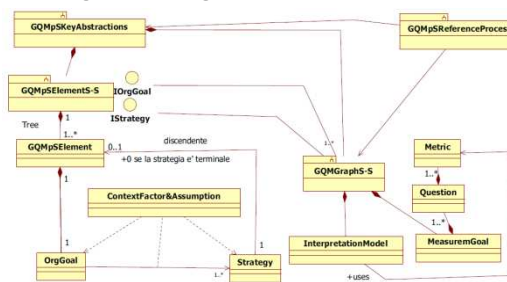


1. Agile approach

- I. Explain the Scrum artifact Product Backlog
- II. Explain the Scrum artifact Sprint Backlog
- III. Explain the Scrum artifact Increment
- IV. Explain the Scrum role Product Owner
- V. Explain the Scrum role Scrum Master
- VI. Explain the Scrum role Development Team
- VII. Explain the Scrum meeting Sprint Planning Meeting
- VIII. Explain the Scrum meeting Daily Scrum
- IX. Explain the Scrum meeting Scrum Sprint Review
- X. Explain the Scrum meeting Scrum Sprint Retrospective
- XI. Explain the Agile requirement types User story and Epic

2. GQM + Strategies (GQMps) in a Nutshell

- I. Describe in a half page the GQMps' Key Abstractions
- II. Describe the GQMps' Basic Approach
- III. Define the meaning of the GQMps Basic Approach's Terms Goal, and Strategy
- IV. Explain why the GQMps Basic approach requires that measurement data are collected
- V. Explain which are the GQMps' major perspectives
- VI. Explain the intervention of Context factors and Assumptions in the GQMps Organization Planning perspective
- VII. Explain when it stops the decomposition process of organization goals into strategies in the GQMps Organization Planning perspective
- VIII. Explain the contribution of GQM in the GQMps Control Perspective
- IX. Explain the function of interpretation model in the GQMps Control Perspective
- X. Explain the GQMps Grid
- XI. Explain the types nodes participating to a grid, and their possible relationships
- XII. How many GQM graphs could be associated to a node of a GQMps grid, and why?
- XIII. Explain briefly the following class diagram:



- XIV. Explain the Organization Goal Template and its fields
- XV. Explain the Measurement Goal Template and its fields
- XVI. In what extent the GQMps process model is a framework?
- XVII. List and briefly comment the three stages of the GQMps process model
- XVIII. Describe the specific goal, and output of the GQMps phase 0
- XIX. Describe the specific goal, and input and output of the GQMps phase 1
- XX. Describe the specific goal, and input and output of the GQMps phase 2
- XXI. Describe the specific goal, and input and output of the GQMps phase 3
- XXII. Describe the specific goal, and input and output of the GQMps phase 4

- XXIII. Describe the specific goal, and input and output of the GQMpS phase 5
- XXIV. Describe the specific goal, and input and output of the GQMpS phase 6
- XXV. Reason on when, for what kinds of domain, it should be enough to execute the GQMpS “phases” in sequence and, vice versa, when they should be intended as parallel messaging sub-processes.
- XXVI. Show a simple instance of Organizational Goal and follow its handling through a GQMpS cycle.

3. Measurement

I. Theory of Measurement

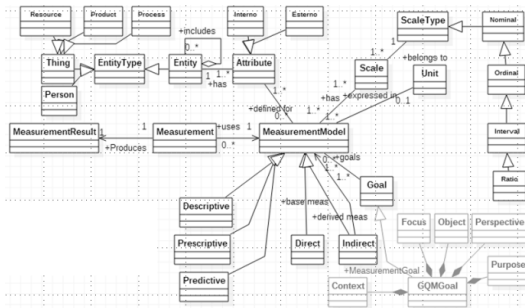
- i. Comment the following ISO 9127 definition: “*Measurement is the process by which numbers or symbols are mapped to attributes of entities in the real world in such a way as to describe them according to clearly defined rules.*”
- ii. What is the meaning of “Measure”?
- iii. What is an empirical relational system, ERS?
- iv. What is a formal relational system, FRS?
- v. Explain informally the following formal definition: *A measurement model, MM, is an homomorphism of ERS on FRS, $\mu: \mathbf{E} \rightarrow \mathbf{F}$:*
 - $\square \quad \zeta_i(e_1, e_2, \dots, e_{ki}) \Leftrightarrow S_i(\mu(e_1), \mu(e_2), \dots, \mu(e_{ki})) \quad (i=1..n) ;$
 - $\square \quad \mu(\Omega_j(e_1, e_2, \dots, e_{sj})) = \bullet_j(\mu(e_1), \mu(e_2), \dots, \mu(e_{sj})) \quad (j=1..m).$
- vi. What is a scale?
- vii. Explain the characteristics of a Nominal scale
- viii. Explain the characteristics of an Ordinal scale
- ix. Explain the characteristics of an Interval scale
- x. Explain the characteristics of a Ratio scale
- xi. Give a list of operations that can be applied to a Real Interval scale but are not applicable to a Real Ordinal scale
- xii. Give a list of operations that can be applied to a Real Ratio scale but are not applicable to a Real Interval scale
- xiii. Describe briefly what is a descriptive measurement model
- xiv. Describe briefly what is a prescriptive measurement model
- xv. Describe briefly what is a predictive measurement model

II. Software Measurement

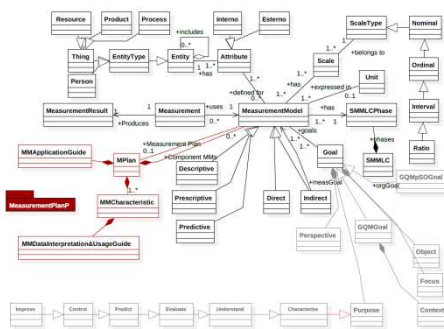
- i. In Sw. Engineering, what types of entities are expected to be measured?
- ii. Explain the differences between internal attributes and external attributes of an entity
- iii. Examples
 - 1. Definition Function Point
 - 2. COCOMO
- iv. Developing Sw. Measurements: Measurement Models Life Cycle
 - 1. Explain the role of the “Experience Base” in the Measurement Process – ISO/IEC 15939:2007
 - 2. Name the phases of the SMMLC and explain their interflows
 - 3. Explain the SMMLC Identification phase
 - 4. Explain the SMMLC Creation phase
 - 5. Explain the SMMLC Acceptance phase

6. Explain the SMMLC Accreditation phase
 7. Explain what is a SMM package and what are its component
 8. Explain what is a Measurement Plan and what are its component
- v. Sw. Measurement Ontologies: BMMO, SMMO, RSO

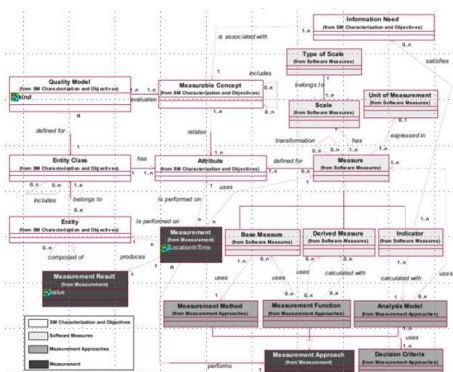
1. Explain the following class diagram (BMMO)



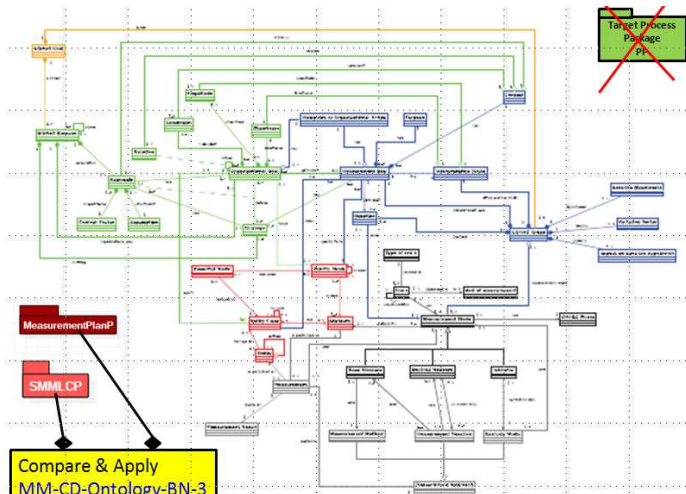
2. Explain the following class diagram (sMMO)



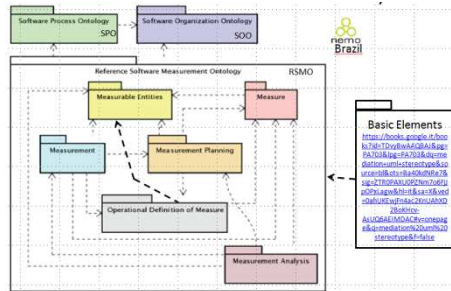
3. Explain the following class diagram (SMMO)



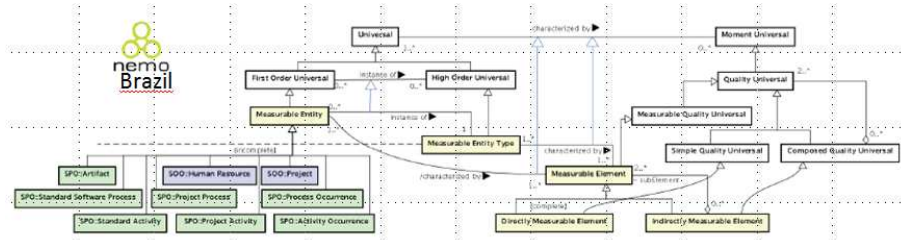
4. Explain the following class diagram (iMMO)



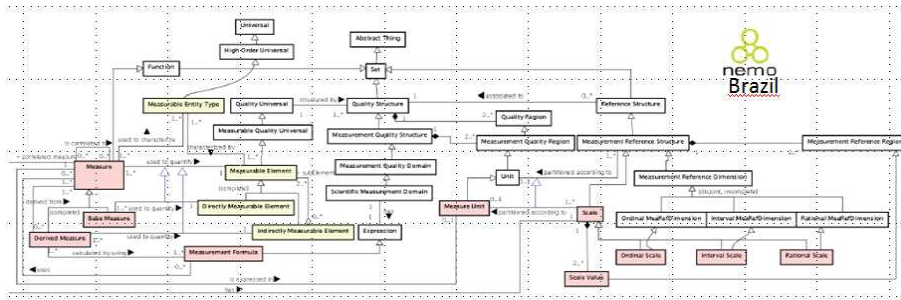
5. Explain the following package diagram (RSO)



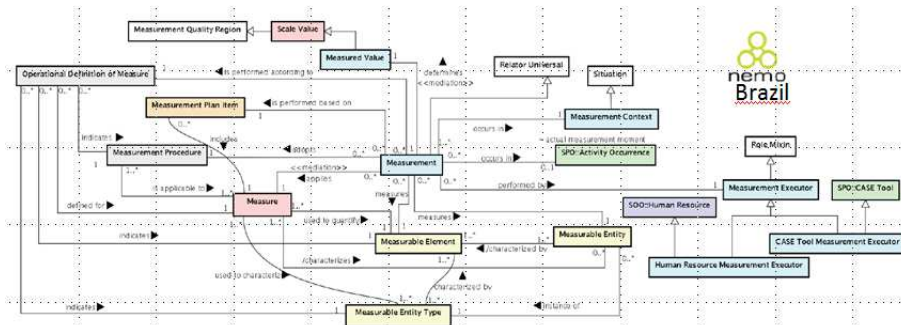
6. Explain the following class diagram (RSO-Measurable Entity sub-O)



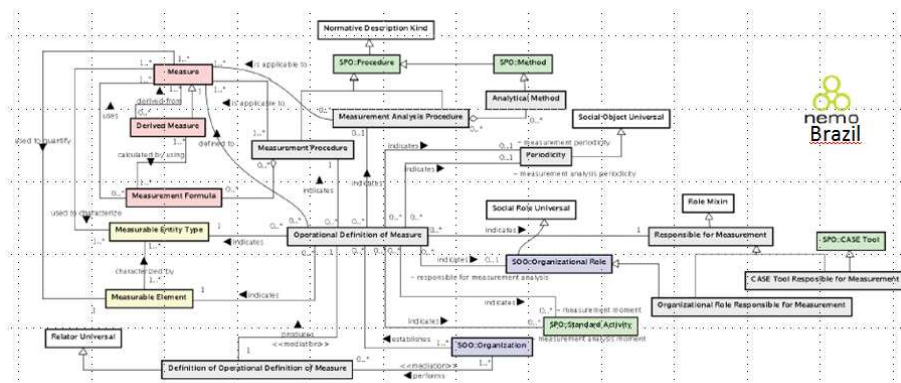
7. Explain the specific aspects of the following class diagram (RSO-Measure sub-O)



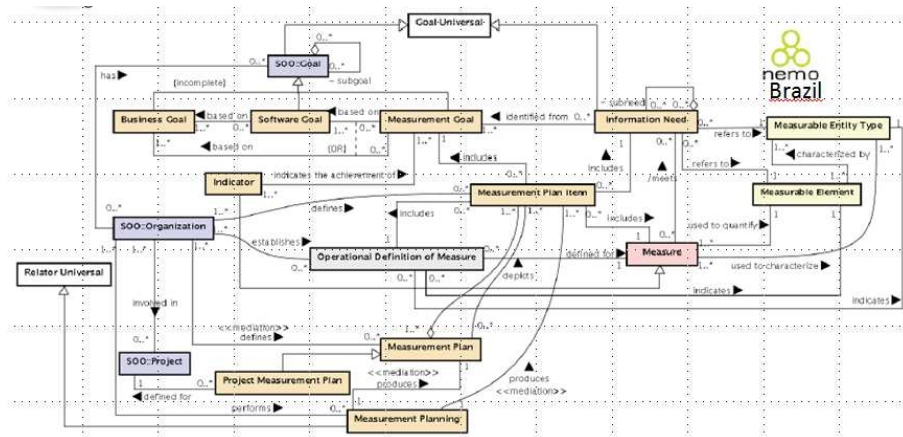
8. Explain the specific aspects of the following class diagram (RSO-Measurement sub-O)



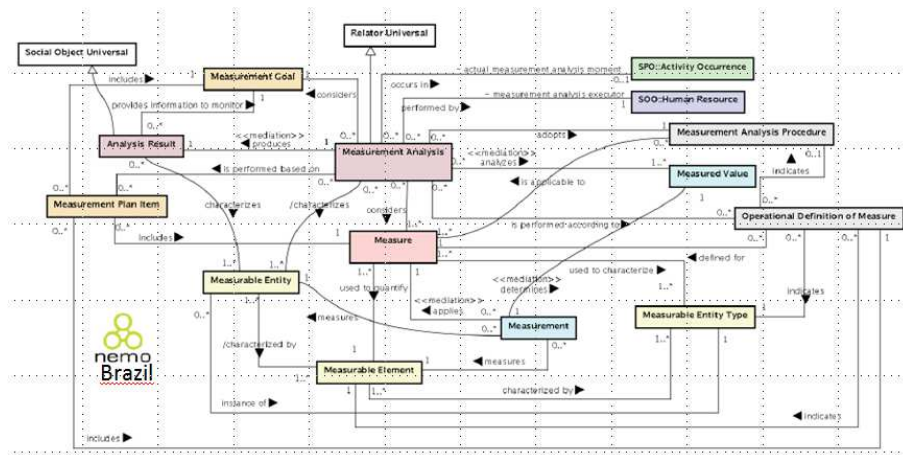
9. Explain the specific aspects of the following class diagram (RSO-Operational Definition of Measure sub-O)



10. Explain the specific aspects of the following class diagram (RSO-Measurement Planning sub-O)



11. Explain the specific aspects of the following class diagram (RSO-Measurement Analysis sub-O)



4. Experimental Sw. Engineering

I. Experimental Models for Validating Sw. Technology

- i. Types of methods: Characterize a Historical method
- ii. Types of methods: Characterize an Observational method
- iii. Types of methods: Characterize a Controlled method
- iv. Historical method: Characterize a Literature search
- v. Historical method: Interview vs. Questionnaire
- vi. Observational method: Characterize a Project monitoring
- vii. Observational method: Characterize a Case-study
- viii. Observational method: Characterize an Assertion
- ix. Observational method: Characterize a Field study
- x. Observational method: Characterize a Pilot study (or Feasibility study)
- xi. Controlled method: Characterize a Controlled experiment
- xii. Controlled method: Characterize a Replicated experiment

II. Software Engineering Controlled Experiment Life Cycle

- i. Show the input and output, and list and explain the phases, of such a Life Cycle
- ii. Show the definition of a controlled experiment
- iii. Show the planning of a controlled experiment

- iv. Give an example of hypotheses formulation
- v. Explain Variable selection and give an example
- vi. Explain why randomizations should be applied to subjects in a Sw. Eng. Controlled experiment
- vii. Explain why randomizations should be applied to objects in a Sw. Eng. Controlled experiment
- viii. Explain how you would use the collected data to validate hypotheses of a controlled experiment.

5. Alternatives

- a. RUP & Sw. Project Mgt.*
- b. Task assigned per subject*