Concept Modelling with Normal People –
Five Key Lessons From 45 Years of Modelling

45 in 55

Adept Events
Data Warehousing & Business Intelligence Summit
24 March 2026 in Utrecht NL

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///AdeptEvents

DATA WAREHOUSING &
**BUSINESS INTELLIGENCE SUMMIT**

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1

Alec's background…

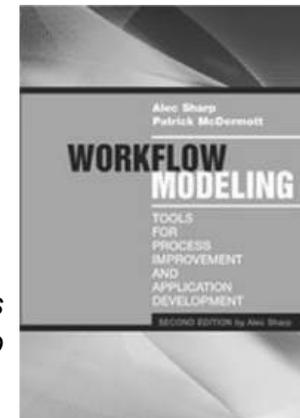**Alec Sharp**, Clariteq Systems Consulting – *asharp@clariteq.com*

- 45 years global experience as an independent consultant:
  - Data Modelling and Management   My roots!
  - Business Process Modelling &
    Business Process Change – discover, scope,
    analyse, and design/redesign processes
  - Application Requirements Specification
  - Facilitation & Organisational Change
  - Project Recovery
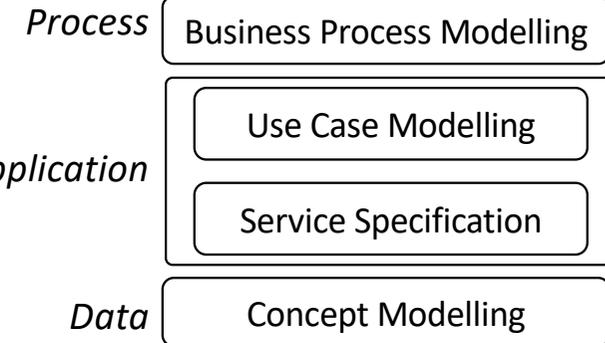
- Awarded DAMA's global Professional Achievement Award for contributions to "human-friendly" data modelling

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

Process | Business Process Modelling

Application | Use Case Modelling
Application | Service Specification

Data | Concept Modelling

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

2

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

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3

What we'll cover…

| ★	*Five Key Points*
1. Start with a nice conversation	
2. Understand the "what" vs. "who and how" distinction	
3. Patience is a virtue (so are Simplicity and Consistency)	
4. Be fearless yet vulnerable - you don't know it all	
5. Graphical design principles matter	
6. and along the way… we can use Concept Models for so much more	

The presentation slides provide
a structure, but mostly I plan to
tell stories.

1 – Start with a conversation

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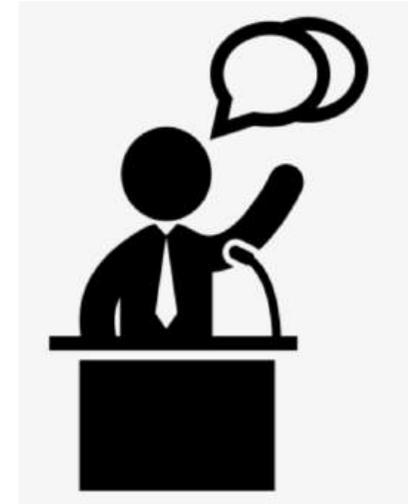
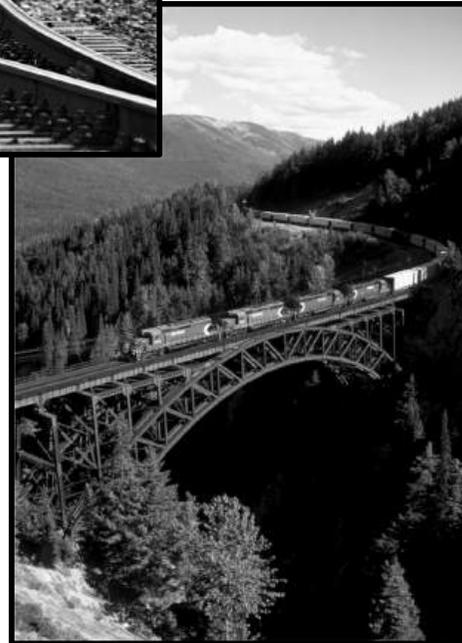If you **avoid** starting with the theory and practice…

Modelling sessions go better

Allows use of concept modelling in non-typical situations

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

JUST DO IT.

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
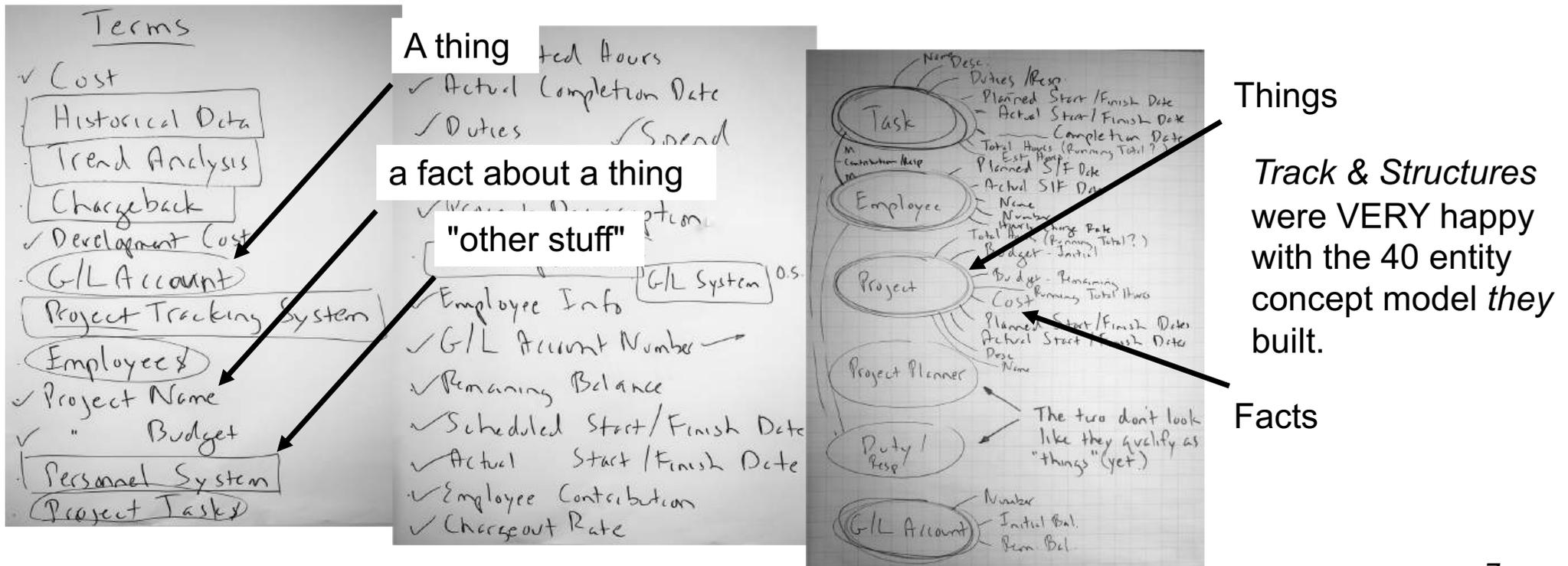identifiable person, place,
thing, event, ..."
Bad idea!!!
"I can't stand you IT guys!"

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…

A thing

a fact about a thing

"other stuff"

Things

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

Facts

Or, start with one-on-one interviews

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.

Or, start with an email (or other) survey

- *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 actual 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. :-)

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

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
- 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)

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

At the first session - "Here are the 'things' you mentioned"
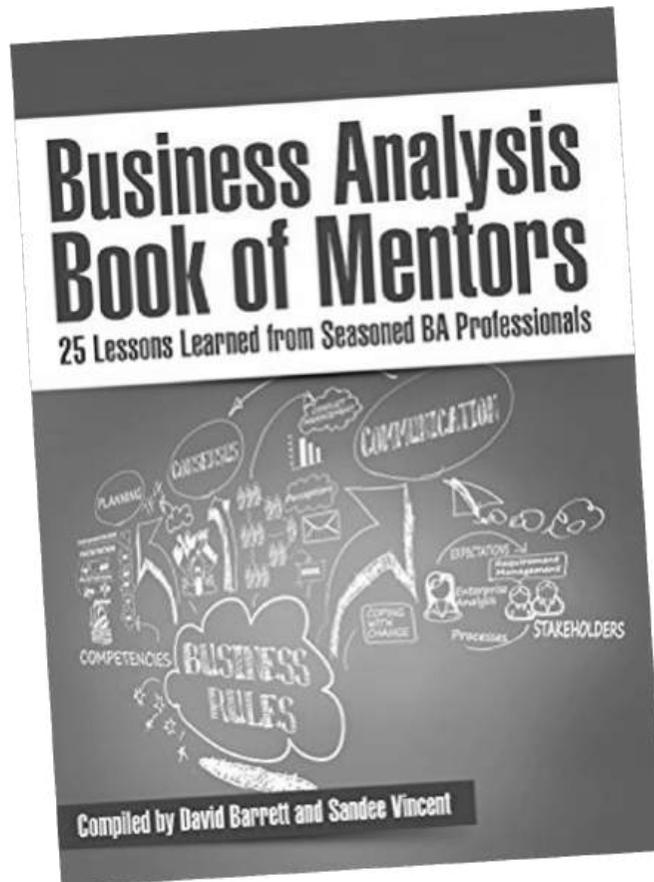
More than enough to work with – here are 30:

They added more…

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

2 -– Use the distinction between the "what" and the "who & how"

My chapter in the "BA Book of Mentors"

The premise of the book:

- 25 experienced BAs from around the world would each write a chapter on "The Most Important Lesson I Learned in my BA Career.'

- I knew mine instantly – separate the "what" from the "who, how, and why"

- In other words, separate the "essence" from the "accident"
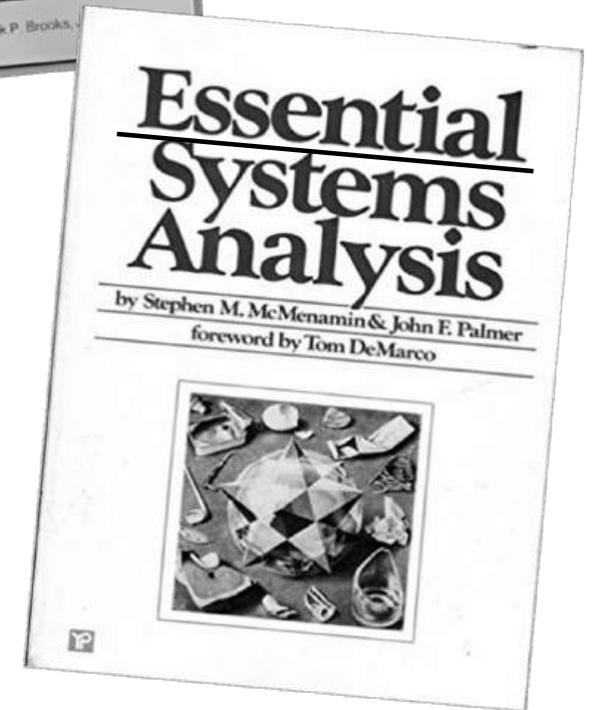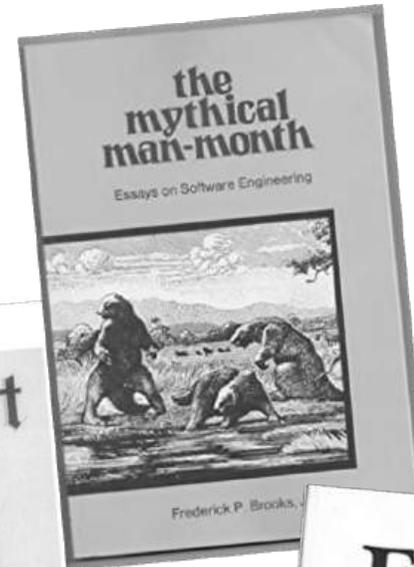
Essence and Accident?

Essential:

1) ~~absolutely necessary; extremely important.~~

2) something's basic or most important characteristics;
the intrinsic, inherent, or fundamental nature of something

Cup:

The *essential* characteristics:
a round, handheld container
for drinking from.
What it is.

The *accidental* characteristics:
ceramic vs. bamboo, handle or not, …
how it is designed or made and
who it will be used by

the mythical man-month

Essays on Software Engineering

Frederick P. Brooks, Jr.

No Silver Bullet

Essence and Accidents of Software Engineering

Frederick P. Brooks, Jr.
University of North Carolina at Chapel Hill

Essential Systems Analysis

by Stephen M. McMenamin & John F. Palmer

foreword by Tom DeMarco

14

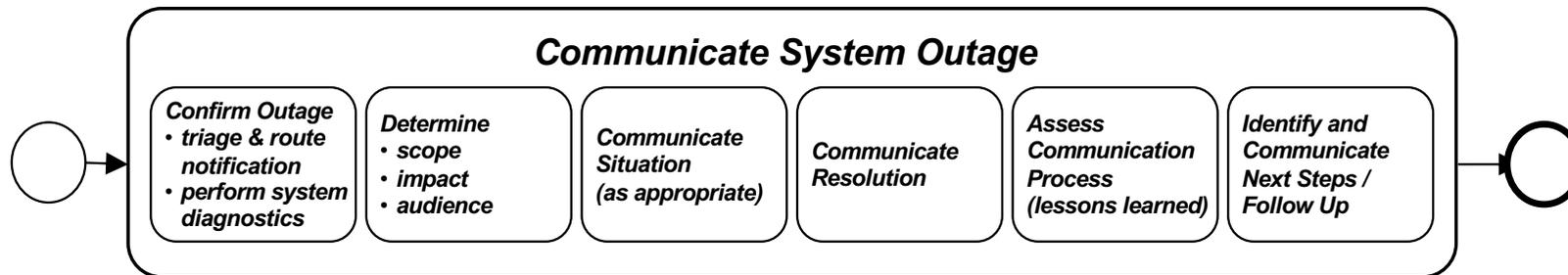# *"All models are wrong, but some are useful."*

George E. P. Box
1919–2013

Two especially useful models

- Business Process Scope Model
- Business Concept Model
  (a.k.a Conceptual Data Model)

Both are "essential" –
they show the essence – the "what" –
of a subject with no reference to who,
how, why, etc.

"What" - a Process Scope Model

Communicate System Outage

Confirm Outage	Determine	Communicate	Communicate	Assess	Identify and
• triage & route notification • perform system diagnostics	• scope • impact • audience	Situation (as appropriate)	Resolution	Communication Process (lessons learned)	Communicate Next Steps / Follow Up

Triggering Event:

Notification of degradation or lack of Service
• internal system
• external provider
• calls to Service Desk

Cases:
• new
• recurring

Other factors:
• severity
• key operations periods / areas (registration, summer, course evaluation season)
• time of year
• time of day

Results:
Communications about the Outage and the progress on resolving it are delivered:
• internally and externally
• informally and formally

Final Results:
Service is restored and root cause is known (or is determined to be unknowable) and resolution is communicated:
• Externally ("good news")
• Internally ("cause & resolution)

Process Scope Model using "TRAC" - *what* is the Trigger, *what* are the Results, *what* are the main Activities (7 ± 2 milestones, phases, or subprocesses,) and *what* are the main cases or variations?

# Why 7± 2?

"What" – a Concept Model
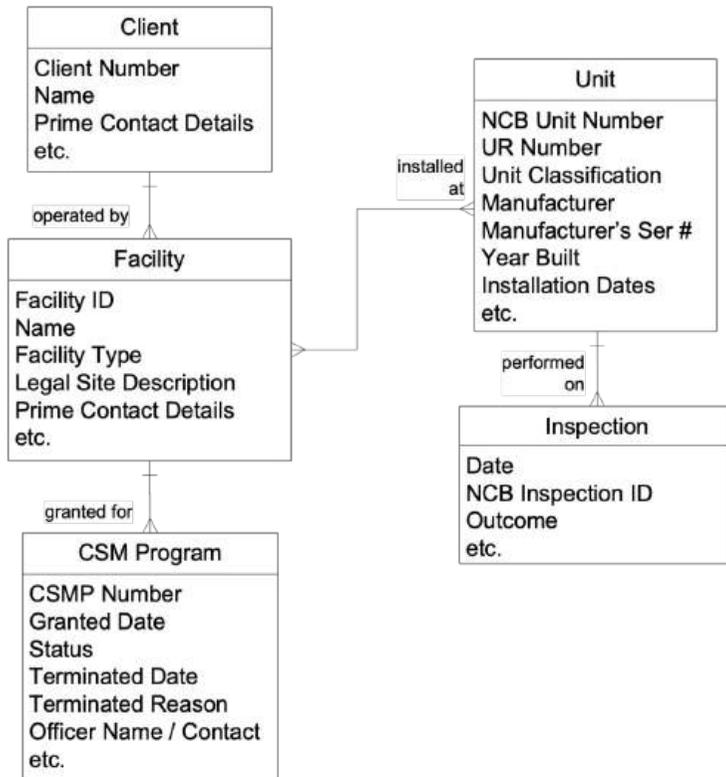
A description of a business in terms of
- **things** it needs to maintain records of – *entities*
- **facts about those things** – *relationships* & *attributes*
- **policies & rules** – *definitions*, *constraints,* and *assertions* governing those things and facts

Use a Concept Model to demonstrate what's possible

When Concept Modelling in a university environment,
everyone wants their favourite report (or artifact) show up on the data model.

We need to be ready to show a near-infinite number of reports etc. can be
produced from one essential model:

- Class Roster
- Student Transcript
- Instructor Assignments
- …
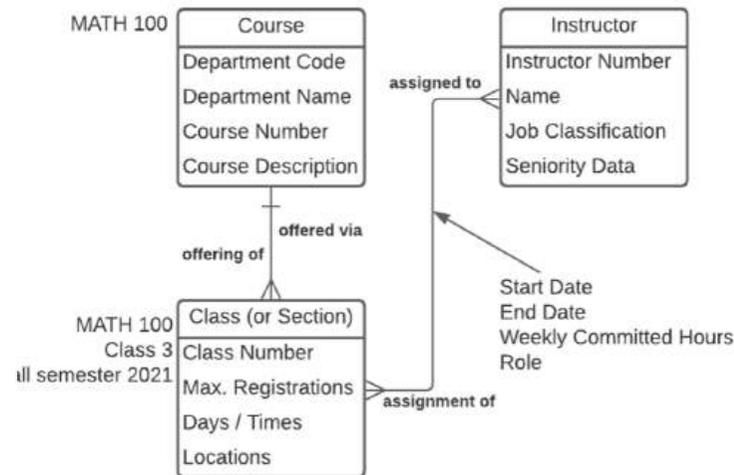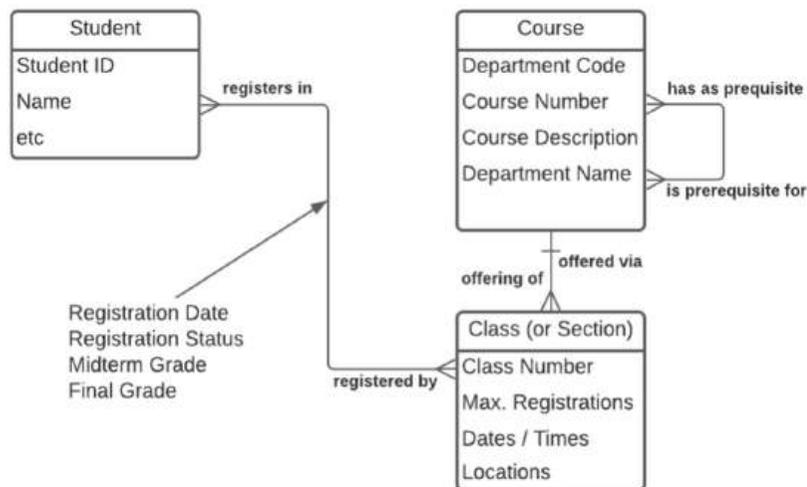
3 – Patience is a virtue

Two examples I'll illustrate with stories:

1. Don't rush people into agreeing on an
   entity definition (the heart of concept modelling.)
   First, establish there are legitimate differences of opinion

2. Don't rush to generalise or create supertypes.
   First, help everyone see the similarities.

Recent student comments -
"I learned modelling should proceed at the pace the group is
comfortable with"
and
"Move faster by slowing down"

Entity definition - start by opening minds

*"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

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

21

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*

Employee

Project

Account

Task

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
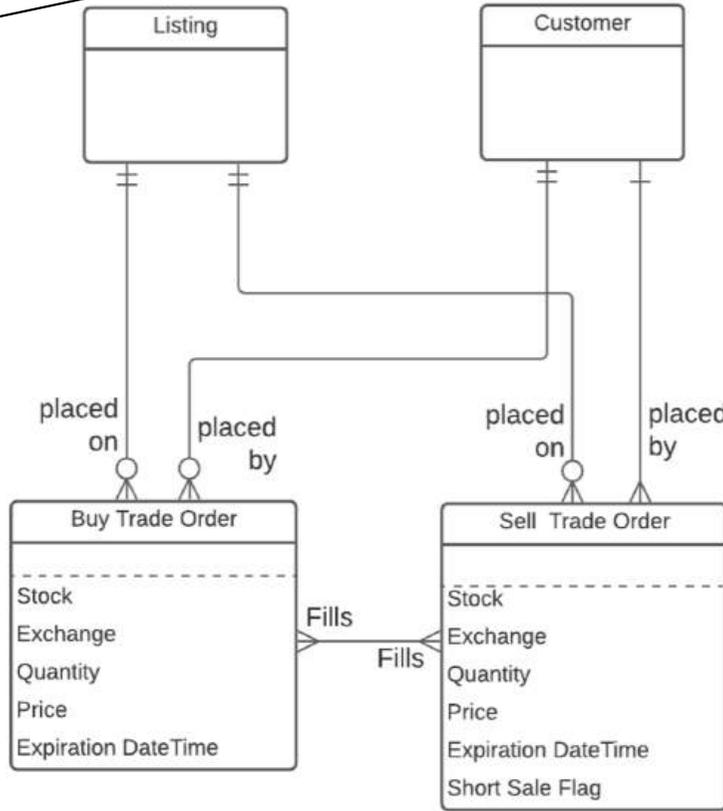- Company Owners and Managers

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)

A real example - specifics first, generalisation later
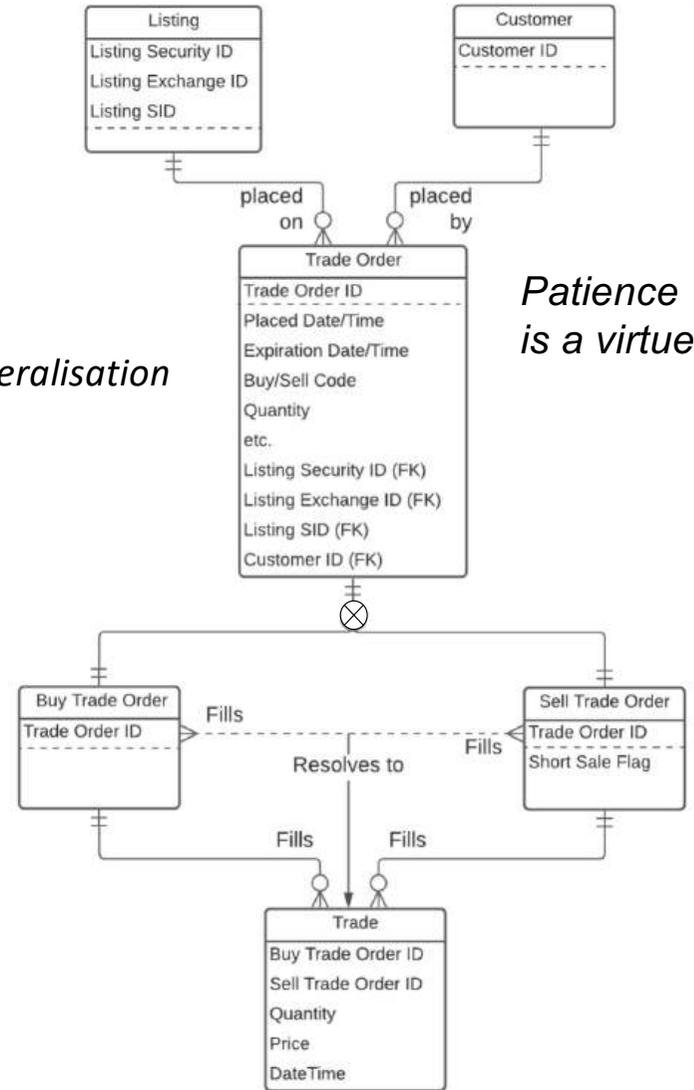
Delaying supertyping/generalisation -
a real example

Client:
"Wow! Buy and Sell
Trade Orders
look very similar!"

Me:
"Omigosh!
That's amazing!"

Generalisation

*Patience
is a virtue!*

Listing
- Listing Security ID
- Listing Exchange ID
- Listing SID

Customer
- Customer ID

placed on — placed by

Trade Order
- Trade Order ID
- Placed Date/Time
- Expiration Date/Time
- Buy/Sell Code
- Quantity
- etc.
- Listing Security ID (FK)
- Listing Exchange ID (FK)
- Listing SID (FK)
- Customer ID (FK)

Buy Trade Order
- Trade Order ID

Fills — Fills

Sell Trade Order
- Trade Order ID
- Short Sale Flag

Resolves to

Fills   Fills

Trade
- Buy Trade Order ID
- Sell Trade Order ID
- Quantity
- Price
- DateTime

Listing

Customer

placed on — placed by   placed on — placed by

Buy Trade Order
- Stock
- Exchange
- Quantity
- Price
- Expiration DateTime

Fills
Fills

Sell Trade Order
- Stock
- Exchange
- Quantity
- Price
- Expiration DateTime
- Short Sale Flag

Specifics

4) The Principle of Constructive Ignorance

Never be
afraid to ask
"dumb"
questions…

- Myth -

"I've got to have all
the answers.
I can't show my
ignorance."

- Reality -

- You're not paid to **know** - you're paid to **ask**
- **Someone** will be glad you did
- The number of different answers will surprise **everyone**
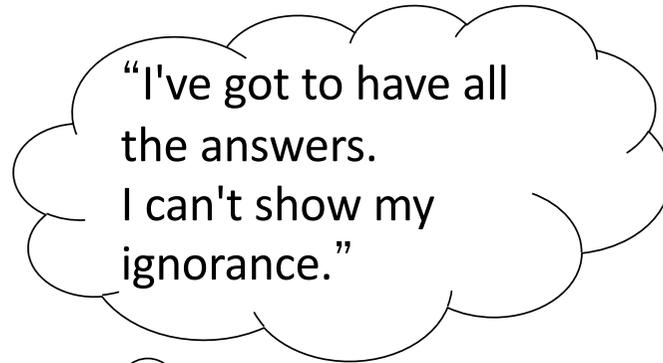
**Just one more question, ma'am.
Nothing too important...**

There's one thing I'm not clear on...

Could we go over this just once more to be sure I've got it right?

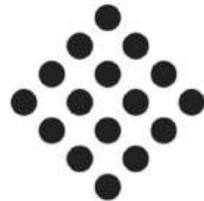Lieutenant Columbo takes up Data Modelling

5) Graphical design principles matter

It's learnable! e.g., Gestalt principles (study them on your own)
- how humans instinctively organize individual visual elements
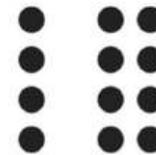- groups, patterns, and unified wholes vs. separate parts.
- key principles:
  - proximity
  - similarity
  - closure
  - continuity
  - symmetry

Good Figure

Objects grouped together tend to be perceived as a single figure. Tendency to simplify.

Similarity

Objects tend to be grouped together if they are similar.

Closure

Visual connection or continuity between sets of elements which do not actually touch each other in a composition.

Proximity

Objects tend to be grouped together if they are close to each other.

Continuation

When there is an intersection between two or more objects, people tend to perceive each object as a single uninterrupted object.

Symmetry

The object tend to be perceived as symmetrical shapes that form around their center.

Cognitive psychology of diagramming - a process example

What do people first perceive on a diagram?

1. relative size

an important step

a less important step
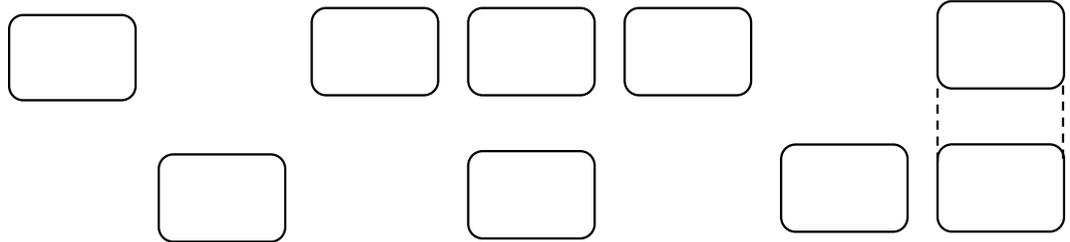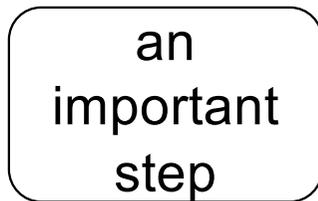
Make all the steps the same size, *unless* you're trying to make a point

2. relative X-Y position

Actors

Y

X

Flow (time)

27
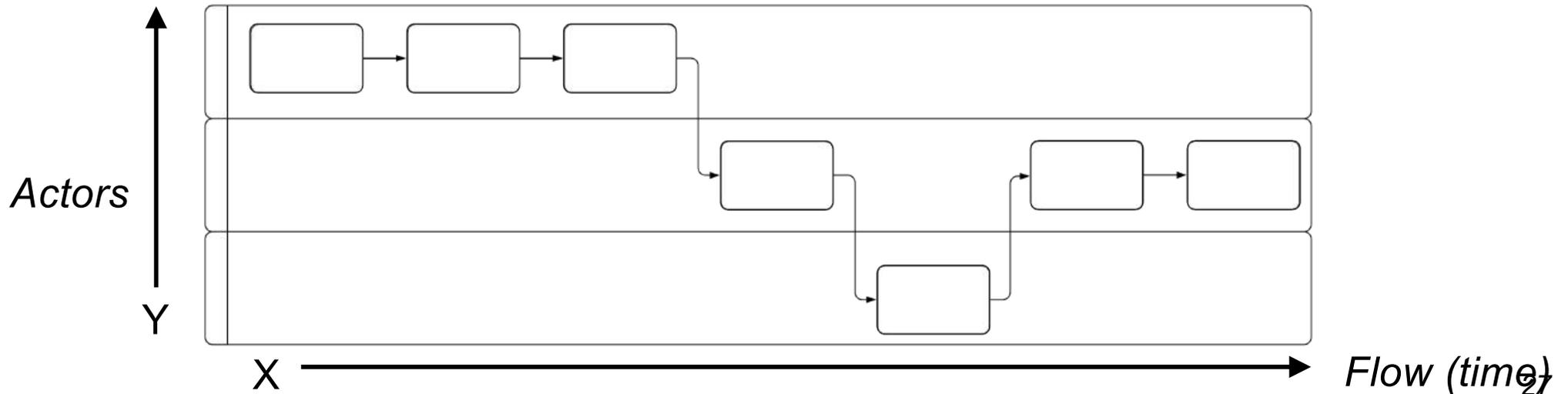
Don't conceal sequence and dependency
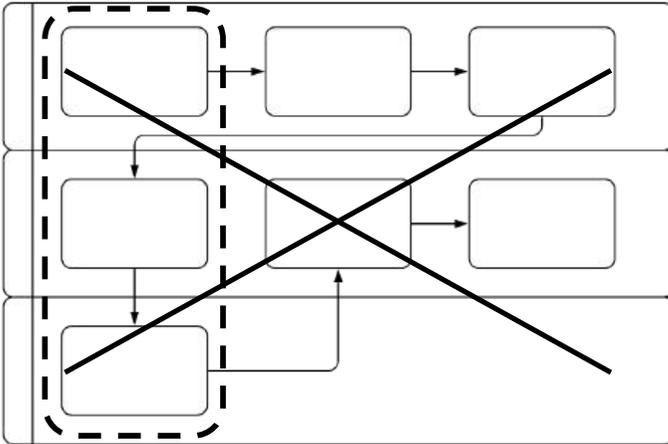
Steps perceived as happening in *parallel*, even though flow lines indicate *sequential*.

Critical in analysing a process:
- sequential vs. parallel
- dependent vs. independent

A simple guideline: flow lines *only* leave the right edge and *only* enter the left edge – never the top or bottom.

And for data…?

28

For data models, always draw top-down by dependency

For a 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

granted / granted for

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

registered at

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

29

Top-down by dependency

For a Logical Model

Kernel Entity
(independent)

Department
Department Code — MATH
Name — Department of Mathematics

Kernel Entity
(independent)

Student
Student ID
Name
etc

Characteristic Entity
(dependent on 1 parent)

Course
Department Code — MATH
Course Number — 200
Course Description

Characteristic Entity
(dependent on 1 parent)

Class (or Section)
MATH — Department Code
200 — Course Number
03 — Class Number
Max. Registrations

to Math 200   to Math 110
for   is

Prerequisite
For Department Code — MATH
For Course Number — 200
Is Department Code — MATH
Is Course Number — 110

Associative Entity
resolving the recursive relationship
(dependent on two or more parents, in this case each an instance of the same entity)

Math 110 is a prerequesite for Math 200

Registration Status
Reg. Status Code
Reg. Status Desc
etc

Reference Entity
(independent)

of   in

Registration
Registration Date
Registration Status
Midterm Grade
Final Grade
etc.

Associative Entity
(dependent on two or more parents)

Class Lecture
Department Code
Course Number
Class Number
Class Lecture SID
Day
Start Time
End Time
Location
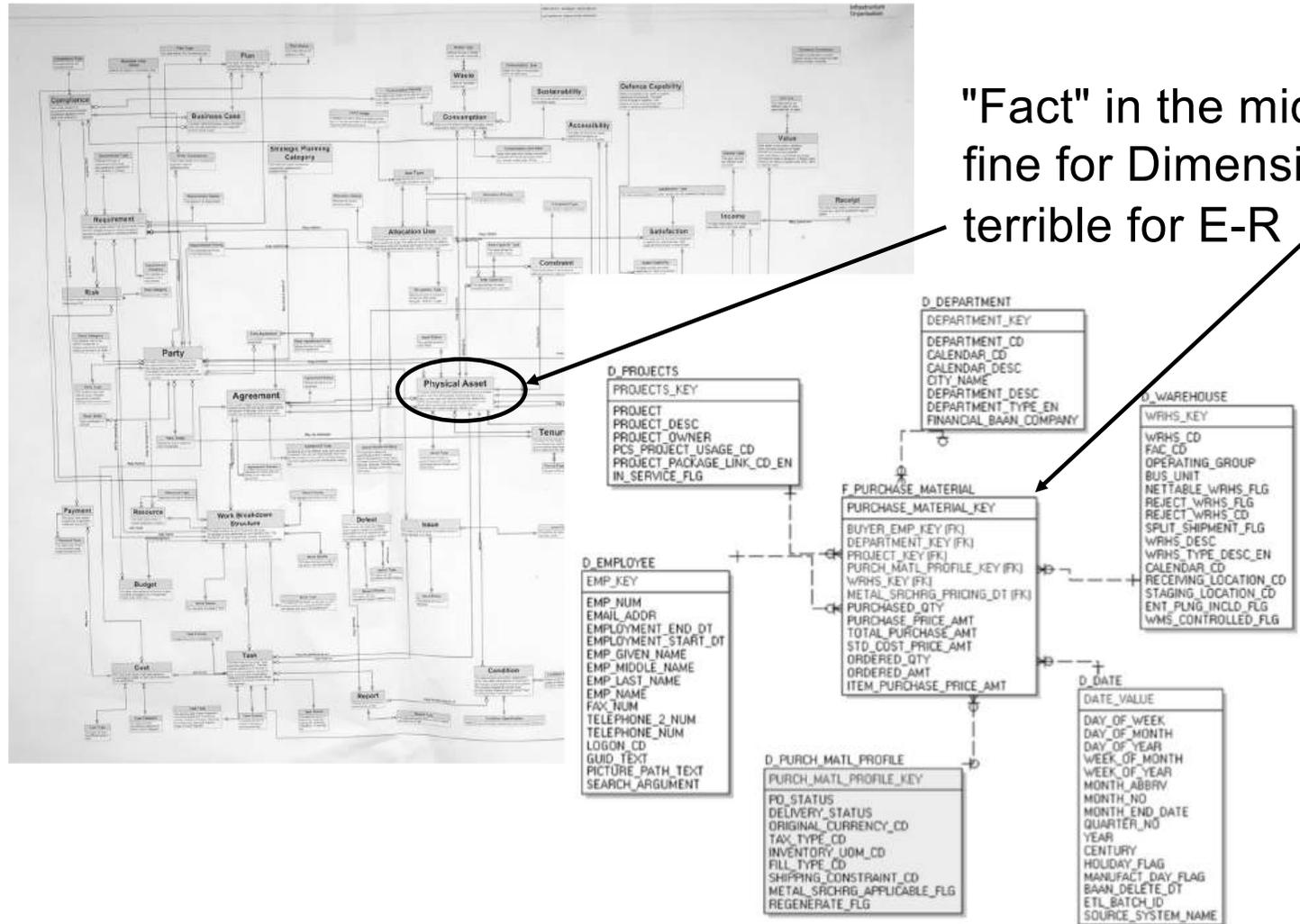
30

Top-down by dependency

For a "halfway-house" model

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
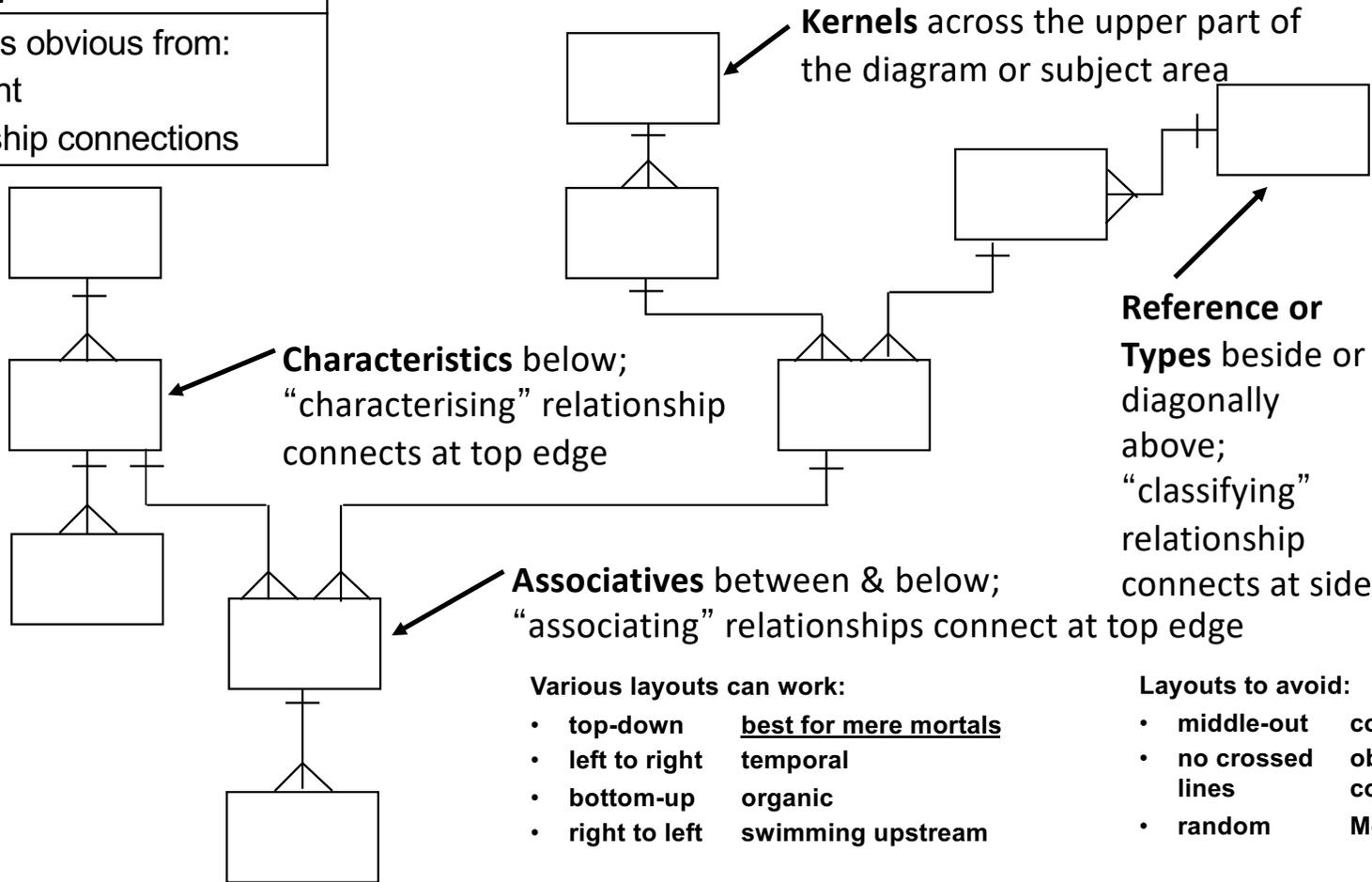difficult to follow –
no sense of direction.

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

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

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

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

Characteristics below; "characterising" relationship connects at top edge

Associatives between & below; "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

33

In summary – 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)

What we covered

| ★	***Five Key Points***
1. Start with a nice conversation	
2. Understand the "what" vs. "who and how" distinction	
3. Patience is a virtue (so are Simplicity and Consistency)	
4. Be fearless yet vulnerable - you don't know it all	
5. Graphical design principles matter	

*We hope you got some
good ideas from this session!*

Thank you – stay in touch!

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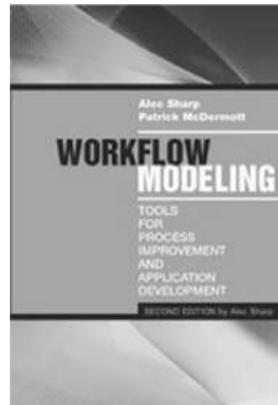
And most of all, if you have questions or comments…
don't be shy – send me a note!