Advanced Object Oriented Analysis of Hard Problems using UML

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2020 March 06, 02:55PM

Índice general

Capítulo 1

Section 1: Intoduction

1.1. Straighten the concepts

1.1.1. Discrepancy of usage of terms

- Most people don't share the same concepts and refer to things with the same name but refering to diferent things.
- People make up new names for new and old concepts.
- How long would it take for this phenomenon to cause disasters.

1.2. Concepts as building blocks

> "Concepts, pretheoretically, are the constituents of thoughts"
>
> -Stanford Encyclopedia of Philosophy

1.2.1. Prerequisites for knowledge

- The two constituents of knoledge are: intuition and concepts.

> "Intuition and concepts constitute... the elements fo all our knowledge, so that neither concepts without an intuition in some way corresponding to them, nor intuition without concepts can yield knoledge"
>
> -Immanuel Kant 1724-1804

- Concepts are illusive to grasp.

> "Nothing is more important than the formation of a fictional concept, which teach us at last to understand our own."
>
> -Ludwig Wittgenstein 1889-1951

- Most concepts are rooted deeply in us.

> "Our concept of governing is derived from our view of people. It is a concept deeply rooted in a set of beliefs firmlyy etched in the national conscience, of all of us."
>
> -Barbara Jordan 1936-1996

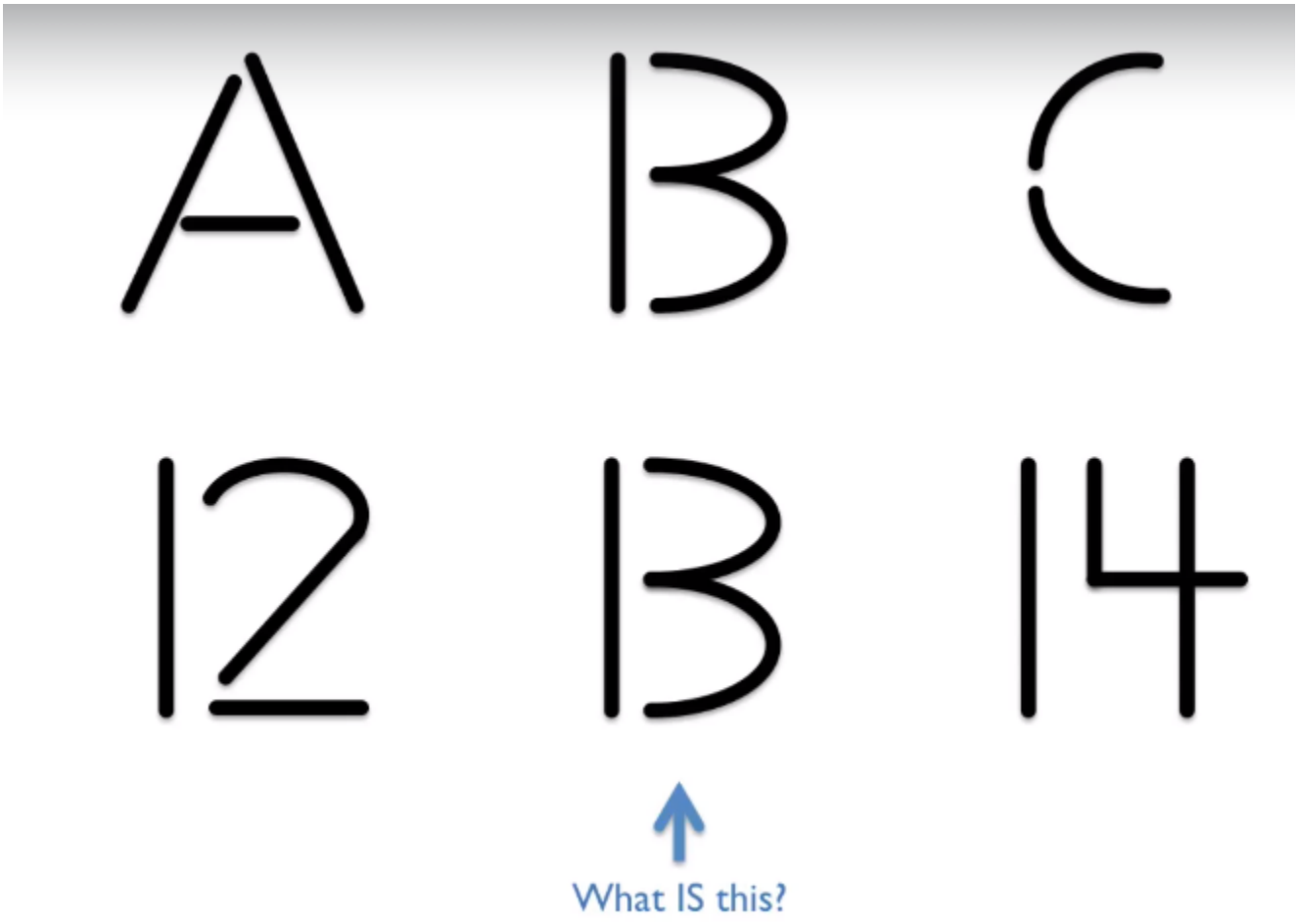
Conceps are more or less constructs of human societies.

> "We coin concepts and we use them to analyse and explain nature and society. But we seem to forget, midway, that these concepts are our own constructs and start equating them with reality."
> -Abdolkarim Soroush

- Concepts $\neq$ reality, though concepts we understand reality.

> "Society exists only as a mental concept; in the real world there are only individuals."
> -Oscal Wilde 1854-1900

- Example:



1.3. Visialization of concepts

- We can order concepts visually using maps.
- A conceptual map is a graphical tool that organizes and represents knoledge, it illustrates the concepts, also it shows the relationships between the concepts, it also labels the concept, specifies the relationship, this is to make a proposition.

- We use maps to boost concept learning, fast visualization of concepts, communicate better, to implement a better concept of our project.
- Creator of concept mapping: developed by Joseph Novak, initially used to analize view psycological phenomenon in kids.
- This is a tool that can be applicable to almost anything.
- It helps transform tactit information to explicit.
- Every big project starts out as a conceptual map.
- You can use conceptual maps to create etrics.
- Sumarry, concepts are:
  - Concepts are the constituents of thoughts
  - Visual tool
  - Boost knoledge acquisition, communication, system development and creativity.
  - Applications are almost unlimited.
- A conceptual map represents and organizes knoledge.

1.4. Course goals and structure

- Introduction
- Foundations
- Notation - Models and UML
- Process and workshop techniques
- Packaging

1.5. Two ways to complete the course

1. Theory first: philosofical foundation and then notation.
2. Practice first: learn the notation first and then the thory.

Capítulo 2

Section 2: The cognitive Foundation of concept mapping

2.1. The congnitive foundation introduction

- Contract example:
  - How to comunicate the same concept.
  - How to show the idea to convey vasts amounts of knoledge.
- Why is this so intuitive? Cognitive research proves these maps are intuitive.
  - Knowledge acquisition
  - Visual communication
  - Creative thinking

2.2. Three memory systems

- The brain has three memory sistem:
  1. Sensory information storage: thw subdivisions, we hold information for 0.5 sec, whether we do something with that information determines if this information passes to the working memory.
     - Iconic memory
     - Echoic memory
  2. Working memory: Central excecutive, can stored for 10 sec.
  3. Long term memory: three subdivisions, memory can be stored for years, weeks, months, etc.
     - Semantic memory
     - Procedure memory
     - Episodic memory

2.3. Semantic memory

- It organizes knowledge in networks.
- Example:
  - Iconic memory, holds for 0.5 sec

- Working memory, process 10 seconds
- Long term memory:
  - Semantic memory, encoded in diferent ways, in images or words or other ways. These nodes become conected ith previous memory, this is how it is remembered in the long term.
  - Episodic memory: holds specific situations I have been through, the semantic memory you "don't know why you know it you just know it, this is because of the links it does to n already existing memory network"
  - Procedure memory: how you remember procedures, you cant probably say how you do it because it's procedural.

- How to encode knowledge? there is a process it's not just encoded by the information we see.
- Example:
  - Agroup given complex material.
  - Directly after, thir understanding was tested.
  - Sometime later they were probed again.
  - The ones who got the meaning from the beggining had much better memory when probed again.
  - The ones who understood this from the very beggining recalled it better.

  # This means that weather we store semantic memory:
    - Shallow: poor resistance, mechanical rehearsal, methonds of regurgitations.
    - Intermediate: better resistance, Attention to sound and appearance, details method.
    - Deep processing: best resistance, focus on semantic meaning, this is a process that links new links from the existing memory to the new.

- This means that in order for knoledge to stick we need to create new links and to the new memory nodes.
- The best resistance method, deep processing, allows us to fetch with great efectiveness knoledge from the long term memory to the working memory.

2.4. Brains like visualizations

- Brains are likely to recall with resistance knoledge when they are shown elements that are integrated, remember th example of the doll siting on a chair holding a flag, rather than the three objects shown separately.

2.5. How does creative thinking work

- Where does creativity it come from?
  - Understad the problems structure
  - Activate spreading in the knowledge network.
  - The more knowledge - more activation
  - If knowledge is richly interconnected then ...
  - ... Creative leaps might occur.

2.6. A concept map of the cognitive foundation

- A tool tha t pus focus on meanind in the subject area.
- Creates a scaffold for the limited working memory so it does not loose context in teh constant iterations with long term memory.
- Utilizes integrated visualization that maps the to+be+learned to already estabished knowledge.
- Increases the associative links which increase the possibility for creative “leaps”
- The conceptual map does all these things.

2.7. Resources

- Eric Ries: “The lean startup”

Capítulo 3

Section 3: Philosopjical foundations of conceptual analysis - introduction

3.1. Section overview

- From brute facts to social facts.

Exists independently to us	Existis since we use and treat as such	Exist since we have jointly declared the to do so
• Bacteria • Sun • Tree • Mountain	• Hammer • Table • Computer Screwdriver	• University • Birthday party • Loan • Insurance

- Example dollar bill:
  - Declaration: this note is legal tender to all debts public and private.
- An assertion exits by it's self, a declarations exists from an assertion, from an accepted declarations we create social facts. (confusing)
- We are creating evergrowing sistems of concepts, this is how we create the reality concept.
- Concepts triangle.

3.2. What happens when we visualize concepts together?

- It's useful for knowledge transmition.
- Knowledge is usually heterogenic.
- Some people have the power to emit declarations, others don't. Some people have lacking powers to assert their beliefs.
- If the normal person says war then it's just an asertion, if the president says that then it is war declaration.
- Visualizing concepts makes it easier to:

1. Transfer knowledge
2. Spot knowledge differences
3. Acquire knowledge
4. Makes it clear which declarations are made
5. Visualizing concepts makes it easier to develop complex systems of any kind
6. Facilitates creative thinking

3.3. Philosophical foundations overview analysis

- This is an ongoing debate.
- Section structure:
  - Ogden's triangle
  - We know objects, we have concepts in our mind, then we use language to refer to both the object and the concept.

3.4. Four thories about concepts - First corner of the triangle

- Why is the concept "concept" so hard to define:
  - Concepts are the constituents of thoughts.
- Four theories:
  - The clasical theory
  - The prototype theory
  - The theory theory
  - The conceptual atomism theory

3.5. The clasical theory of concepts

- It's been around for 2,000 to 2,500 years.
- A concept C has definitional structure in that it is composed of:
  - Simpler concepts that express
  - Necesary and
  - Sufficient conditions for
- The man, unmarried, bachelor concept.
  - Bachelor: unmarried man
  - Man and unmaried is a bachelor.
- Categorization: A psycological process where a concept is matched to an item if,
  - Each and every one of the concept's definitional constituents
  - Aplies to the target
- Example: set of people, some man some women, some are married, the not maried and man are bachelors.

3.5.1. Problems of the conceptual view:

- Plato's problem:

  1. Even the simples concepts are hard to define clearly.
  2. Easy to spot counter examples.

  - Paint: to paint or not to paint, defined "x covers y with paint", does this provide sufficient condition for something falling under a concept?
  - First try: "A paint factory (x) explodes and covers spectators (y) with paint." Has x painted y?
  - Lets add X needs to be an agent and Y needs to be a surface.
  - Second try: "you x accidentally kicks paint over your (y) shoes"
  - Lets add x needs to paint intentionally.
  - Third try: "Michaelangelo wasn't painting the celing of the sistine chapel, ha was painting a picture on the ceiling", the painting unintentonally painted the ceiling.
  - Let's add that the primary intention should be to paint it.
  - Fourth try: "Michaelangelo does have a primary intention to dip the tip of the paintbrush in the pain when painting the picture"
  - Has Michaelangelo painted the paint brush?

- These are counter examples.
- The tipicality effect: We rank items with respect to how "tipical they are" as members of a category. This is problematic, considering this concept undefines the clasical theory definition.
- The clasical theory definition is binary.

3.6. Prototype theory of concepts

- The prototype thoery states that a concept C doesn't have a definitional structure but has probabilistic structure in that:

  1. Something falls under C
  2. Just in case it satisfies a
  3. Suficient number of properties
  4. Encoded by C's costituents.

3.6.1. Witchestein

- Wittgenstein:

  - Example: Poker, solitare, fishing, chess
  - There are all diferent but can be considered a family if objects game.
  - They don't have the same atributes.
  - Family resemblence.

- "Fuzzy" concepts:

  - You cannot define a concept more clearly than it appears to us in the world, "for imagine having to sketch a shaply defined picture corresponding to a blurre one".

- "If you are surprised that one can now something and not be able to say it, you are perhaps thinking of a case like the first."

3.6.2. Problems of the prototype

- Many concepts lack prototypes, there are somethings that can't be cataloged by prototyping because they don't have a clear prototype to identify, example you can prototype fish, birds but "a pet fish that swallowed their owner in Armenia" cannot be prototyped.
- No compositionality, prototypes are often not functions of the prototypes of their constituent concepts, remember the bachelor, man, unmarried, they can not be applied in the theory of prototyping.

3.7. Theory theory

- Concepts stand in:
  1. Relation with one another in the same way as
  2. The terms of a scientific theory and
  3. Categorization is a process that strongly resembles
  4. Scientific thorizing
- Shape concepts in iterations:
  - Develop abstrat, coherent system or a *theory*
  - Make predictions and interpret and explain evidence.
  - Experiment to test the thoery and reevaluate it
  - When it's falsified we seek alternatives
  - Repeat if falsified //
- The theory is not said as truth but is thought of as the most accurate way to explain up to date.

3.7.1. Problems - Stability

- If concepts are theories that are ever evolving,
- How could ever two persons share the same concept?
- Do we know the same concept as yesterday?

3.8. The conccptual atomism theory

- A casual relation between
- The concept and it's
- Instance determines it's reference
- A causal relation between the instance determined it's reference.
- Concepts are primitive and have no structure.

3.8.1. 2,500 years of phylosophy

- It's not setled, the conceptual structure is unsettles.
- Solution?:
  - No "one true" structure of concepts
  - Diferent structure for diferent explanatory functions

3.8.2. A pluralism about concepts

- Concepts might have multiple "paralel" structure operation in our minds.
- This is called the Dual Theory where we differentiate between:
  - Identification procedure
  - Core component
- Identification procedure:
  - Quick categorizartion
  - Based on prototype theory
- Core component:
  - Used when resources are not limited, a combination of clasical and thoery and atomism theory.
  - There is more knowledge.
- Concept of concepts are not universally defined, in artifitial inteligence this is a problem, this is a disagreement because sometimes we must model the human mind and we are not in agreement as to how a human mind handles concepts.

3.9. Resources

- Wittgenstein heritage
- Concept coreseries Eric Ergo
- Gregory All Murphy Concepts

Capítulo 4

Section 4: Philosophical Foundations of Conceptual Analysis - Continued

4.1. Intentionality

- The "aboutness" of the mind
- Intentionality is the way that the mind is directed at or about the world.
- An intentionality state consists of:

  1. A propositional content, p
  2. A psychological mode, S

  it is noted as S(p)
- Propositional content:
  - Whatever that-clauses contribute to whatever the intentionality is about.
  - Example:
    - Ralph believes that Jack Sparrow is alive.
    - Ralph hopes that Jack Sparrow is alive.
    - Ralph desires that Jack Sparrow is alive.
  - This will formally be noted as Ralph:
    - The first one: Believe(is alive)
- Psychological mode:
  - You can keep the propostional content constant while varying the mode.
  - There are generic modes.
  - Some people think tha beliefs and desires can form all teh other modes..
  - Remember the logical operators and the double negatives.
- Conditions of satisfaction:
  - The propositional content also determines what will count as it's condition of satisfaction:
    - What makes the belief true?
    - What makes the intentions and desires fulfilled?
  - Propositional content dosnt's have to be text.

    - Condition of satisfaction is a necesity fulfulled from doing a task.
- Direction of fit:
    - (Water) If I desire water (CoS) when water gets inserted into my mouth that is the condition of satisfaction (Mind)

4.2. Sumarry lecture

- We have concepts about objects in propositional content as part of intentional states in the mind.
- Concepts, objects are instances of objects.

4.3. The network of intentionality and the background

- Intentional states come in a network.
- Example: Intend to drive to work, but you can't do that unless you believe you have a job, you have a license, you have teh capacity...
- There form a network not individual units.
- Background:
    - Wittgenstein: You woudn't even understand an action with out a background.
    - We have a hurly-burly that are going on at the same time and only this can give something meaning, this is called background.
    - If im playing the piano I don't think of how I place fingers but just playing the chords.
- The "background":
    - The network is not infinite
    - If you follow out the threads and you will find non-intentional states.
    - You don't belive that your finges can grip the steering wheel you just take that for granted.
    - This is a very impotant role when we conceptualize anything.

4.4. Collective intentionality

- Emerges when we have intentional states about other people's intentionality states.
- In coordination with others we create the possibility of collective intentionality.
- It emerges as a result of:
    1. Multilie people
    2. Having intentional states andmutual intentional beliefs about
    3. each other's intentional states.
- They have an intenional state of each other's intentional state.
- Multiplier effect:
    - Systems exists in out collective intentionality. There are no objective independent systems.
    - They only exist because I think they exist, you think they exist and I think you think they exist and you think I think they exist.
    - This is recursive, reciprocity in concepts of one individual with respect to the other.
    - This is the way we form institutional facts, such examples of these facts is money, money just has value in our minds.

4.5. Sumarry

- We use our concepts about objects and facts in the world as part of the propositional content in intentional states in our minds.
- These intentional states come in a network that takes certain background abilities for granted.

4.6. Language overview - second corner

- Language: "The systematic creation maintenance and use of systems of symbols, which dynamically reference concepts and assemble according to structured patterns to communicate meaning"
- It's something that is systematic, there are rules, languages also evolves, it's a systems of symbols as well.
- Components of languages:
  1. Phonology: how words and sentences are pronounced.
  2. Syntax: how words are arranged in sentences.
  3. Semantics: meaning of words and morphems.
  4. Pragmatics: sets general constraints on the use of language.
- What do we do with a language?
  - We use language to communicate our intentional states and, as a subset of that, to inform about the world.

4.7. Terms and propositions

- Proposition in phylosophy of language:
  1. The "content" or "meaning" of a meaningful declarative sentence.
  2. The pattern of symbols, marks, or sounds that make up a meaningful declarative sentence.
- A propositions is:
  - A pattern of symbols, a proposition is the pattern of symbols, marks or sounds that make up a meaningful declarative sentence.
- Symbols (os sign or term etc):
  - Link of relationship between the signified and the signifier:
    - The signified is entity in the world or concept in the mind.
    - Carl(sign referencing a real person) is a head master(sign refering to a concept "headmaster" in the mind).
- Terms refer to concepts:
  - Concepts do not have "names"
  - We refer to concepts using signs or terms.
  - Think of a concept, the concept in the mind doesn't have a name, name the concept agreement or name the concept contract?
  - It's a misunderstaning.
  - This is actually called synonyms and homonyms.
  - Homonyms and synonyms are common sources for misunderstanding.

4.8. Generativity and compositionality

- Features of propositions, propositions have compositionality.
  - Compositionality is the framework of rules in which morphemes can be composed, it applies to both syntax and semantics.
  - The lion ate the apple, or, the apple ate the lion; both have meaning to us.
- Generativity: is the feature of a language in which it:
  - Through recursive syntactical operations (subordinate clauses and conjuntions)
  - You could produce an infinite number of sentences.
  - Example: you can append to a sentence more and more compositionality and generativity infinetly.

4.9. Sentence meaning is not enough

- Signs are composed in propositions according to syntactical rules and creates: Sentence meaning.
  - Example: can you go to the desk overthere? r// yes i can, I would just use my legs.
  - From a sentence meaning it's a correct answer, but clearly the person is asking a favor in the way "I would like you to go to the desk"
  - Sentence meaning doesn't transmit intentionality.
  - This is a computer problem, it's ambiguous to talk to a computer using only sentence meaning, you need to speak literally.

4.10. The king of France is bald

- "The king of France is bald" Bertrand Russell.
- Natural languages can sometimes be very ambiguous.
- If the king of france isn't bald then the negation must be true? this is not always the case.
  - $$\exists x(\text{ King of France(x) } \& \forall y(\text{ King of France(y) } \rightarrow y = x) \ \& \ \text{ Bald } (x))$$
  - Or:
    1. There is an x such that x is presently king of France.
    2. For any x and y, if x is presently King of France and y is presently King of France then $x = y$
    3. For every x that is presently King of France, x is bald.

    \# In this case one condition fails, there is no presently a king of France.

4.11. The indeterminancy of translation

- "The indeterminancy of translation" Willian Van Oranam Quine.
- The rabbit example: "your out in the bushes, with a native speaker of the language Arunta, a rabbit passes by, he yells 'Gavadai' how could you translate this statement? "
  - Lo food?
  - Let's go hunting?
  - There will be a storm tonight?

- How do you determine the transation?
- This is not about the fact that you don't speak arunta, every child struggles with this, in the bussiness world people speaking the same langueage sometimes are not clear in their comunciations.
- The theory theory "how do we know that we all have the same concept?"

4.12. Speech acts

- Speech acts are the Uttarances real, intended meaning.
- The insufficient sentence meaning, an enourmous amount of background that is presupused when we comunicate. There is always an underlaying background given when we communicate.
  Example:
  - Let's go out for a drink?
  - Sorry I can´t, my doctos wond't allow me.
  - What's the matter with you?
  - ———————
  - Let's go out for a drink?
  - Sorry,i can't my mother in law won't allow me.
  - What's the mater with you?

  See the diference? Language is ambigous.
- We can't spell out all the context, this would make communication imposible, communication is necesarily lacking.
- Intentionality's natural extension, intentional states lead to speech acts.
- The intentional state "S" about a proposition "p":

  $$S(p)$$

  Translates to an illocutionary force "F" about the same proposition "p":

  $$F(p)$$

  Example: "$\underbrace{\text{The salt passed to me (p)}}_{\text{Intentional state}}$" $\rightarrow$ "$\underbrace{\text{Please hand me the salt! (p)}}_{\text{Speech act}}$" $\rightarrow$ Request (F)

4.13. Meaning through speech acts

- Example: "$\overbrace{\underbrace{\text{True is a cat sits on a mat}}_{\text{Condition of satisfaction}}}^{\text{Belief (S)}}$", Intention "$\underbrace{\text{This utterance has identical condition of satisfaction as my belief}}_{\text{Intention (S)}}$" ,the speech act "$\overbrace{\underbrace{\text{There is a fluffy mouse catcher on the mat}}_{\text{(p)}}}^{\text{Assertion(F)}}$", given mind to world and a word to fit world.

4.14. Five types of speech acts

1. Asertives:
   - Commits a speaker to the truth of the expressed proposition.
   - Commits me to the truth given that I said something.
2. Directives:
   - Cause the hearer to take a particular action, a request or order.
   - Example: SALT, NOW!
3. Commissives:
   - That commits a speaker to some future action, a promise.
4. Expressive:
   - Used to express the speakers attitudes and emotions towards the proposition.
5. Declarations:
   - Change the reality in accordance with the roposition of the declaration, for example declaring someone guilty.

They have relation with intentionality:

- Asertive $\leftrightarrow$ Belief
- Directive $\leftrightarrow$ Desire
- Commisive $\leftrightarrow$ Intention
- Expressive $\leftrightarrow$ Emotive

4.15. The strange thing about declarations

- "This party starts now", as Declaration (F): there is no intentional state directly linked to that, I can believe and desire the party has started but it will not start until I perform the declaration.
- If you are a judge you can't just judge you have to declare.
- Declarations have double direction of fit: Its conditions of satisfaction are fulfilled when:
  - The act as such
  - Alter the world in the way that
  - The world is represented to be altered in propositional content.

  We have double direction of fit.
- Power of declaration: declarations are one of the most important aspects of language:
  - We as humans use this to create our social world.
  - Declarations are the building blocks of the social world, they are used recursivelly.
  - Examples: you need to declare it to make it happen.

4.16. Language summary

- We are a reace of humans who have consciousness, intentionality and the capacity of the collective intentionality. We can represent objects and facts that we believe, desire, intent to do, etc.
- Language has diferent components and on the lowest level, terms are combined into propositions that have sentence meaning.
- Language is also the natural extension of the intentionality. Speech acts are utterances real, intended, meaning and is made up os illocunary force and a proposition (statement).
- The illocutionary force connects the intentionality with the language usage and corresponding facts and objects in the world.

4.17. Metaphysics - introduction

- Metaphysics of the world: objects, properties and relations, facts and truth, functions and social facts.

4.18. Objects

- Objects exists so we need a metaconcept of existance.
- Existance - familiar, yet elusive:
  - We know how to use the word but have a hard time describing it.
  - One could be inclined to call only material stuff.
  - However, that will rule out a lot of the things that we with just a reflection also would call objects. Example: products, agreements, etc.
  - A general notion that tends to hold for most situations is "anything that may be presented to the mind; object of thought".
- Concrete objects:
  - They only have spatiotemporal properties, they ocupy space and exist for a period of time. Examples: mountains, trees, etc.
  - Not only spatio-temporal: do human-created material objects exists in the same way as natural objects? Example: upside down woman, upside down table.
  - Even spaciotemporal objects are always tied to something else.
- To be or not to be, four different meanings of "is",
  - the "is" of existance:
    - "Socrates is", $\exists x(x =$ Socrates $)$ "
  - The "is" of identity:
    - "Hesperus is Phosphorus" Hesperus $=$ Phosphorus , here we have two words for the same objects.
  - "The is of predication"
    - "Socrates is wise" Wise (Socrates)
  - "The "is" of general implication":
    - "Man is an animal" $\forall x($ Man $(x) \rightarrow$ Animal $(x))$ if x is a man then x is also an animal.
- Objects of objects: Objects can be composed out of smaller parts, Objects are not always simple, there are objects composed of objects, this is called aggregation. This is called a whole-part relation.

- When is an object composed of parts?
  Examples:
  - In contact? Must all parts have to be in contact with each other? is an atom an object? under this definition an atom woudn't be an object, and that is wrong.
  - We can say that they must have a force-wise collectively fastened to each other? How much fastened? Example: deck of cards, is it a deck of cards if I spread them around?
  - The "two-woman": if two people shake and thir fingers get stuck, are they then one object? no, they are still two diferent women.
  - Maybe there are no composite objects, only mereological simples? indentity crisis? but if there wew only simples, how can human beings with identity exist? we are actually a compositions of a lot of objects.

  A diferent angle:
  - Existence is a. second level feature that applies to concepts, not objects.
  - That something exists is to say that the concepts have instances.
  - It's in the concepts, in this way, the existance of composition is dependent on the concepts we have, not a spceific feature of the physical object.
  - Example: duck or a rabbit? where is the criteria.

4.19. Properties and relations

- Properties: are the
  - attributes or
  - qualities or
  - features or
  - characteristics of

  things.
- Phenomena of interest:
  - Properties are typically introduced to help explain or account or phenomena of philosophical interest.
- How do we notice properties? when we have a breakdown case: related to phenomenology of Heidegger "A just perfect hammer for me"
  - When the hammer weighs "just perfect for me " then we don't hammer and at the same time think "such a perfect weight for a hammer" the hammer is just a natural part of the world. I won't think of the hammer if it's perfect for me.
  - Something stop's us: for some reason we stop and start contemplating the tool, it suddenly for this particular job it's too heavy,
  - Breakdown case, we contemplate on the hammer and notice that hammers in general could be too light, perfect, too heavy, but they are all for me.
  - De-worlding: we remove ourselves from the equation and attribute hammers as having weight. If there were no break down case we wouldn't notice the object's properties.
  - In 99.999 % of the cases we dont notice the properties of an object unless the object doesn't "do it's job" or if we are reflecting on the nature of the object.

- No breakdown case → no property. Example: does money have the propesty weight? in the old times it did, it was a property weight, now there isn't a weight property in today's money.

- Primary and secondary properties:
  - Primary: properties are objective features of the world: shapes, size, mass, etc.
  - Secondary properties are mind-dependent: colors, tests, etc. (intrincic or relative properties)

- Relations:
  - "Beind in love is a specific type of property" love involves multiple types of objects, this is a special property.
  - Relations are a type of property, relations are properties that exists in multiple things, the property being in love is a two-place relation, there can be multi-place relations as well.
  - Relations have a single relation:
    - Romeo $\underbrace{\leftrightarrow}_{\text{Loves}}$ Juliet

    The objects have roles in the relation or they can be multidimentional.
    Example:
    - Work well together.

- Instantiation: "instantiates" is a special kind of relation between an object and a propery (concept).
  - Relation between objects and the concept we have in our mind.

4.20. Facts

- Facts: a situation that the actual world must be in to make a given proposition about the world true: the truth maker.
  - At any given situation, the world ob objects with their properties is arranged in a certain way. This we call a fact.
  - Example: 7 yellow ducks, it is a "state of affars" or "fact"; the proposition "means" the fact.

- The fact is not just an alone object, the fact obtains if an object excemplifies:
  1. at least one property or
  2. one or mode objects stand in relation

  - "A car"is not a fact, "two pink cars that face each other" is a fact they stand in relation and excemplify the properties.

- The truth-maker and truth bearer:
  - Truth-maker: the fact.
  - Truth bearer: the actual propoition about the fact. In this relation.

- Facts are not true or false:
  - Propositions can be true or false, the truth value is a meta-linguistic property of a proposition.
  - A fact in it of itself is not true nor false, or more generically state-of-affairs, can only obtain or fail-to-obtain.

- Propositions picture simple facts:

- In the simplest case, the proposition can be thought of as a "picture" of the real world fact. The propositional content is the content of the "picture".
- Counterfactuals are also facts: the negation of some facts. Picture the negation of the fact or the fact with variation, there are endless ways to negate a fact so this is tricky.

- Facts are any condition that makes a proposition true:
  - Not just a picture.

4.21. Social facts

- All types of objects and properties are involved in facts, not only natural kinds. Example: the money is on the mat, that is a fact.
- Objective knowledge: this means that we can have objectively true knowledege about subjective relative phenomena. The statement, proposition can be true, where as tha subjective opinion is isolated. Example: the country is in a resion is a fact based on the subjective fact.
- There is no true knowledge at all, because all knowledge is derivated from subjective phenomena, this is called the **pragmatic truth**.

4.22. Status functions adn institutional facts

- Function:
  - Function is always observer relative, secondary property that is.
  - Example: hammer, it's part of a whole, a funtion is defined in a context of others.
  - Functions are contextualizes explicitly or implicitly in systems.
  - We assign a function to an object, this function plays a role in the system.
- System has goals:
  - The system strives towars some type of precieved goal, value, purpose or goal, a system. This shoun by the fact that they can fail, or malfunction.
  - Example: hammer, nails, planks function as a shelter.
  - Exists on a background, the whole system axists within an intentional network and preuppose a background.
  - Example: I use hammers to drive nails into planks to build a house, which is a shelter. I need shelter because otherwise I would freeze.
- No purpose, goal os value, no function: true also for bio-physical function.
  - This is true for all systems.
  - Biological functions are assigner in respect of some higher imposed value.
  - The function server a role in the explanation of a theory.
  - The functions are no intrinsic: We impose them on organs to explein them, if you cahnge the value to destruction from survical, then the organs are malfunctioning, the system always strive to accomplish a higher goal or purpose.
- Status functions: A special type of agentive function is the status function. We use the declaration speech act to create a function. Example: "this hereby counts as money in this room" if everyone accepts this declaration then that piece of paper is money in that room.
  We impose functions on objects using declaration of the format:

$$X \text{ counts as } Y \text{ in } C$$

- Recursion does the rest for us:
  - This is the way we create social reality.
  - We declare status functions with the format and then we use recursion to construct the social reality.
- Steps for status functions:
  1. Declare a system
     - Example: there is hereby a concept called money which the central bank is our state is allowed to issue. Declaration (F).
  2. Recognize and accept:
     - Everyone accepts the intitution and the money concept.
  3. Assign a function to agents:
     - Who does what.
  4. Recognize and accept the declaration of powers:
     - We know the concept and assign status functions to the concept and object.
  5. Declare intitutional facts:
     - We trust and know the social facts of intitutions.
     - Recursion
- Functions in "thin air":
  - They don't need for an object at all, these function are called be Searle "free-standing Y terms", there is no X in the statement.
  - You can have a status function without the X.
  - The normal status function has the power to issuea declaration, example: "thereby counts as a corporation (declaration F)" Corporation is Y, the word corporation is Y, a corporation exists from the declaration, and is sometimes independent of X.
  - We can't do this without language, we can't just think and make it so, a declaration is requiered.
  - Language is super important.
- With:
  1. Collective intentionality.
  2. Declare speech acts and
  3. Recursion

  We create our social world:
  - This realli exists in our collective minds, somethings don't exist out of the social collective mind.
- Things can exist in diferent forms:

Exists independently to us	Exists since we use and treat as such	Exists since we have jointly declared them to do so
• Human • Being • Bacteria • Sun • Tree • Mountain • Earth • River	• Hammer • Table • Computer • Screwdriver • Fork • Engine • Thermometer	• University degree • Birthday party • President • Money • Loan • Insurance

- We use language to create social reality.

4.23. The triangle in new light - Summary

1. We take for granted that there are concrete objects and state of affairs that exists.
2. We have concepts about these objects
3. We form intentional states based on the concepts
4. We use language signs that represent the objects and concepts.
5. We make declarations of new concepts and assignments of these.
6. Those status functions are collectively rectognized and accepted
7. We apply the new concept and thus we create new abstract objects in the world.
8. Repeat and repeat.

This is done very implicitly, the objective is to grab those facts and objects and make them explicit.

4.24. Resources

- Making the social world

Capítulo 5

Section 5: Lessons learned by our deeper knowledge about how we create our world

5.1. Lessons Learned

- Let's do some analysis: we now have the tools to understand what is going on in communication between people.
- Let's use them to make sense situations where communication "waste" is produced.
- And see how the waste can be eliminated using concept modelling.
- This is lean thinking, which persues the elimination of "muda" or waste.
- How to use the tools now learned to eliminate waste.
- Case studies:
  - The meaning of breakdown
  - The slow knowledge
  - The language legacy
  - The rigid IT system
  - The lack of creative leaps

5.2. Case studies: Meaning breakdown

- Let's say:
  - A group of people are discusing a problem, thus an agrement is created.
  - Do they think that they agree or do they actually agree?
- They are using the same references to concepts but who knows if they all have the same concept.
- Do they think they agree?
  - Taking in to account the diferences in concepts, in plain sight nothing indicates disagreement, but some can have diferent concepts of strategy or action plan.
- So:

- How many agreements will the customer need to sign?
- What happens if we just broker a service and "we" are not the supplier of the service?
- How many agreement templates need to be developed?
- This is the meaning breakdown, this produces waste, they sit down and try to explain their concepts for hours and hours, and never reach anything of an agreement because they all have diferent conceptualizations of the same terms they are using.

5.3. Slow knowledge acquisition

- Let's say:
  - People are discussing solutions in a bussiness.
  - Someone sugests to increase some product sales.
  - He is answered yes I will do that.
  - The conceptualizations are diferent, though the conceptualizartion is very simple, they are diferent.
  - Something goes wrong, then waste comes, then the agreement of the persons are diferent conceptualizations.
- The conceptual map gives us easier agreement and more precise conceptualization of solution:
  - You need to consider all the premises.
  - Then connect all the ideas.
  - Define the types, the relations and the properties of each step of conception in the conceptual map.
  - What happens if this? what happens if that? evaluate.
  - Adverbs, they are very ambigous, how we describe actions can invite easy mistake.
- So many situations where you need to gain knowledge very fast and modeling and visualizing can enable us to do so.

5.4. The language legacy

- Language gets stuck in conversation, it's stuck.
- Let's say:
  - Implicitly declared set of status function concepts.
  - Persons that declared the status functions are long gone.
  - For strategic reasons ⟨this happens⟩
  - In early conceptualization of a concept the terms where changed, so they are refering to diferent objects with diferent properties and concepts and instances with the same term.
  - Until you see that the object is another you're stuck.
  - The keep referring to and trating this crucial objecto as another term.
  - This creates waste, lots of waste.
  - Example of customer as provider.
- New status functions implied in the strategy must be declared explicitly by the agent with the power and collectively accepted by the organization.
  - Agrement 1: customer agrement, make the declaration explicitly.
  - Agrement 2: broker agrement, who is the broker, what is his role.
- You can get stuck in an old language and how that sometimes can prevent you from implementing a new business strategy.

5.5. The rigid information systems

- Group of people that are sketching out the idea of a new project:
  - The model of the project is encoded in the IT system and database, the service is becoming very popular, the larger it grows the harder it becomes to change its structure.
  - Years after... they want to implement new features to the model, now implementing this would take too much work, adding this "modifiability" from the beginning would have been a small thing, adding it now results in costs that are exhorbitant.
  - This is waste!

5.6. The creative leaps catalyst

- This is a sucess story:
  - Starting position - lack of a common language (and concepts)
  - Study of other domains and gain new knowledge.
  - Let's say that we study lean, and we connect the patterns that we study to my challenge, then a framework is formed.
  - Not treating this creative process the same way is waste.

5.7. Early customer acceptance language

- Once you create status functions you need to make sure your organization does understand your model.
- Declaring the status functions is not enough to make their instances "alive" in the collective intentionality...
- This declared set of status functions needs to be "rooted", incorporated and accepted in the user's existing intentional network and background...
- Once you have learned the language you will be able to communicate better.
- Teach your language to real consumers as early as posible!
- You will neew to adjust your status functions for best optimal fit with existing user's network and background to eliminate waste.
- Pick you language and test it on real customers, try to fit the in to the collective intentionality if they don't understand it you need rework it and make it clearer. This will eliminate waste.

5.8. Final conclusions

- Concept of concept: we create our social reality when creating function concepts, declaring instances of them and getting people to recognize these as existing. This is done using language.
- In the same way as a hammer can be too heavy, a malfunction conceptual system os status functions could prevent growth, development and lead to disasters.
- When we communicate we often leave out the network and background to a level that we think is common with the people that we communicate. This is natural, if we said everything in our collective intentionality it would take ages to explain "I'm taking a walk", we tend however to leave out a little bit too much. Try to be too detailed in explaining the collective intentional network to understand your domain. Say a littlebit more about the network you want to create.

- This process is so deeply part of what is to be human that we often neglect it's logical mechanisms and lack the tools to fiz the problems that arise frome it.
- What to do then? Eliminate communication waste,
  - Pay attention to implicit differences.
  - Visualise conceptual structures. Doing it visualy helps the brain understand.
  - Reconsider the shared legacy of concepts when game shifts occur.
  - Make the language flaxible for future changes. Make you construct flexible.
  - Find conceptual similarities between diferent domains. This jump starts the creative leap process.
  - Get early "acceptance" from all users of the language, get feedback in small iterations.
  - Refine the language in iterations to let it ground itself in the collective network of intentionality. People have diferent conceptualizations about the same world, with tools such as conceptual maps it's easier to see te diferences.
- Conceptual maps help a lot to eliminate communication waste.

5.9. Resources

- The lean startup, Eric Ries

Capítulo 6

Section 6: Notation - The boxes and arrows and their semantics

6.1. What is a model?

- UML, Unified Modeling Language.
- Why do we model?
  - It's important to diferentiate the subject matter and the model.
  - To make complex subject matters more comprehensible and possible to grasp on a higher level.
  - We create a model to understand, we use it to simulate.
  - To be able to simulate real-world scenarios to get an approximation on how the subject may react and work.
  - We create models to understand complex things and once we have the model to run simulations.
  - Specify, not yet build tangible subjects, we use a model to specify a subject.
  - Specify, not yet developed intengible subjects. Like bussinesses or business models.
- Models:
  1. To understand complex subject matters.
  2. To do simulations and try to predict the future.
  3. To specify not yet built physical things and intangible things.

6.2. Domain models

- What is a domain model:
  - Domain: encloses the content of a particular field of knowledge. Example: the domain of the Udemy example is the things that encapsulates the whole area, it's the knowledge that limits that field.
  - This is recursive, a system is a part of a bigger system, the scope can be played with, it's also layered, I can describe something using biology or chemistry or physics or quantum physics. You can broaden the scope and tweek the abstraction.
  - A conceptual domain model is: can be described on the conceptual level, it includes the concepts used by the experts in that particular domain, used to create, reason understand adn develop theories and systems within that domain.

- Depending on who you are there will be diferent concepts in the field.
- Problem and solution domain:
  - The conceptual model is explicitly chosen to be independent of design or solution concern.
  - This problem-solution domain is relative, it depends on who you ask.
- What is a business domain model:
  - It includes concepts the business experts use.
  - It's usually independent on any organization or software system.
  - It is detailed to a level that makes sense for the business experts.
  - Sufficient to describe the business logic.
  - Not only information entities.
  - Business concept models do not just include "what we have in our databases"

6.3. What is a model more formally?

- Definition of model in UML:
  - Three categories of elements: Classifiers, events, behaviours.
  - Each major category models individuals in an incarnation of the system being modeled.
  - An incarnation of the system being modeled.
  - An incarnation is one instance of the concept.
  - Example: a McDonald's restaurant is an instance of the McDonald's concept.
- Classifiers: A classifier describes a set of objects, an object is an individual thing with a state and relationships to other objects. Example: car.
- Events: describes a set of posible occurrences. An occurrance is something that happens that has some consecuences within the system. Example: accident.
- Behavior: describes of posible executions. An excecution is the performance of an algorithm according to set of rules. Example: A $\rightarrow$ B, A $\rightarrow$ C, A behaviour is described as A can go to B or C.
- Models do not contain objects, occurrences, and executions, because those things are the subjects of models, not their content.
- You have subjects and you have models, A model can model aspects of individual objects, events or behavior. Example: occurrence of an accident, we model the event, type of accident, time of accident, occurrance specification; the occurrance will be complete the model will be incomplete.
- Value specifications, occurrences specifications, and excecution specifications model individual objects, occurrences, and executions within a particular context.
- Is a diagram a model:
  - No, they are not.
  - The model is the "store" of the complete, often recursively composed, set of elements that describes a system.
  - A diagram/map is a view of specific aspects of the model's elements.
- Bare in mind "we often use the term model as a shorthand for diagram, maps or subset of a model", we must understand the distinction.
- One diagram showing one aspect of the some of the elements. A model is thus composed of diagrams but the model isn't a diagram.

6.4. The unified modeling language

- A standard general-purpose modeling language in the field of software and business engineering. Managed by, the object management group.
- Includes a set of graphical notation techniques to create visual models of systems.
- Brief history:
  - Formed 1996, UML 1.0, released by the three amigos. They merged their methods for object oriented modeling.
  - Version 1.3,1.4 fixed bugs.
  - 2005 major revision was adopted.
  - 2012 is version 2.5, newest.
- UML is big, it's a tool set used to specify a complete systems. A lot of diagram types.
- The basics needed in this course:
  - Class: has attributes, they can have associations to others, they can have generalisations, they can have relations in the diferent types of clases.
  - A class is an instance, we can have links between instances.
  - This is linked to the phylosofical course content.
  - We can have domains, can have dependences.
  - There is hundreds of elements in UML.

6.5. Classes, attributes and objects

- Classes:
  - Classes are rendered as boxes with a name indicating the "term" for the concept.
  - Concepts are modeled as classes in UML.
  - Classes have compartments that hold the fetures (such as attributes) of the class.
  - Compartments can be shown or hidden in a specific diagram.
- Attributes:
  - They model the non relational properties become attributes on the class in UML.
  - Examples: a group of people that have the concept car, color pink;
  - The attribute's instantiations describe the objects of the class.
  - Attributes could be set to a specific type, for example in an agreement wi'll have the attribute date, valid date, identifier.
  - Get the concepts straight first. We notice attributes in the breakdown fase.
- Objects:
  - A classifier describes a set of instances that have features in common, classfier is the generic term for a class.
  - The special type of instances that are instances of classes are called objects.
  - The objects in the wordl are represented in UML as instances of a class. Instance specifications, are like constructors in java.

    - A box with an underlined name is used as notation for an object, the class name is stated after the colon.
    - Objects can be anonymous. The name could be left blank.
    - Objects can be unclassified, you can set the class later in the process, you can have names and no object instantiation, you then add the class instantiation as you start to understan what you need.
    - Attribute's instantiations describe the objects of the class.
- Stereotypes:
    - What if I want to classify my classes?
    - You can add a stereotype to enrich the predefined semantics.
    - A common classification in business modelling is a stereotype business entities, business workers and business actors.
    - You can create "icons" for the stereotypes. You can have the default like this: `<<something>>`
    - Two equivalent UML diagrams of the same model.
- Summary:
    - Classes are boxes with a name indicating the "term" for the concept, elements can be stereotyped. The attributes, which could have a type, are shown in the class compartements.
    - Objects are rendered as a box, with underlined name and optionally the instantiating class. The attributes instances that describe the object could optionally be shown in the objects compartment.

6.6. UML Associations - "The lines"

- Assosiations are the most common relationship used in class modeling, associations are shown as a solid line between two classes.
- Associations (ends) could have multiplicity.
    - It regulates which type of object constellations that are posible.
    - "An agreement must have at least one party but a party doesn't have to be involved in an agreement."
    - The 1..* declares the dependencies, one depedency in this case.
- Associations can have role names. The association end has a role, in UML Language.
- Association end could have navigability, this is represented as an arrow.
    - Navigability specifies if the class "knows" about the relationship.
    - If no arrows are shown, both ends are navigable.
- Very common confution about directions:
    - Static: meaning, the agreement concept "depends" on the existance of the product concept, the direction of the arrow implies the dependence.
    - Dynamic meaning, the process of defining products to sell is prior to the writing of agrements. In concept modeling mixing behavior and dependencies can be confusing.
- Reading directions are like comments in the diagram flow.
- Links:

- Links specify specific properties become links between objects in UML.
- Links are shown as a solid line between two objects.
- Exampl: Romeo:Person → Loves → Juliet:Person (agent) vice versa.
- Links are instances of associations.

- An associations declares that there can be links between the objects. So associations are also classifiers, as classes... An association can be instanciated thus they are classifiers as well.
- What if I need to describe attributes for the associations:
  - Associations classes are shown as a regular class which has a dotted line that conncets them to the associations that they describe.
  - It's like a comment for attribute links.
- Modeling compositions of objects:
  - Typically, a part instance is only "attached" to one whole instance at a time.
  - The composite aggregate are shown as a solid black "diamond" at the associations end for the "whole" class.
  - Objects that are composed of other objects are called aggregations (phylosophy mereology).
  - Example: a table is aggregating the top and the table legs.
  - Composite classfiers provides mechanisms for specifying structures of interconnected classifiers created within an instance of a containing classifier. Instead of showing the table as three diferent classes you can have an anidated box composed of the objects that are composed to aggregate the master object.
- Summary:
  - Associations are shown as a solid line between two classes, a name and "reading" direction can be shown.
  - Association ends could have multiplicity, role names, and navigability.
  - Composite aggregations are shown as a black diamons on a side "owning" class.
  - Links between objects which are instances of associatons are **also** shown as solid lines between objects.
  - How we model depends on what is considered important in the domain.

6.7. Generalizations

- Generalizations:
  - Are another type of relation, generalizations are the way to express general implications. Remember:
    $$\forall x(\text{ Man }(x)) \rightarrow x = \text{ Animal}$$
  - General implications become just generalizations in UML.
  - The generalization relationship is solid line with a non solid triangle in the parent side.
  - This is the way we relate concepts when the links are generalizations.
- Associations and links:
  - Example: Cows and barns, mammal is a generalization, a generalization of mammal is animal, so on.
  - Hence by definition there are only objcets of the lowest level clases.

    - All superordinate classes in a generalization structure are abstract, this means you can't instantiate them directly.
    - The name of an abstract class is put in italics, this means that this class can't be instantiated directly.
- Two orthogonal ways to subtype accounts:
    - A class can have multiple generalization sets.
    - Each set can also be further described with constraints within curly brackets {} and the set could be given a name, such as Liability Type and Account Type.
- What if you need to speak about the type before you have an object to speak about:
    - This is called powertypes.
    - Powertypes are shown as a class with the same name as the generalization set, stereotyped to "powertype".
    - A powertype is a class whose instances are also subclasses of another class.
    - Example:
        - Maple: Tree Species
        - a specific tree: Maple
- Multiple inheritance:
    - A class might specialize more than one class.
    - Be careful, it makes the model harder to interpret.
    - Example:
        - Vehicle $\rightarrow$ car $\rightarrow$ boat $\rightarrow$ amphibious vehicle.
    - One class inherits form another.
- Summary:
    - The generalization relationship is shown as a solid line with a non-filled arrow head.
    - The roles is the relationship is called generalizaion (the parent) and specialization (the child).
    - A class can have multiple generalization sets which could have a constraint (such as incomplete, disjoint) and the set can have a name.
    - If needed a specific class, called a powertype can be modeled for each generalization set.

6.8. Packages - Divide and conquer

- Packages are used to decompose large UML models.
- Packaging are used to deal with complexity and modificability of model by decomposing it in to smaller chunks.
- Packages depend on each other, dependencies are shown as dotted lines with an open arrow in UML.
- The direction of the dependency is derived from the ingoing elements' relationships.
- The packages are dependent.
- Sound packing is so important that the whole last section of this cours talking about this.

Capítulo 7

Section 7: Concept modeling workshop tecniques - Perform an outstanding workshop

7.1. Workshop overview

- Producing crystal clear models is a craftmanship.
- Workshop tecniques:
  1. Preparing for a workshop
  2. Storytelling
  3. Object diagrams examples
  4. Pattern recognition
  5. Pattern utilization
  6. Process and concept modeling
  7. Diagram composition
- Three phases of the workshop:
  1. Preparation
  2. Facilitation
  3. Documentation

7.2. Workshop preparation

- You are the facilitator, you don't tell what to do, facilitate, you are the facilitator not the expert.
- Still, ou must understand what experts are trying to say, you are afterall the person who is going to make the diagrams.
- Hence, read and analyze as much you can find on the web sites, process descriptions, marketing material.
- Interview the assignor:
  - This is the one who is going to recieve the result.
  - Why are we doing this? describe the purpose.

- What is the scope? state a domain.
- As-is or to-be analysis? map the concepts that we are using, create new way of conceptual analysis for the future? you listen in the as-is and you propose in the to-be.
- Who should attend?
- When it should be done?
- Where should we do it? online, phone, in a room? what limitations?
- Which methods should be applied?

- Workshop agenda:

  1. Icebreaker: break the language breaker. For example, introduce yourself, everyone will follow the format of introduction, even if they know themselves for 15 years they will start to think, this icebreaker can't be stiff.
  2. Introduction slides:
     - Background and purpose.
     - Workshop goals.
     - Scope.
     - Brief introduction to concept.
     - Description of the process.
  3. Workshop!
  4. Wrap up: (have 15 minutes to make a summary etc.)
     - Summary
     - Were the goals achivied
     - Next steps
  5. Ask them for comments.

- Steps:

  1. Analysis
  2. Goals
  3. Organization
  4. Execution
  5. Evaluation

- You have diferent roles during the workshop:

  - Domain experts: they are the persons who have the terminology and the specialized knowledge.
  - Facilitator: You have the idea of concepts and everything.

- Do not give up until you as the facilitator, understands!

  - A fuzzed speech is often a fuzzed thought.
  - It is you that shoul deliver a coherent model, you is the one that is going to deliver this coherent model.
  - However, make sure that they not trying to describe how a clarinet sounds. If you get stuck, leave it and get back. Maybe there are prerequisites not yet known to you.

7.3. Storytelling

- It's about telling stories, its a powerful way of knowledge aquisition.
- It's a powerful way of organizing information.
- The magical words are: "let me tell you a story"
  1. People start listening.
  2. A new entity is created: the story.
  3. Listeners get emotionally involved.
  4. Create more persistent knowledge.
  5. Foster the shared understanding.
  6. Activation of prior knowledge.
  7. Foster collective creativity.
- Conceptual modeling using Storytelling:
  - The facilitator is not the story teller.
  - "Today you the participant is going to prepare us a story"
  - However, it's not just any stories. I am interested in what happens when a payment is sent invoice is recieved?
  - Then listen very carefully and model everything you hear.
  - "Sure, let me tell you a story... Payments are recieved to out bank accounts twice per day. Every payment has a reference text which we use to figure out which invoice the payment related to."
  - So a payment for an invoice is made by a payee and includes a payment reference. The is recieved at a bank account.
- Remember:
  - You are not the expert, you should be asking the questions.
  - Make parables form other similar situations.
  - This is one way of trying to make inferences for checking if the same conceptualizations are being done.
- Question current stated model:
  - Make specific question of the explicit model you have created, they may've only given you one scenario out of five right?
  - Raise "stupid" questions: play the role of the donkey.
    - "I might be a bit stupid... but can anyone here tell me exactly what a train is"
  - State implications from the current model:
    - Can you verify this statement=
    - "All product prices must be overridden and connceted to an agreement price. "
  - Involve yourself as an actor in the actual story.
    - Let's say i'm the ⟨role in the story⟩ , what would happen?
    - Ok ⟨this⟩ will happen.
- The process:
  - Start by: which stroies to use.

- Ask the participants to start telling stories.
- Tell the stories.
- Model the concepts. Glify a workshop tool.
- Pause, associate.
- Raise control questions
- Role playing
- Derive and implicate
- Recite where you stopped and start again.
- You do this until you are done, do it in iterations.