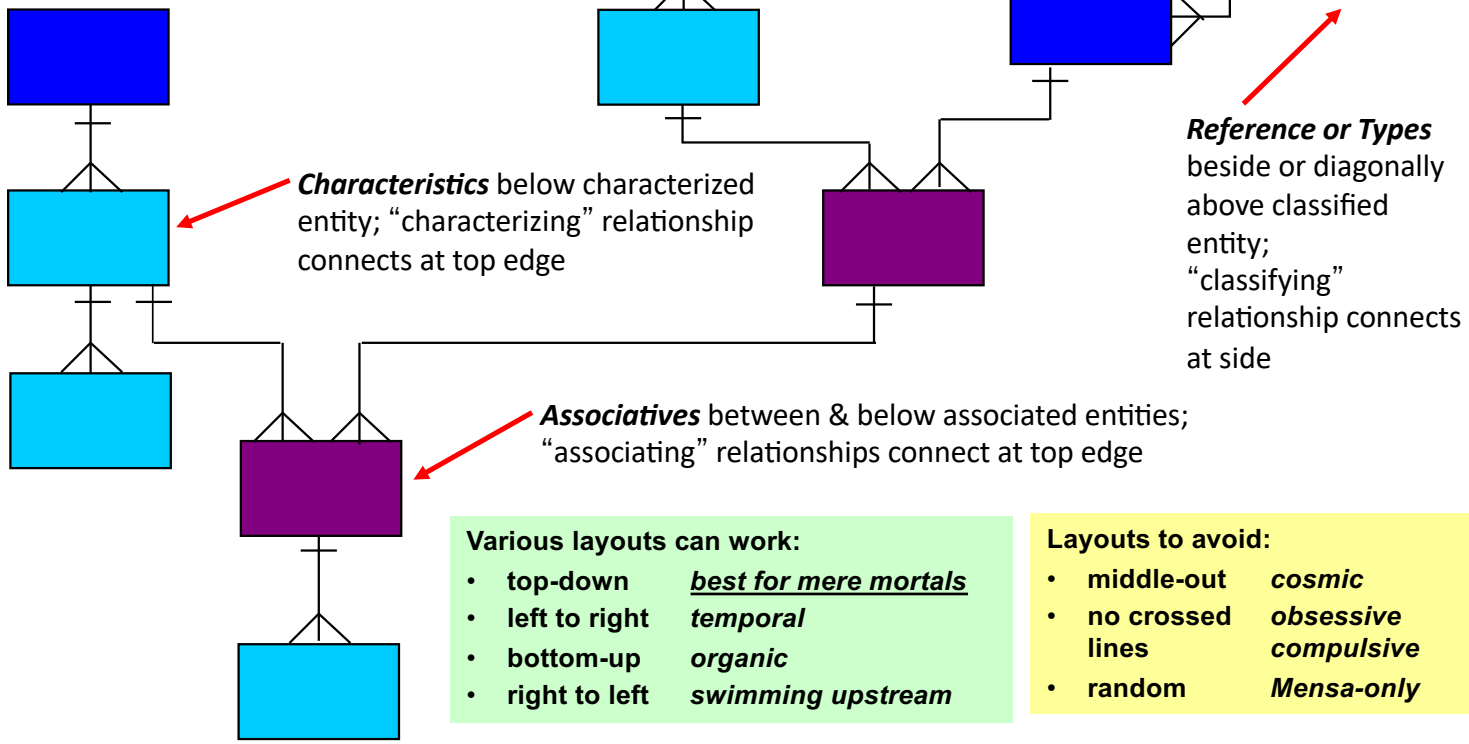
A 'Net sampler – evidently, help is needed…



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 characterized entity; "characterizing" relationship connects at top edge

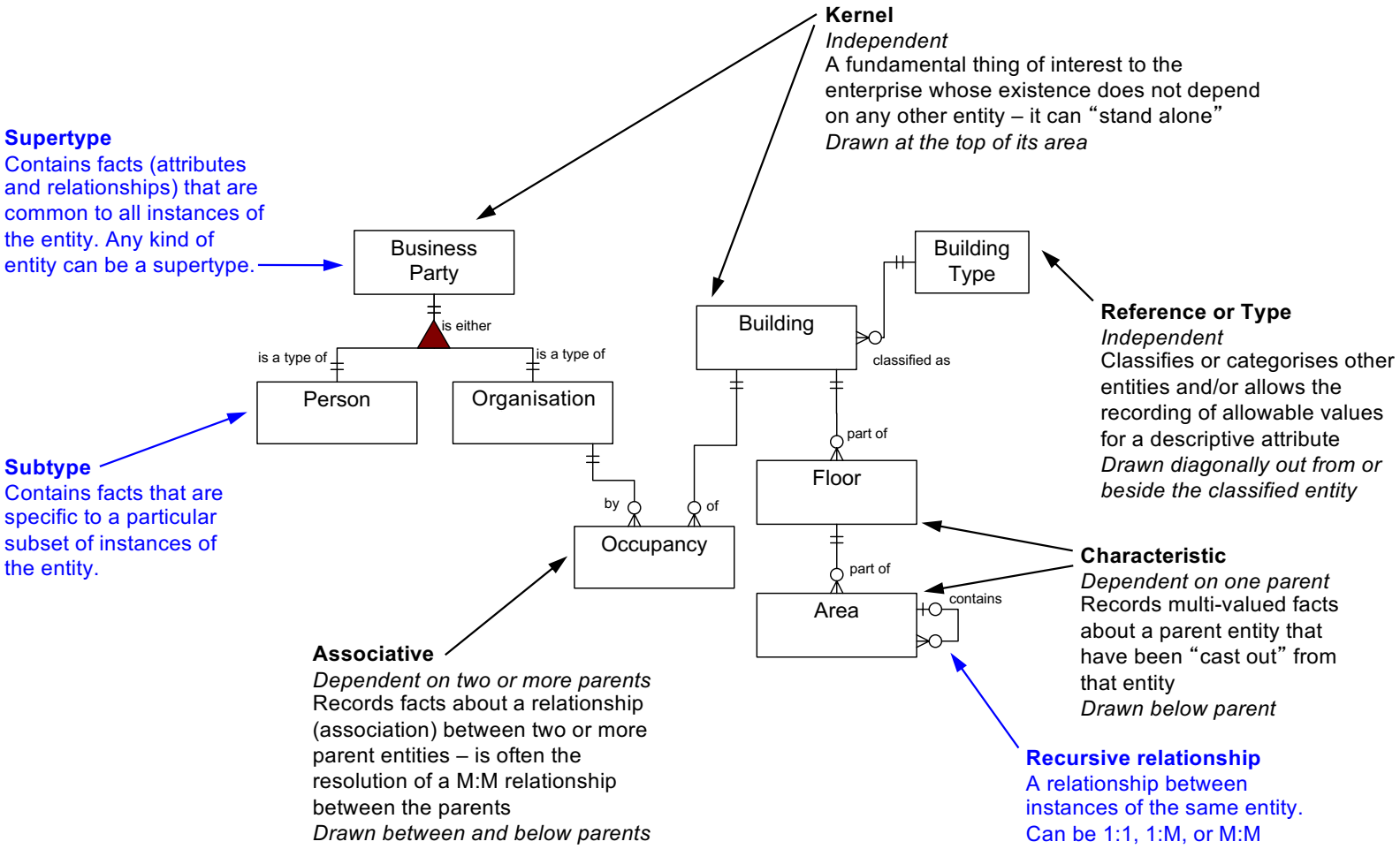
Reference or Types beside or diagonally above classified entity; "classifying" relationship connects at side

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

Various layouts can work:
- **top-down** — ***best for mere mortals***
- **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***

Summary – entity types and conventions



Kernel
Independent
A fundamental thing of interest to the enterprise whose existence does not depend on any other entity – it can "stand alone"
Drawn at the top of its area

Supertype
Contains facts (attributes and relationships) that are common to all instances of the entity. Any kind of entity can be a supertype.

Subtype
Contains facts that are specific to a particular subset of instances of the entity.

Reference or Type
Independent
Classifies or categorises other entities and/or allows the recording of allowable values for a descriptive attribute
Drawn diagonally out from or beside the classified entity

Characteristic
Dependent on one parent
Records multi-valued facts about a parent entity that have been "cast out" from that entity
Drawn below parent

Associative
Dependent on two or more parents
Records facts about a relationship (association) between two or more parent entities – is often the resolution of a M:M relationship between the parents
Drawn between and below parents

Recursive relationship
A relationship between instances of the same entity. Can be 1:1, 1:M, or M:M

Bottom-up Concept Modelling with top-level executives

Client: mid-size credit union (a *"member-owned bank"*) in US southwest

- BI team wants to improve modelling of complex *operational* data – schedule in-house delivery of our *Business-Oriented Data Modelling Masterclass*
- BI team invites Chief Strategy Officer (CSO) to attend Day 1
- In-class example shows how important terms and definitions are
- The example – one of the world's largest credit card issuers responds to competitor's goals.
- *CSO is impressed!*

We'll look at this bottom-up modelling example if there's time.

"What is a Customer?" at the credit card issuer

Competitor: "We will have 1 billion customers by the year ____."

Credit Card Issuer CEO (Famously aggressive and competitive): *"We'll have more!"*

- CEO, later: "But how many Customers do we have *now*?"
- IT folks try to answer the question by counting Customers
- Answers start coming in – varying by *orders of magnitude!*
- CEO was unimpressed:
  "IT, you have a $330M annual budget
  and you can't tell me how many Customers we have?!"
- IT (bravely) pushes back –
  "It's not an *IT* problem, it's a *business* problem.
  There's no definition of *a Customer.*"
- **Note** – CEO was impressed by the pushback and the first Data Resource Management group was formed
- The exercise – what were people counting?

Counting customers

Corporation/ Enterprise

Corporate Account

Statuses (active, inactive, …)

Card

Person

Using a
Name & Address match
– good luck with that!

Account-holder

Personal Account

Cardholder

Merchant

Imprint Machine / PINpad

CSO, to Steve, the BI lead: "Hey, Steve, do we know how many *Members* we have?"

Steve: "Not even close…"

CSO: "We need to get the Leadership Team together and do some of this stuff."

Approach and plan

Early lessons on facilitation:

- Simple plans work better.
- My two facilitation rules:
  Write It Up! and *Scan & Ask!*

Our plan:

- Schedule three sessions, Mon-Tue-Wed, 08:30 – 14:30. *Not Full Days!!!*
- By email, participants list "terms I use on a daily basis" (more on that later)
- The simple session plan:
  - Introduction – objectives, examples, common difficulties, participant introductions
  - "Venting" - questions, concerns, suggestions, etc. from the group
  - Core "things" selected by facilitator, and rationale. Divide into three groups (Mo, Tu, We)

each day {
  - Develop a concise (one to three sentences) definition for each thing
  - State "assertions" or "rules" about the things
  - Optionally, develop a graphic form of the findings

  - Summarise, determine next steps, conduct retrospective

Preparation –

- *Virtual* first, *in-person* later
- Via email, we gave a "homework assignment"
  - Please spend ~10 minutes listing terms you use daily.
  - Please identify information you need but can't get, or don't trust it
  - No right or wrong – goal is familiarity with your terminology
- The text of our email…

Before the session, it would be very helpful if everyone could do two things:

- Spend up to 10 minutes or so listing any terms that come to mind that you use on a frequent basis. Each item in your list could be the name of some thing you need to track, a fact about a thing, a spreadsheet, a report, a metric, a system, a database, or anything else that comes to mind. I'm hoping everyone can list thirty or forty things. There is no "right or wrong" – this helps me learn the language and provides clues to what the most critical terms might be.
- Think of one to three examples of information you'd like to be able to get, but either you can't, or you're not sure how accurate it is. For instance, at a US university last week, a Vice-Provost said she would like to know "How many non-resident, tenure-track Faculty do we have." Of course, this means agreeing what is meant by "Faculty," "tenure-track," and "non-resident." (I've done a LOT of work in higher education, and can promise you there is not agreement on what those terms mean.)

That's the whole point of our sessions next week. :-)

Excellent responses to "homework" – here are 6 typical

As it pertains to the data needs of Community Relations, Membership Development, and our Foundation my feedback is below:

Data Terms:

- Delinquency
- Since Inception
- Metrics
- Aggregate
- Reports
- Query
- Database
- Storage
- Visual representation of data
- Timeframe

Information access:

- The ability to query data to match the format funders are requesting
- Different data sets located in multiple places. Integration of systems would be helpful (accounting system not integrated with data integrations)
- Membership by SEG
- Ad hoc reports
- Full understanding of Data Integrations capabilities (menu of services)

- Roll rate

Concept Modelling Overview for Elisa

Some had little to say, others had lots

- What do we consider a Member in reporting?
- What do we consider an Account in reporting?
- How do we determine how many members we have? Is it based on number of individual memberships or unique SSN?

General Terms

- Member
- Membership
- Individual
- Account
- Services
- Co-borrower
- Primary
- Joint
- Pay off
- FIS (Clientlink)
- Co – op (Springboard)
- DMI
- Past due
- Total due

Member Solutions Terms

- Carmpro (collections system)
- ARM (recovery system in Carmpro)
- Promise to Pay (PTP)
- Payment by interval i.e by hour or day
- Call by interval i.e. by hour or day
- Balances saved by interval i.e by hour or day
- Charge off
- Repossession
- Penny loan
- Workout loan
- Fixed Payment Plan
- Loan Extension
- Bankruptcy by chapter 7,11,13
- Delinquency
- Delinquency rate
- 60 day + delinquency rate
- Charge off rate
- Net Charge off rate
- Recovery
- Recovery rate
- Forced closed
- Lexis nexis
- Credit bureau /credit report
- Skip tracing
- Net flow rate
- Leading edge rate
- Roll rate

Excellent responses to "homework" – 1

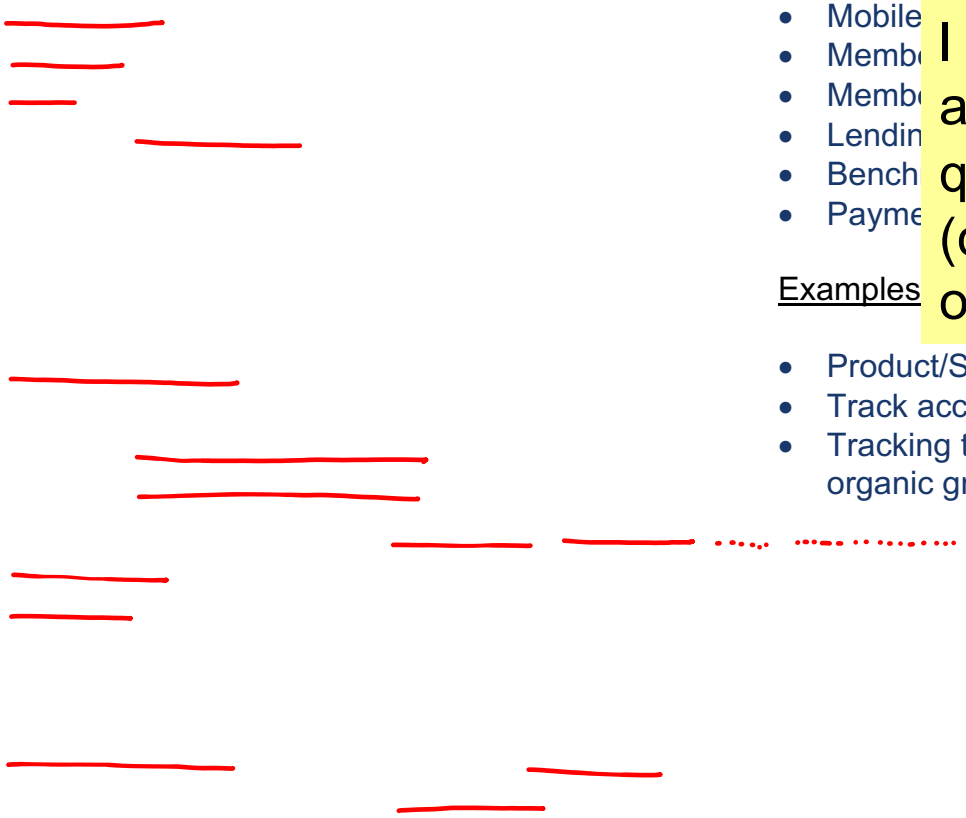
- What do we consider a Member in reporting?
- What do we consider an Account in reporting?
- How do we determine how many members we have? Is it based on number of individual memberships or unique SSN?

Service Delivery would like to collect accurate production numbers for loans, loan dollars. This may be more of a system issue between Meridianlink and XP talking to each other.

- What do we consider a Member in reporting?
- What do we consider an Account in reporting?
- How do we determine how many members we have? Is it based on number of individual memberships or unique SSN?

The next 6 slides are individual responses – skip to slide 85

All were useful



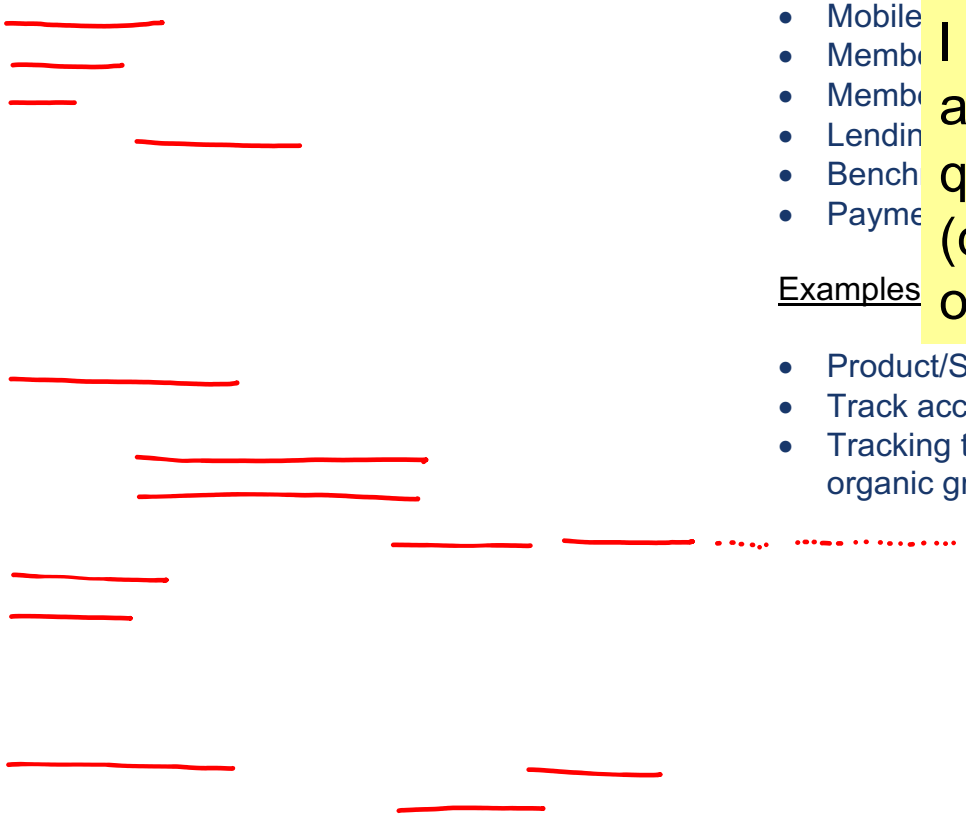
- Average relationship account
- Fee income per member
- Net income per member
- Marketing expense per member
- Member trends
- Market segmentation
- Mobile
- Memb
- Memb
- Lendin
- Bench
- Payme

I went through all the "homework" and selected ~40 terms that qualified as "things" (or entities, or business objects, or classes, or…)

Examples

- Product/Service adoption based on campaigns
- Track acceptance rates on promotions
- Tracking the new member sales path (similar to what we are doing with th organic growth project)

All were useful



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Excellent responses to "homework" – 2

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- Different data sets located in multiple places. Integration of systems would be helpful (accounting system not integrated with data integrations)
- Membership by SEG
- Ad hoc reports
- Full understanding of Data Integrations capabilities (menu of services)

Excellent responses to "homework" – 3

Terms:

- Household income
- Member growth
- Loan originations per member
- Average relationship balance
- Average relationship account
- Fee income per member
- Net income per member
- Marketing expense per member
- Member trends
- Market segmentation
- Mobile/Online banking penetration
- Member investment products
- Member retirement products
- Lending market overview (credit card, mortgage, auto, home equity)
- Benchmarking
- Payment information (how cards are used)

Examples:

- Product/Service adoption based on campaigns
- Track acceptance rates on promotions
- Tracking the new member sales path (similar to what we are doing with the organic growth project)

Excellent responses to "homework" – 4

List of Items/Terms

- sql server
- crystal reports
- 3,000 tables
- weekly/canned reports
- in it to win it
- tickets
- helpdesk
- xp and meridianlink
- wrike
- lots of one-off systems that require integration
- defining member, account, joint account, voting member, keyid, etc.
- duplicate data in multiple tables/sources
- different values for similar or equal variables
- hope to build a self-service datamart

Ability to obtain a wide variety of information and data since projects can pertain to various internal customers in virtually any dept. within the org. Additionally, a lot of research/business analysis is aided by exploratory analysis which may involve iterations of analysis and/or trial and error.

Excellent responses to "homework" – 5

General Terms

- Member
- Membership
- Individual
- Account
- Services
- Co-borrower
- Primary
- Joint
- Pay off
- FIS (Clientlink)
- Co – op (Springboard)
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- Net Charge off rate
- Recovery
- Recovery rate
- Forced closed
- Lexis nexis
- Credit bureau /credit report
- Skip tracing
- Net flow rate
- Leading edge rate
- Roll rate

Excellent responses to "homework" – 6

Terms:
Member number, account # vs loan #, Loan types, Loan balance, Loan AMOUNT, Loan limit, Origination date, payment, interest rate, loan term, delinquency, collateral, – as they pertain to all loans i.e. XP, DMI serviced mortgages, credit cards
Share type, terms, rates, maturity dates
Audit data

Transaction data
a. # of members who use home banking
b. # of home banking transactions
c. Members with charged off indirect auto loans
d. Members with multiple share draft accounts

I know there are metrics meetings currently where reports are gone over. I would like to see those same reports and validate some data against quick reports we can pull. I think there is a lot of data that has not been validated

All were useful

Terms:

- Household income
- Member growth
- Loan originations per member
- Average relationship balance
- Average relationship account
- Fee income per member
- Net income per member
- Marketing expense per member
- Member trends
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- Lending market overview (credit card, mortgage, auto, home equity)
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- Payment information (how cards are used)

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(or entities, or business objects, or classes, or…)

Examples:

- Product/Service adoption based on campaigns
- Track acceptance rates on promotions
- Tracking the new member sales path (similar to what we are doing with the organic growth project)

How we chose "things"

An entity is a distinct thing the business *needs* to know about, 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"
- has *multiple* occurrences
  - all are essentially similar (e.g., have same facts)
  - *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 ("What, not who or how") – *the most common error is to identify artifacts (forms, reports, spreadsheets, …) as entities!*

People appreciate solid guidelines

Present potential "things" from "homework"

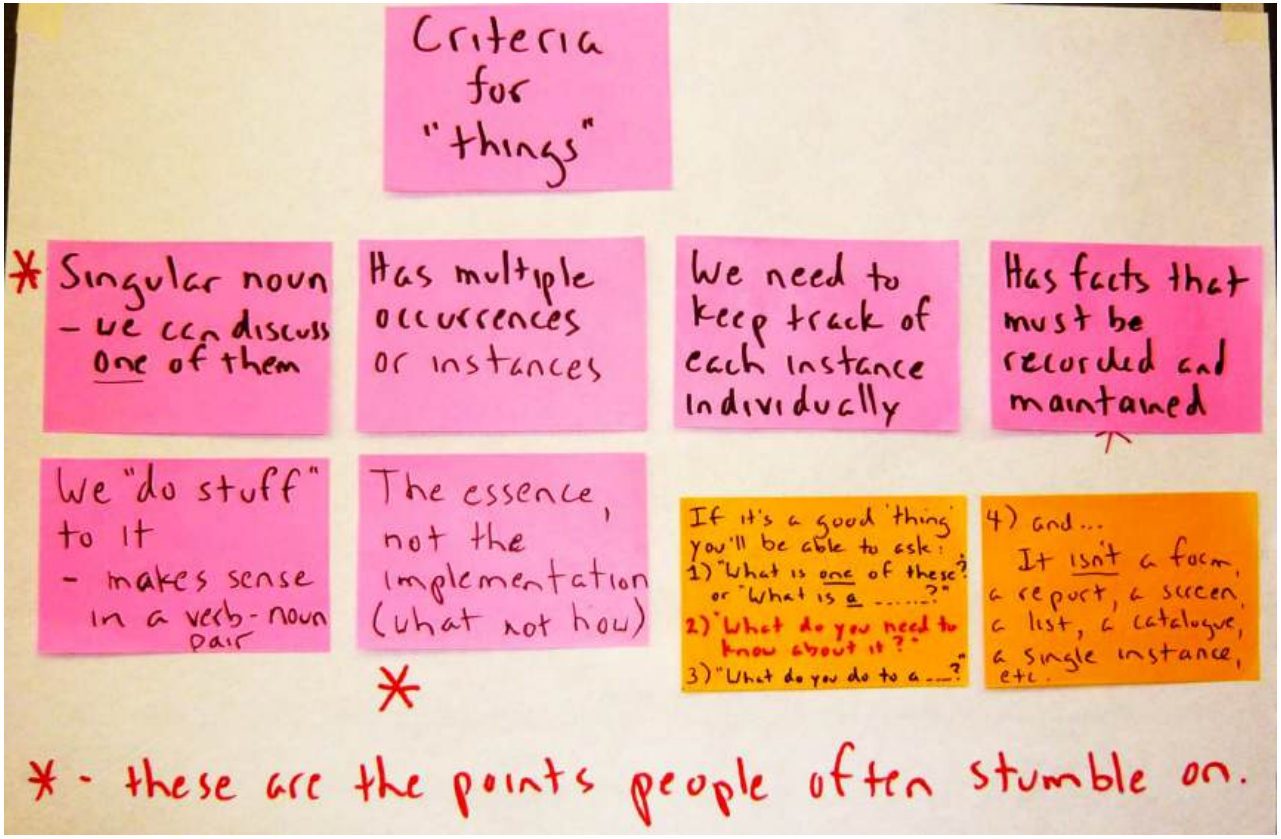
More than enough to work with – here are 30:

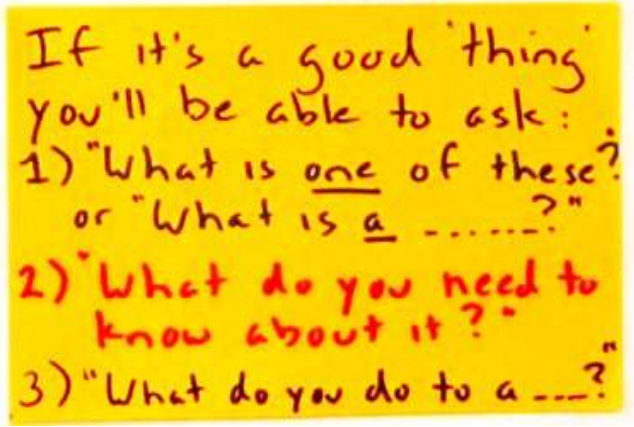
They added more…

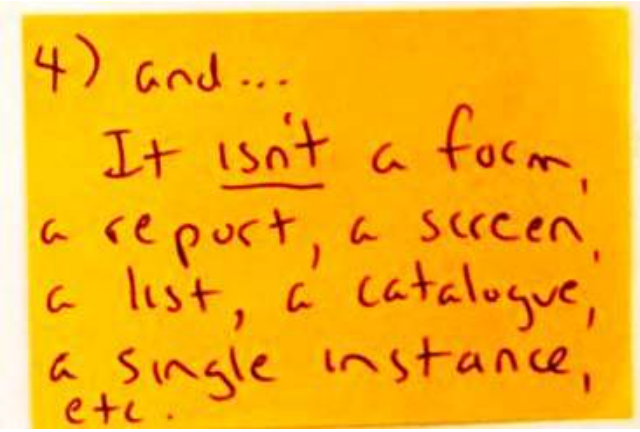
"Wow – you actually *did something* with our homework!"

How did we choose these?

Key Point! This was not arbitrary – there are objective guidelines.
Note – no slide deck; everything was low-tech and tangible – *Post-its & flipcharts*







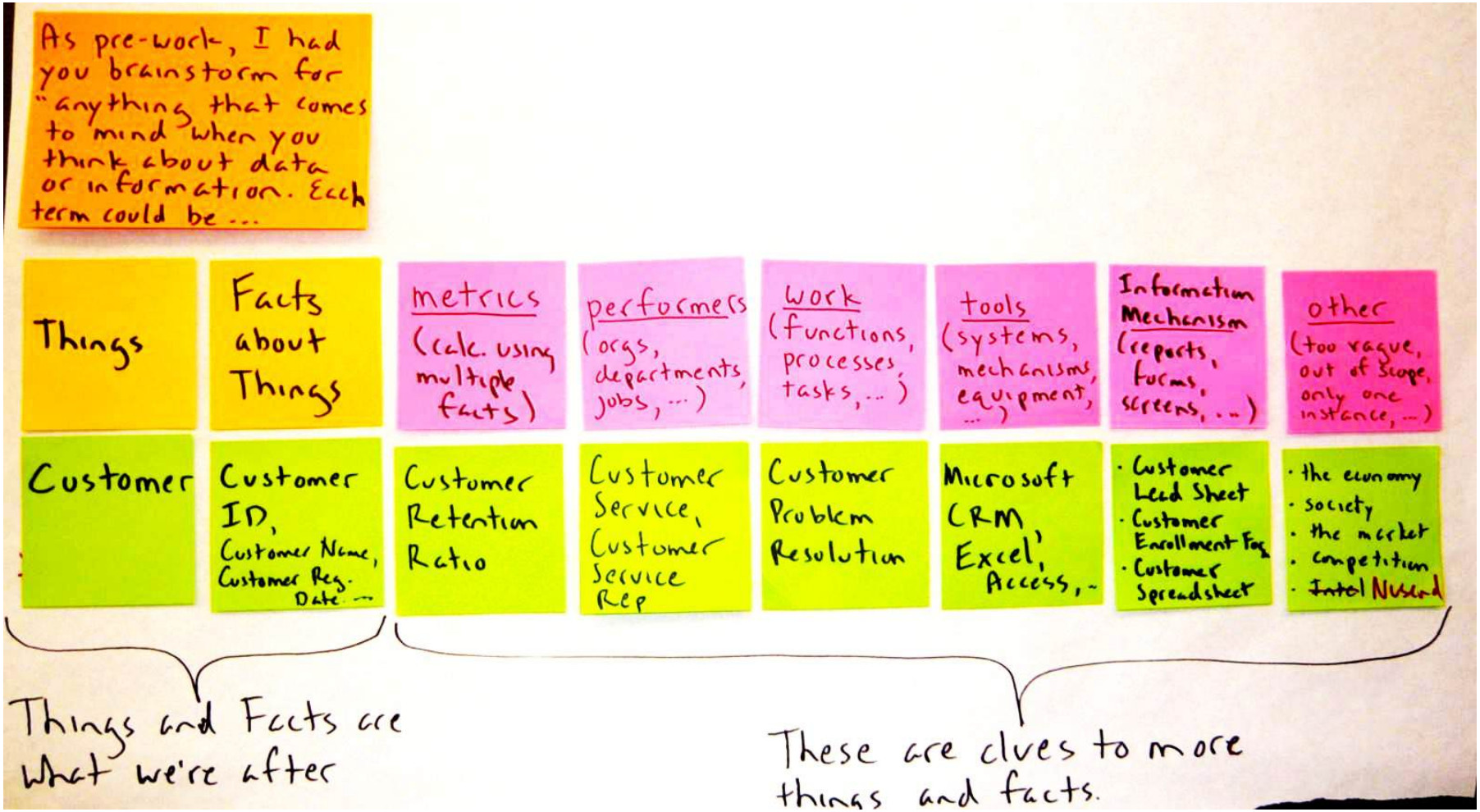
The legible version for your reference

An entity is a distinct thing the business *needs* to know about, 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"
- has *multiple* occurrences
  - all are essentially similar (e.g., have same facts)
  - *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 ("What, not who or how") – *the most common error is to identify artifacts (forms, reports, spreadsheets, …) as entities!*

People appreciate solid guidelines

What I did with your "homework" – sorting the terms

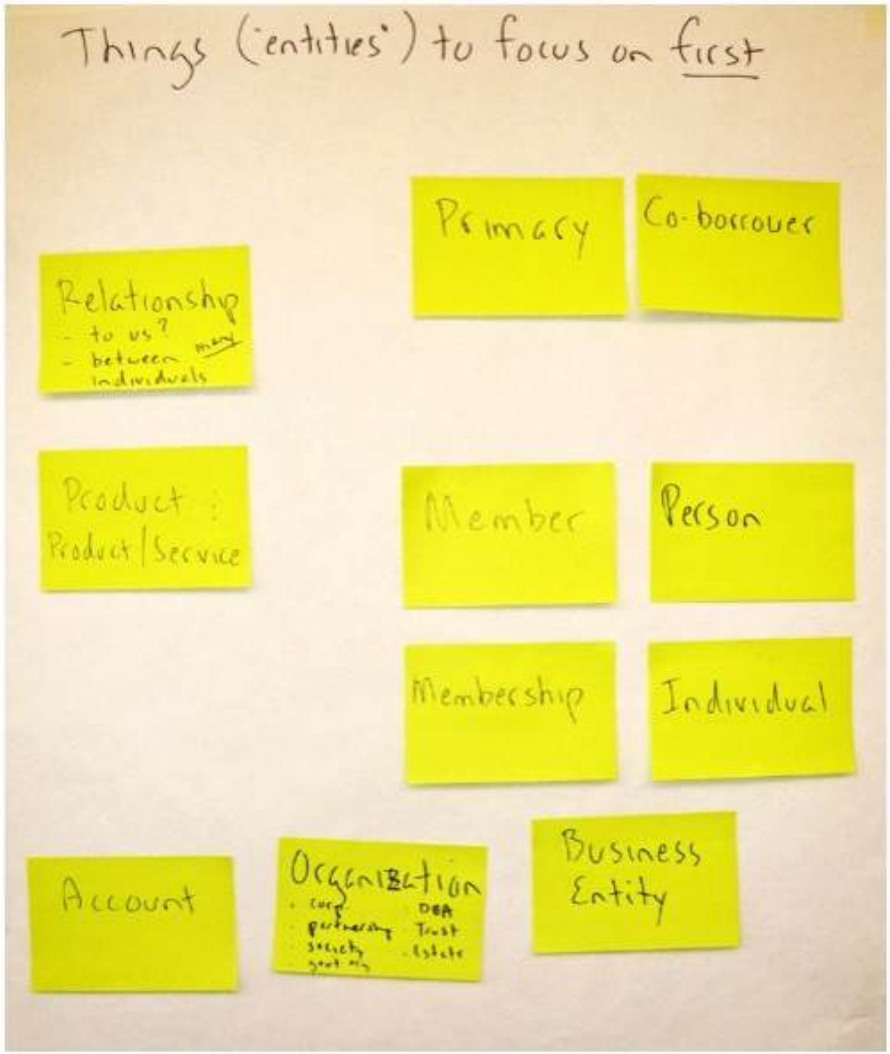


An example from a newspaper for your reference

Selected nouns	Synonyms
Survey	Questionnaire
Market segment	Market need
Product	Section, feature
Issue plan	Editorial calendar
Editorial item	Article, story, interview, wire item, copy
Writer	Reporter, freelancer, columnist, contributor
Issue	Edition
Page	Flat
Customer	Prospect, account, client, advertiser
Display ad order	Order, ad order, retail ad order
Display ad	Ad, retail ad, proof, artwork
Classified ad order	
Classified ad	Classified
Invoice	Bill, receivable
Payment	Receipt, cheque
Commission	

Facts
invoice amount, run date, ad size, page count,
Metrics (a calculation based on two or more facts)
Content percentage, growth rate, profit, *sales*, cash flow, circulation, readership, market share, retention rate
Performers (organizations, departments, jobs, roles, …)
Traffic, *Sales*, Production, Graphic designer, Sales rep
Work (processes, functions, activities, tasks, …)
Billing, design, *sales*
Supporting mechanisms (systems, tools, equipment, …)
G/L system, customer database
Info mechanisms (reports, forms, spreadsheets, …)
Booking sheet, runsheet, order form, master runsheet, chit
Others (too vague, single instance, not tracked, out of scope, …)
Competition, crunch period, the paper, reader

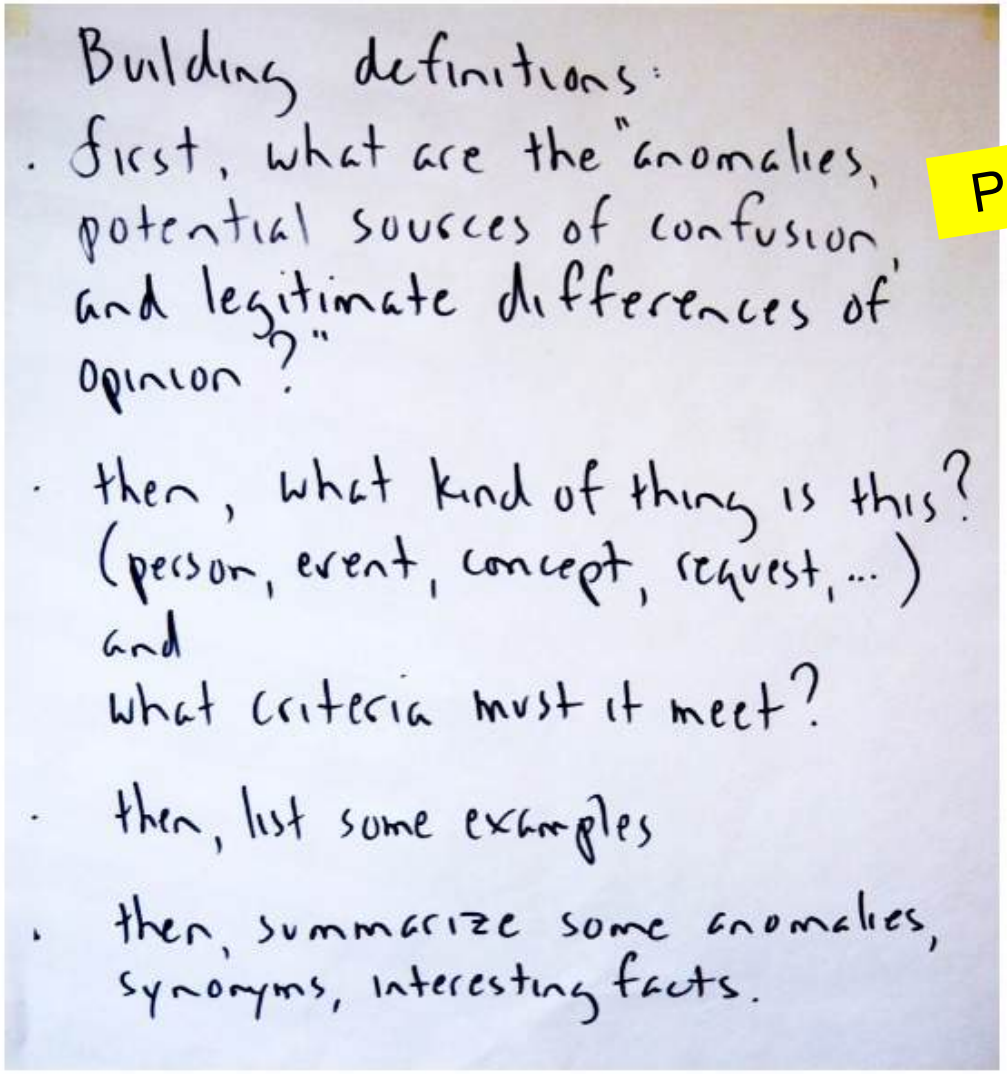
And now we have a plan!



They decided
on Monday we will focus on –

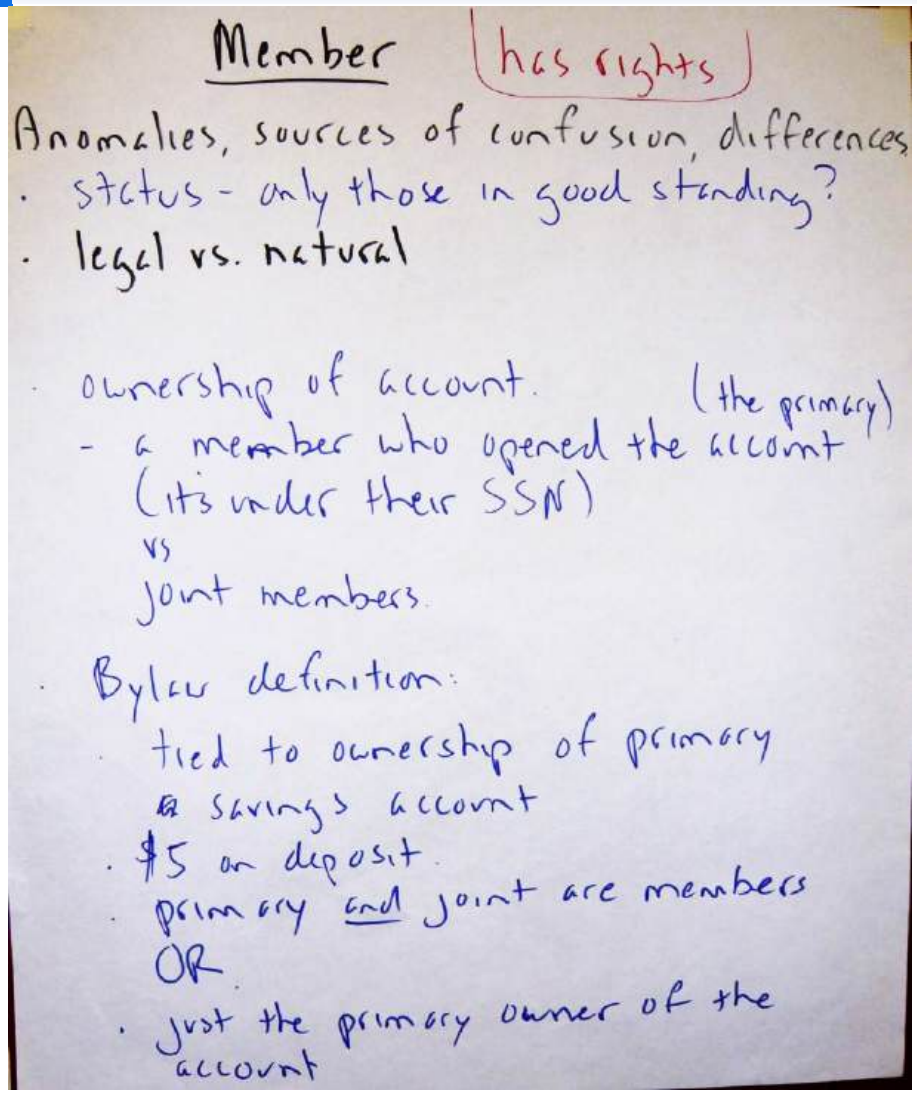
- Member
- Membership
- Person
- Individual
- Account
- Organisation
- Business Entity
- Primary
- Co-Borrower
- Relationship
- Product
- Product/Service

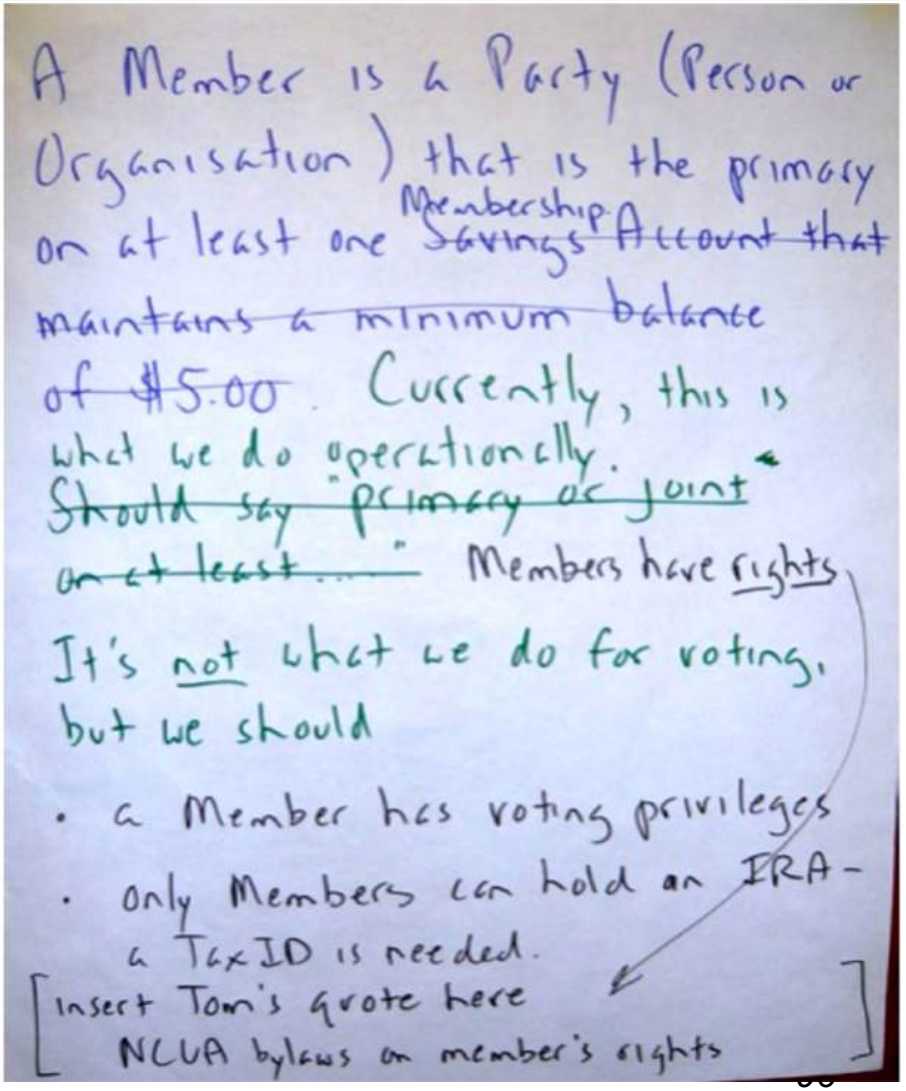
We followed this framework for every definition



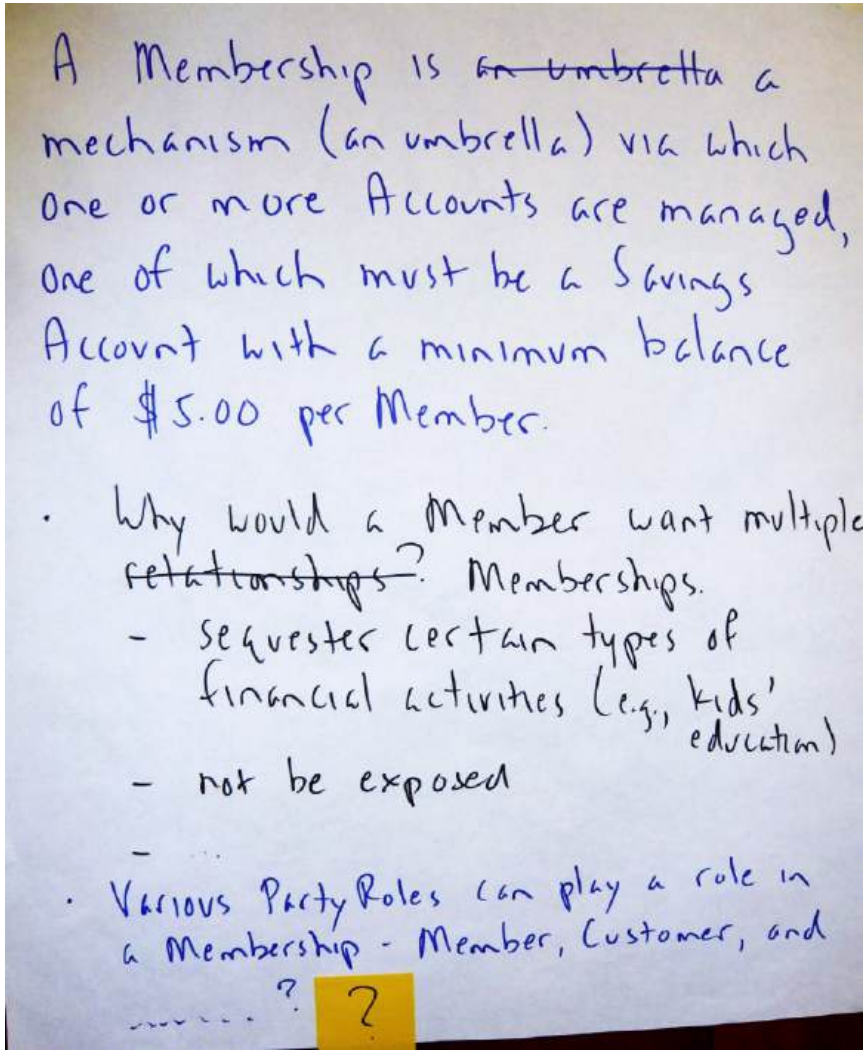
Psychology!

1 – building a "Member" definition…

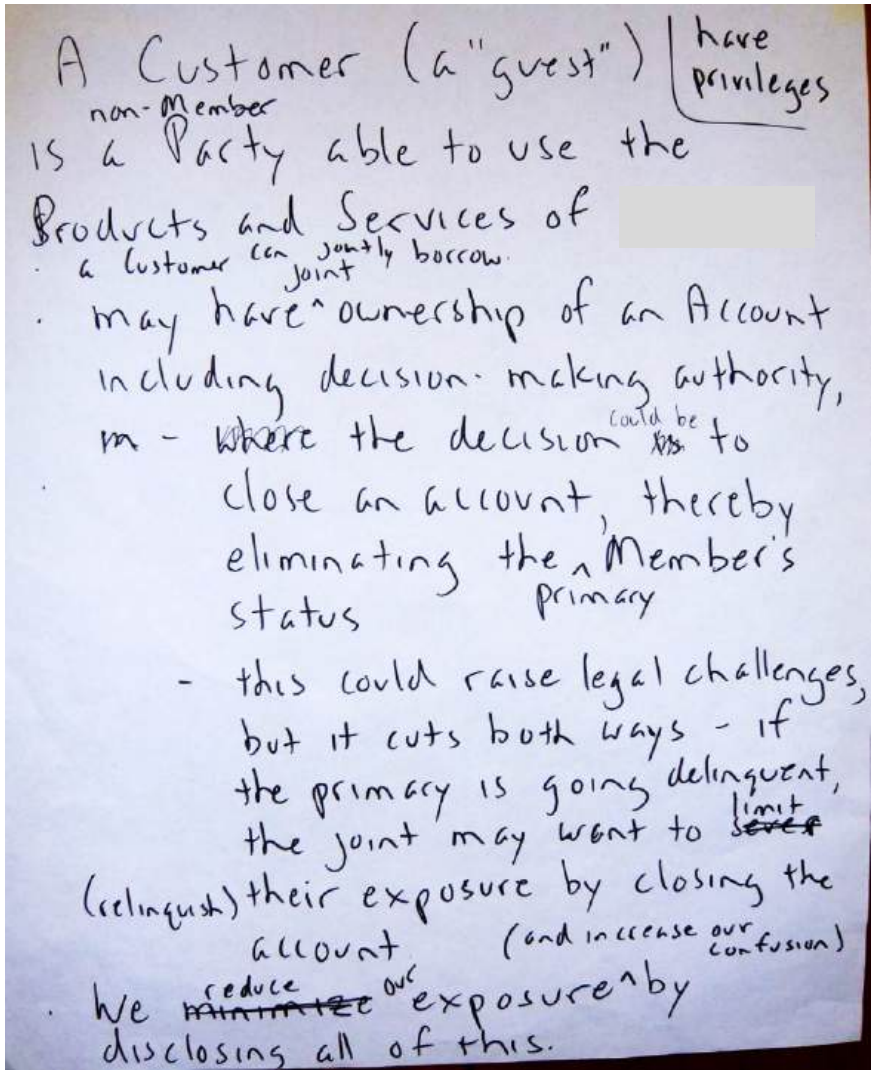




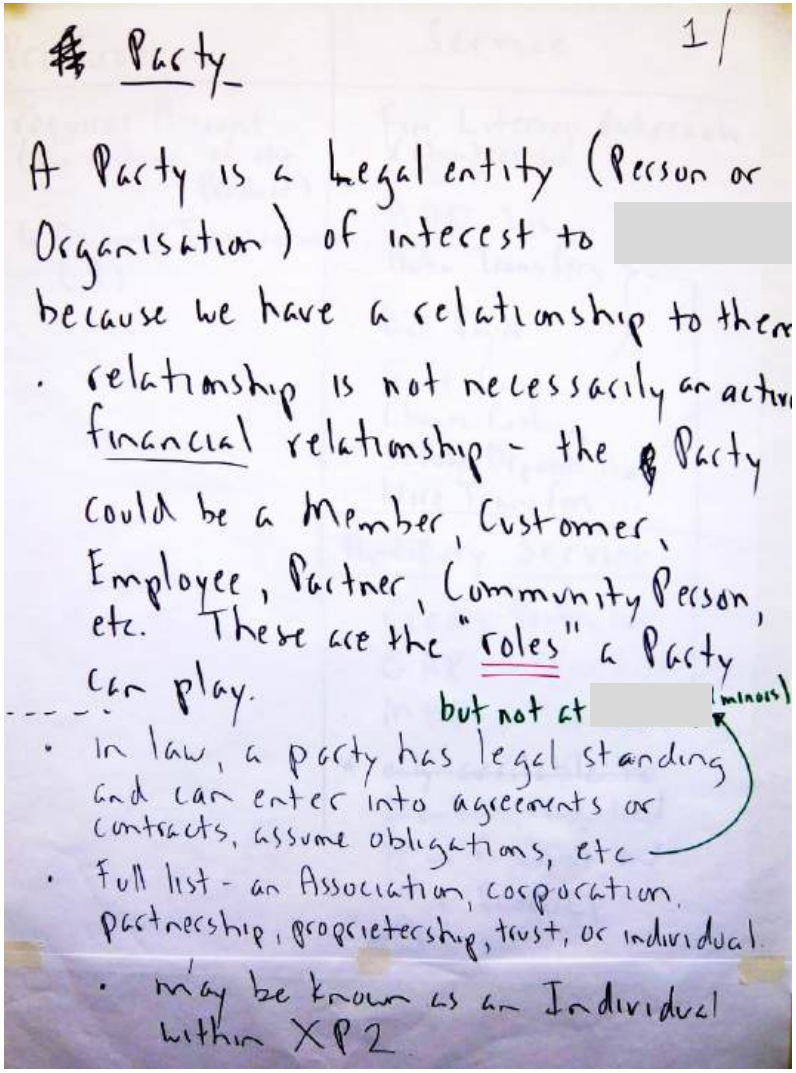
… which is different than "Membership"



… which is different than "Customer"



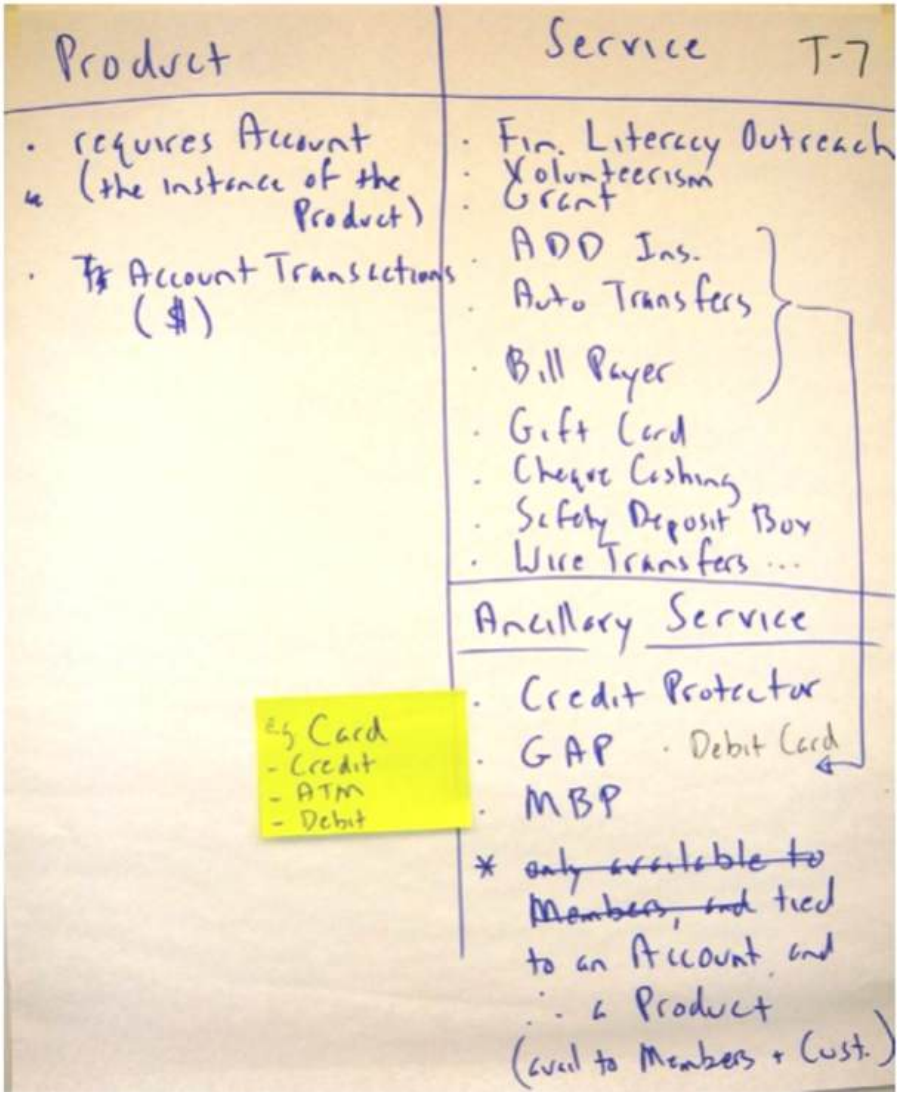
… which is different than "Party"



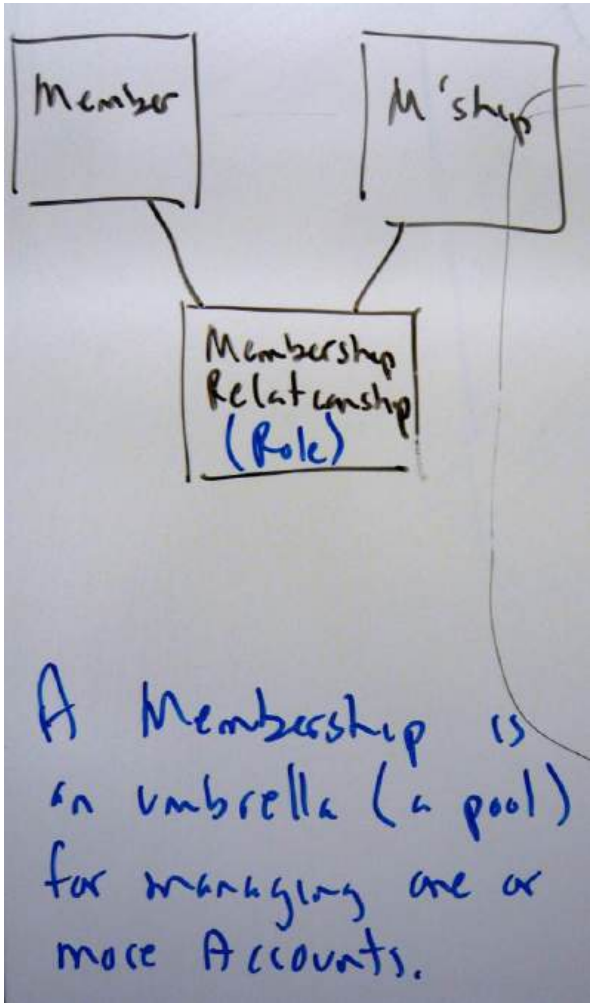
2 – make Assertions about the terms we have defined

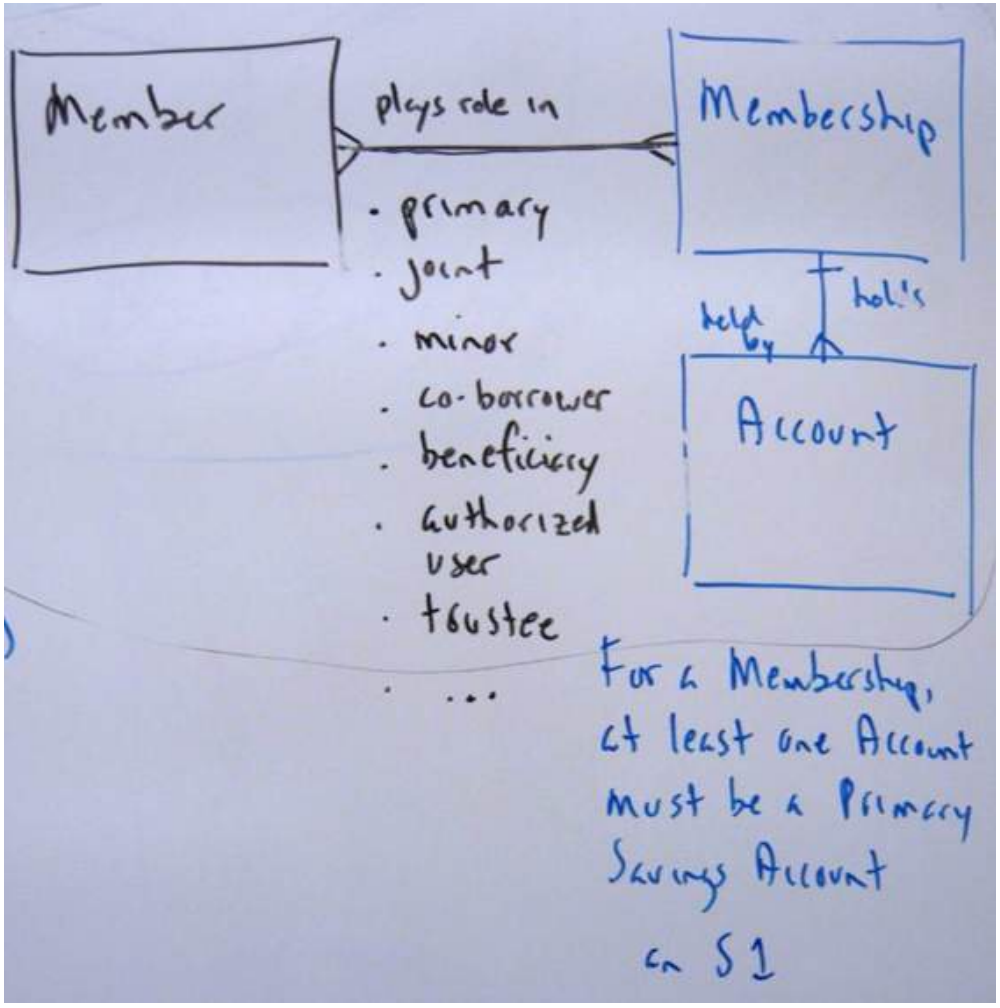
There are no Non-Account-Based Products, just Non Account-Based Services

These came out organically,
from questions and comments
along the way,
but were among the most
important outcomes

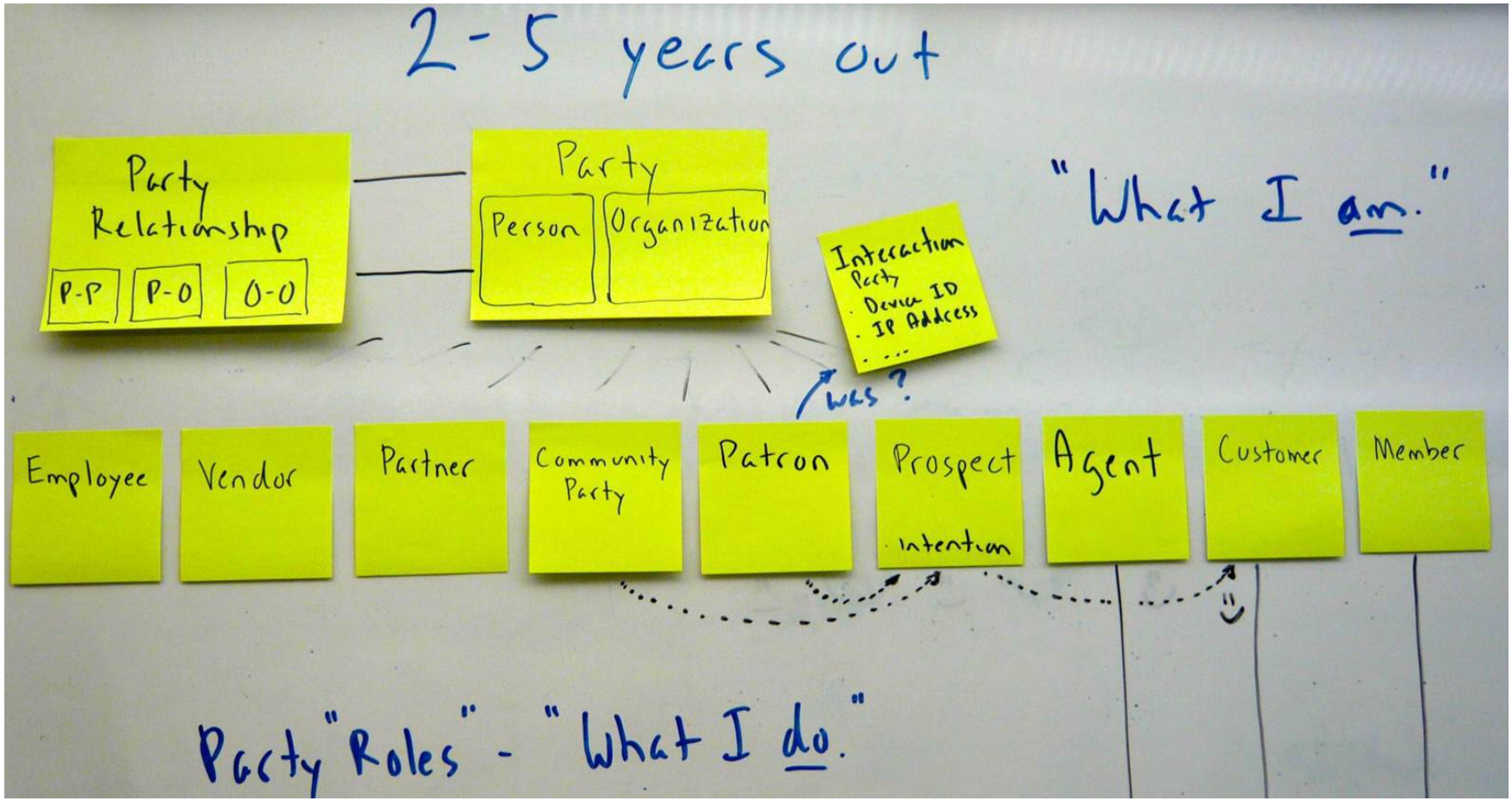


3 – add relationships and draw model fragments





Parties and Roles



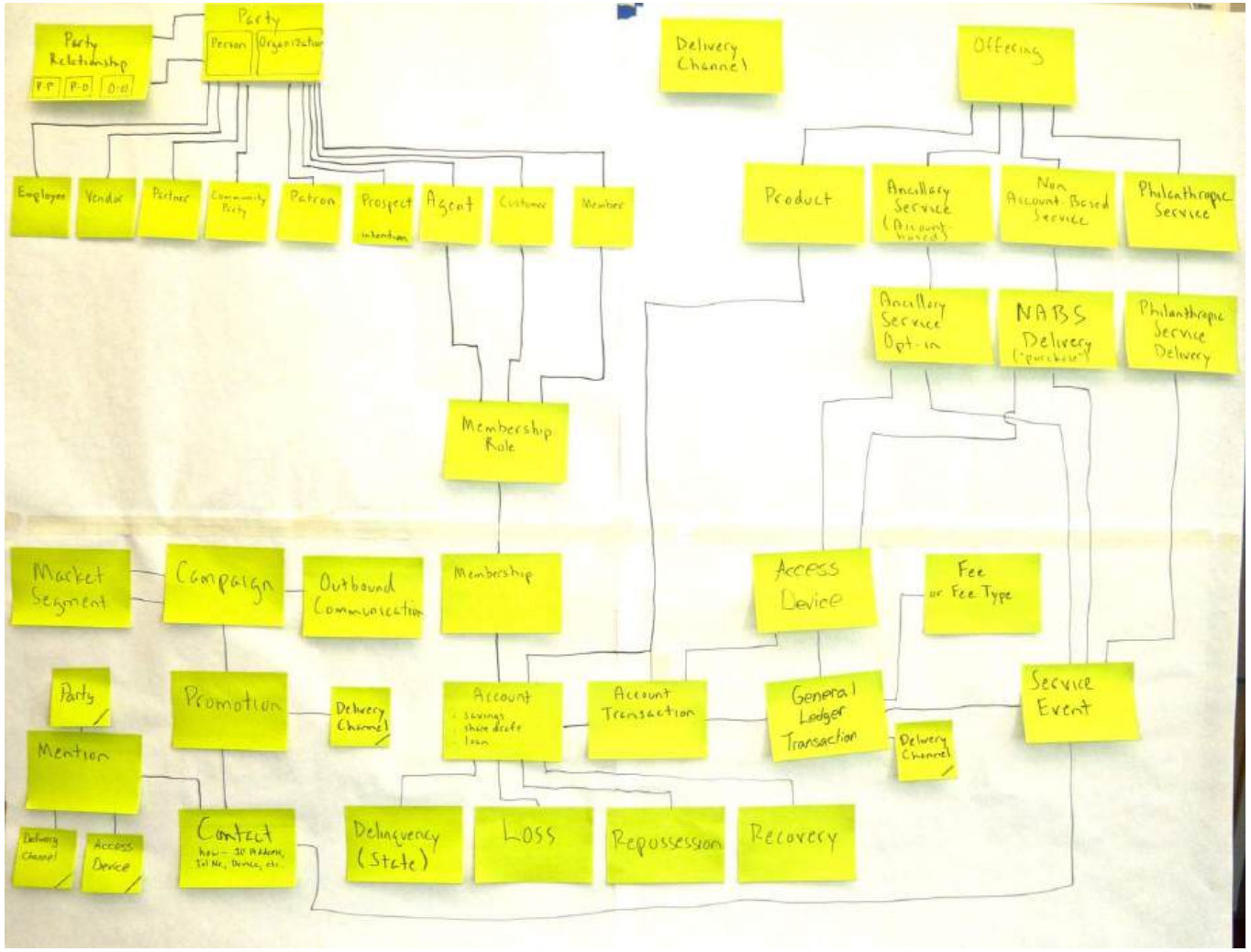
Day One Done!


Things ("entities") to focus on first
Primary
Co-borrower (Customer on a Loan)
Relationship
- to us?
- between many individuals
Done
Business Entity
Product : Product/Service
Member
Individual
Person
Select Employer
Employer
Membership
Organization
Select Employer Group
Account
Select Employer Group
We dealt with these!
Employee

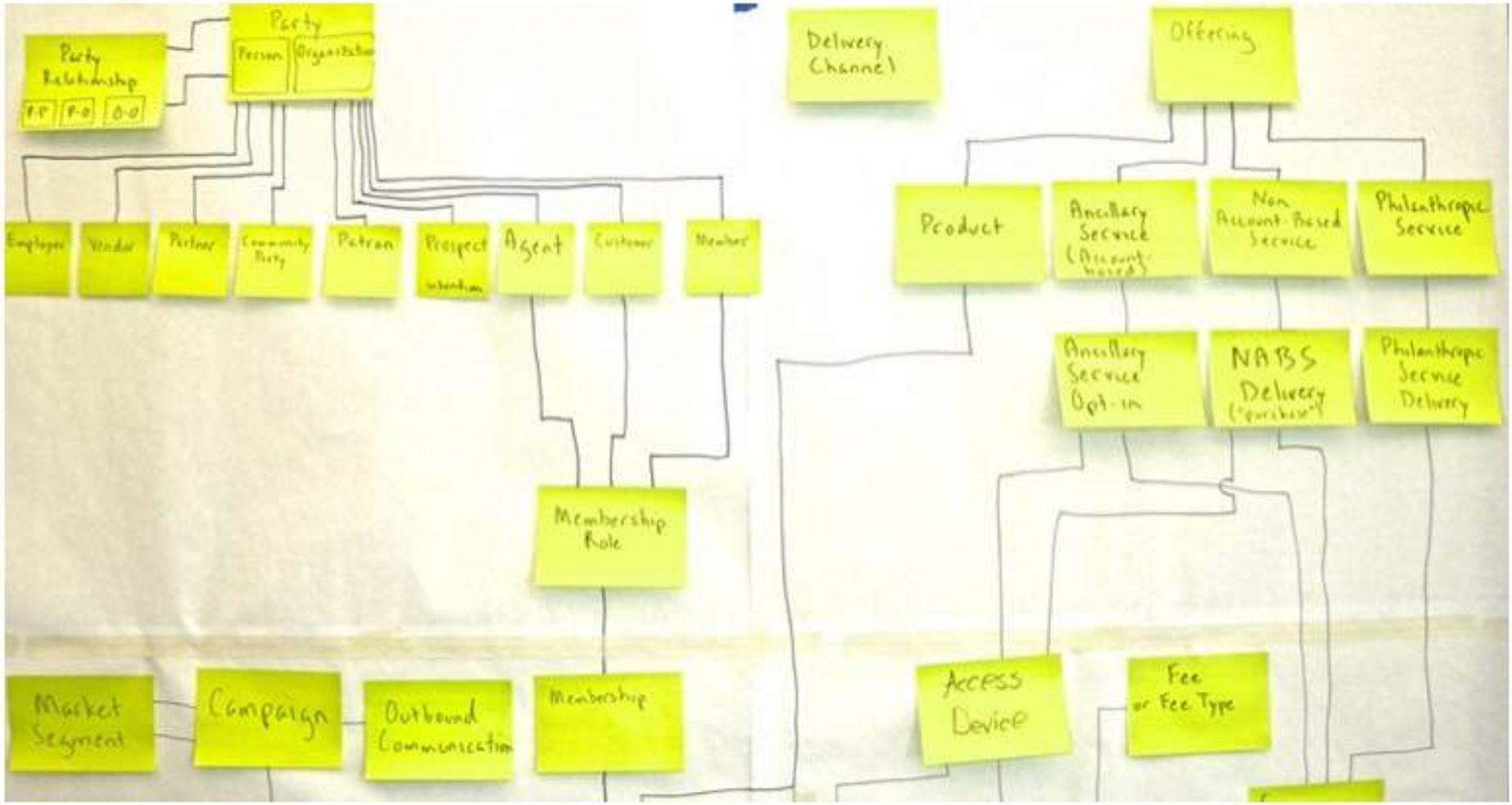
Three partial days, and a ~40 entity concept model emerges

Plus…

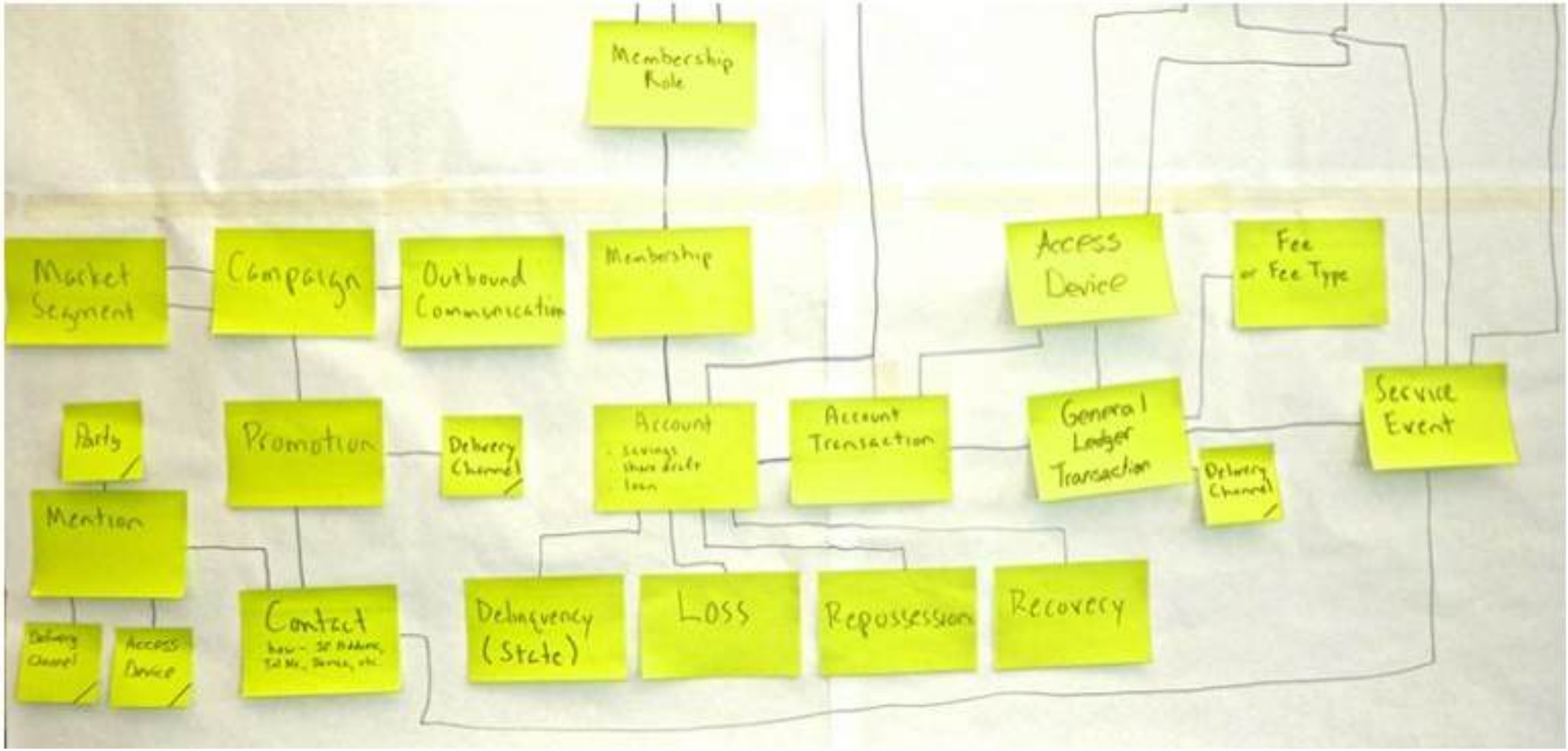
- Over 50 flipcharts of notes – issues, goals, decisions, etc.
- Definitions for all entities
- *Very* positive feedback



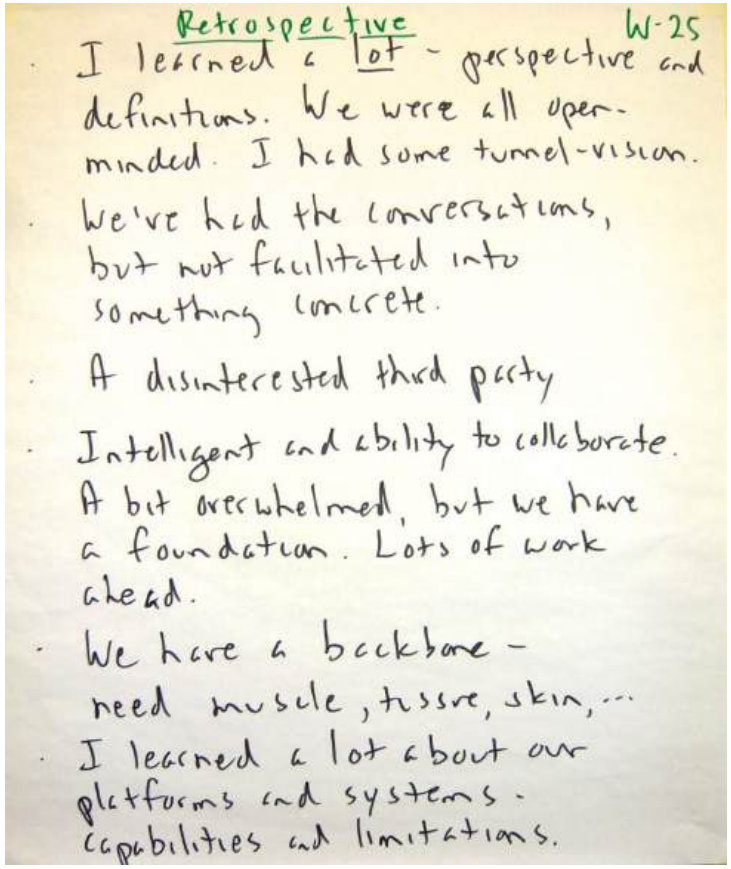
Concept Model graphic – top half

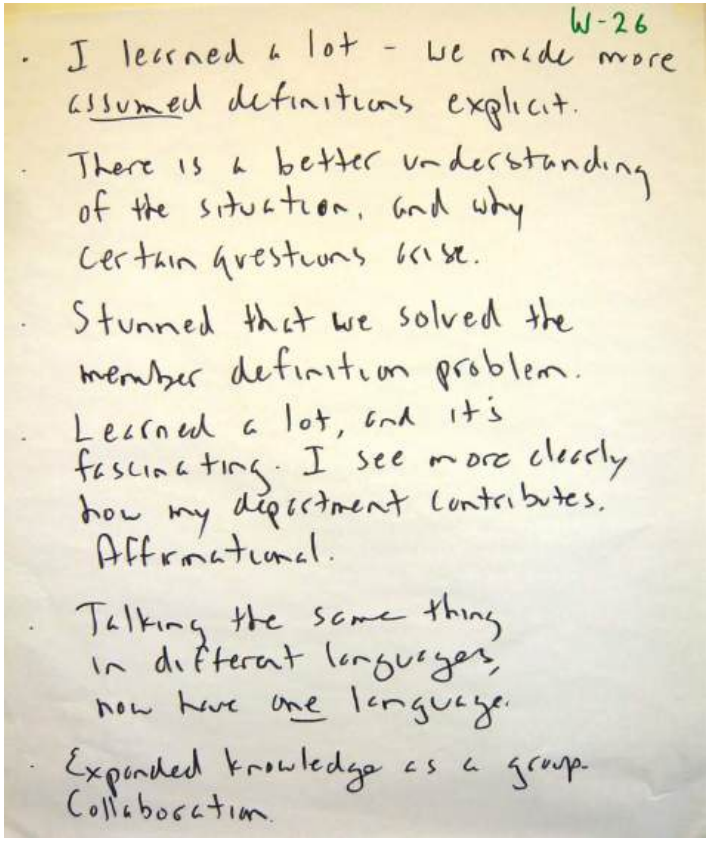


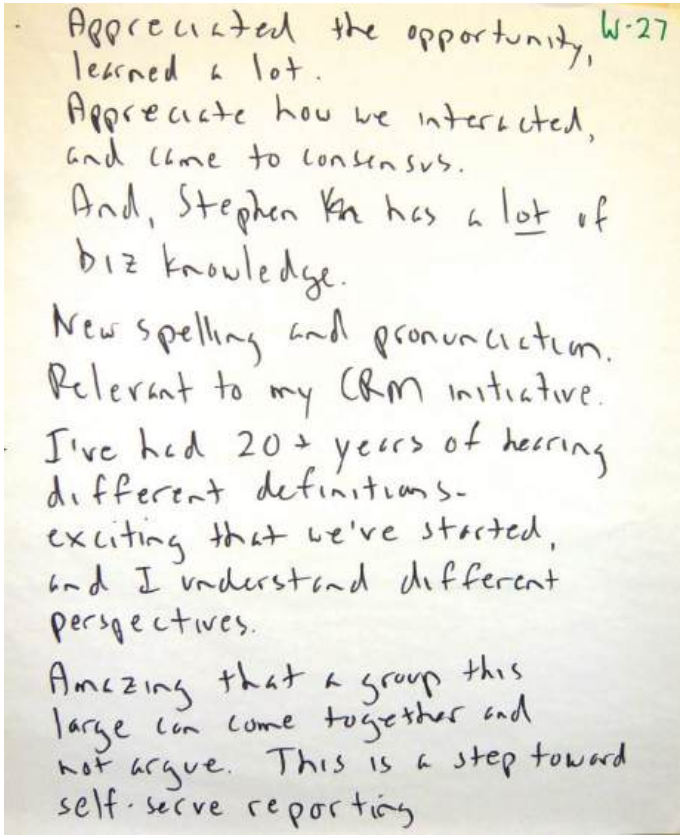
Concept Model graphic – bottom half



They were very pleased with the outcome…







Plus… COO - "We should have done this 20 years ago."

Some closing thoughts…

The basic philosophy….

Data models eventually get complex, but at the beginning they must be kept as simple as possible, to keep everyone on board

- ✓ You're describing a business, not a database
- ✓ Mere mortals build excellent models if you
  - start simple, and add detail in layers
  - use a consistent set of methods, so everyone learns what to expect
- ✓ It's all about communication!

Attitude is everything

- ✓ "It's a privilege to learn about your business!"
- ✓ "It's new to me!"
- ✓ Everyone can contribute
- ✓ Keep smiling…

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.

**** Note: two-day in-person workshops are delivered virtually as three half-day sessions via Zoom.*
Three-day in-person workshops are delivered virtually as five half-day sessions via Zoom.

Thank you – stay in touch!

CLARITEQ

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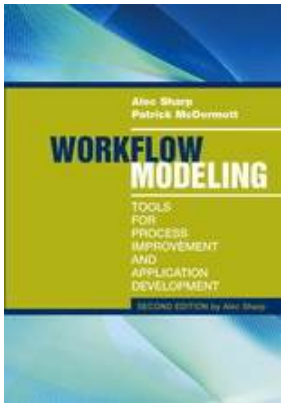
- www.clariteq.com
- Data Modelling blog: www.erwin.com/expert_blogs/authors/22/
- My BPTrends “A Practitioner’s Perspective” columns: http://www.bptrends.com/author/alecsharp/
- Check out the nice reviews of “Workflow Modeling” on Amazon.com - http://amzn.to/dHun1o



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