





| 1        | 5 | Knowledge  |   |
|----------|---|--|---|
| <u>-</u> | 5 | Reuse  | 1 |
|          |   | Purpose  |   |
|          | • | Clarify the confusions that lie around the widely used terms <i>analysis model</i> and <i>design model</i> in software engineering.  |   |
|          | • | Root of some <i>difficulties</i> that practitioners encounter in system modeling, and sometimes lead to <i>bad engineering practices</i> .                                       |   |
|          | • | Our approach consists of placing the duality of analysis and design within <i>a three-dimensional modeling space</i> .   |   |
|          | • | <ul> <li>Models are classified according to:</li> <li><i>First dimension</i>: the reality they represent.</li> <li><i>Second dimension</i>: the purpose of the model.</li> </ul> |   |
|          |   | <ul> <li>Third dimension: the abstraction level expressed in the model.</li> </ul>   |   |
|          | • | This classification facilitates:   |   |
|          |   | - interpretation of models, and  |   |
|          |   | <ul> <li>comprehension of <i>model transformations</i> as shiftings within this space.</li> </ul>  |   |
|          |   | On the difference between analysis and design  | ۱ |















| ~  | Knowledge  | No.     |
|----|--|---------|
| J. | Reuse  | 1 State |
|    | When the System simulates the Domain   |         |
| •  | A radar screen:  |         |
|    | <ul> <li>Simulates the positions and velocities of aircrafts in a certain aerial space.</li> </ul>   |         |
|    | <ul> <li>The degree of accuracy in the simulation is extremely important.</li> </ul>   |         |
| •  | Role playing games:  |         |
|    | <ul> <li>Model imaginary worlds.</li> </ul>  |         |
|    | <ul> <li>There is no proper simulation of any external world.</li> </ul>   |         |
| •  | An electronic voting system:   |         |
|    | - Contains some degree of simulation of its environment: voters, choices, etc.   |         |
|    | <ul> <li>However, the system is designed so that electronic votes <i>do not simulate, but</i><br/><i>replace</i>, manual votes, which will cease to exist once the system is deployed.</li> </ul>  |         |
|    | <ul> <li>Besides, the new electronic votes <i>will not be a mere simulation</i> of the old<br/>manual votes; instead, they will have <i>different features</i> (for example, a different<br/>way to <i>authenticate</i> the voter, or the possibility to <i>change</i> the vote before some<br/>specified deadline, and so on).</li> </ul> |         |
| •  | In general, the software system will create <i>a new reality</i> that was not present.   |         |
|    |  |         |
|    | On the difference between analysis and design 12   |         |













|                         | Reverse<br>engineering   | Forward engineering   |                               |
|-------------------------|--|---|-------------------------------|
|                         | system → model   | model → system  |                               |
|                         | description  | specification   |                               |
|                         | model-as-copy  | model-as-original   |                               |
|                         | analysis model   | design model  |                               |
|                         | process of analysis  | process of synthesis  |                               |
| everse eng<br>nderstood | gineering is a <b>process of an</b><br>by means of a <b>model-as-cop</b> | <b>alysis</b> where the existing<br>oy (result: <i>"analysis mo</i> d | ı system is<br><b>del"</b> ). |

| Knowledg<br>Reuse   | ê  |   |   |   |
|---|--|---|---|---|
|   | Тwo  | ortogonal dime  | ensions   |   |
|   | Specification  | domain<br>specification<br>model  | system<br>specification<br>model  |   |
|   | Description  | domain<br>description<br>model  | system<br>description<br>model  |   |
|   |  | Domain  | System  |   |
| <ul> <li>The distinct</li> <li>Domain</li> <li>Domain</li> <li>An applica<br/>new softwat</li> <li>However, st</li> </ul> | tion can be applie<br>a description mode<br>a specification mode<br>tion domain that w<br>are system is hard<br>specifying the new | d also to the <b>domain</b><br>Is: to understand the cor<br>Iels: if the application do<br>ill remain completely of<br>Ily conceivable.<br>domain is very often | model:<br>ntext of requirements, b<br>main is not an immutab<br>unaffected by the intr<br>ignored in software | uild a vocabulary.<br>le reality.<br>oduction of a<br>projects. |
|   | On t   | he difference between analysis a  | and design  | 20  |















|   | owledge   |  |  |   |  |  |
|---|---|--|--|---|--|--|
| N Ke  | use   | Three orto   | gonal dimensio   | ons   |  |  |
|   | Specification   | Abstract view  | domain specification<br>abstract model   | system specification<br>abstract model  |  |  |
|   | Specification   | Concrete view  | domain specification<br>concrete model   | system specification<br>concrete model  |  |  |
|   | Description   | Abstract view  | domain description<br>abstract model   | system description<br>abstract model  |  |  |
|   | Description   | Concrete view  | domain description<br>concrete model   | system description<br>concrete model  |  |  |
|   |   |  | Domain   | System  |  |  |
| <ul> <li>Do</li> <li>–</li> <li>An</li> <li>are</li> <li>–</li> </ul> | main models, et<br>Example: getti<br>"Concrete" doe<br>y combination<br>less frequently<br>system-descrip<br>domain-specifi | ither descriptive of<br>ng a mortgage fro<br>es not mean "tech<br>of "coordinates<br>used in typical so<br>otion-concrete view<br>cation-concrete vi | r specificative, <i>can be</i><br>m a bank at different I<br>nology dependent", bu<br>" <i>makes sense</i> , althou<br>ftware engineering pro-<br>w: understanding deta<br>ew: modifying details | e abstract or concrete<br>evels of abstraction.<br>It it is still meaningful.<br>ugh actually some of th<br>ocesses.<br>ils of the current syster<br>of the business. |  |  |
|   |   |  |  |   |  |  |
|   |   | On the differen  | ce between analysis and design   |   |  |  |



| Knowledge<br>Reuse   |   |  |   | -@            |
|--|---|--|---|---------------|
| Typical  | trajectories t  | hrough the mo  | deling space  |               |
| Specification  | Abstract view   | domain specification<br>abstract model   | system specification<br>abstract model  | 55.5          |
| Specification  | Concrete view   | domain specification concrete model  | <ul> <li>system specification<br/>concrete model</li> </ul>                       |               |
| Description  | Abstract view   | domain description<br>abstract model   | system description  |               |
| Concrete view  |   | domain description<br>concrete model   | system description  |               |
|  |   | Domain   | System  |               |
| <ul> <li>Two typical tra         <ul> <li>RW model (a<br/>analysis (ana<br/>- Legacy syste<br/>to new syste</li> </ul> </li> </ul> | ajectories:<br>inalysis model in<br>alysis model in the<br>em concrete deso<br>m abstract descr | the classical sense<br>the SE sense), to des<br>cription to legacy sy<br>ription, to new syste | e) to requirements<br>sign model.<br>stem abstract descri<br>m concrete descripti | ption,<br>on. |
|  | On the differen   | ce between analysis and design   |   | 30            |







| Answer   |   | Questionnaires |   |   |   |   |   |   |   |   | Avg. |
|--|---|----------------|---|---|---|---|---|---|---|---|------|
| The analysis model represents the application domain, the design model represents the software system.     | 2 | 2              | 3 | 3 | 0 | 1 | 3 | 2 | 2 | 3 | 2,1  |
| The analysis model describes something that exists, the design model specifies something we want to build. | 3 | 3              | 3 | 3 | 1 | 3 | 2 | 2 | 1 | 1 | 2,2  |
| The analysis model abstracts away low-level details, the design model gives all necessary                  | 1 | 2              | 3 | 3 | 2 | 0 | 1 | 2 | 1 | 2 | 1,7  |







