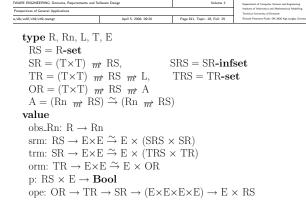
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Topic 28	• The aims are
Domain Stakeholders	\star to introduce the concept of (domain) stakeholders,
• The prerequisite for following this part of the lecture is that you	\star to distinguish between different categories of stakeholders, and
have followed lectures over-viewing	★ to sketch a fairly advanced (also formalised) example of enterprise stakeholders.
\star software development in general and	cherprise statenorders.
\star domain engineering in particular.	
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• The objective is	Introduction
\star to ensure that you carefully consider and include the concerns of	• At the very outset of any phase of development,
all relevant stakeholders	 At the very outset of any phase of development, * whether the universe of discourse be some
\star when in future you are developing	 ★ whether the universe of discourse be some ★ domain model development,
♦ domain descriptions,	★ domain model development, ★ requirements development or
 ◊ requirements prescriptions and ◊ software designs. 	* software design,
-	• it is important to identify all possibly relevant stakeholders.
• The treatment is from systematic to formal (sketches).	• Throughout the development phase it is then important to ensure
	that each stakeholder (group) is properly "taken care of", i.e., their
	concerns are properly modelled.
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Stakeholders	• Obviously we could "equate" institutions and enterprises with
	groups of one or more persons.
Characterisation 9.150 By a domain <i>stakeholder</i> we shall	• For pragmatic reasons of identification (i.e., "discovery") it is, in
understand	cases, sometimes easier, we believe, to think of institutions and
• a person, or a group of persons, "united" somehow in their common interest in, or dependency on the domain; or	enterprises.
• an institution, an enterprise, or a group of such, (again)	
characterised (and, again, loosely) by their common interest in, or	
dependency on the domain	
· •	
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General Application Stakeholders	• Thus general application domain stakeholders are typically those / whom we can characterise as from such domains as:
Characterisation 9.151 • By general application domain	* transportation, manufacturing, mining, financial industries,
stakeholders we understand stakeholders whose primary interest	★ transportation, manufacturing, mining, manifal industries, ★ public government, the service sector, etc.
\star is neither the projects which develop software (from domains, via	
requirements to software design),	Example 9.94 <i>Railway Train System Stakeholders:</i> When modelling, i.e., describing, the domain of railways, one may be well
\star nor the products evolving from such projects.	advised in considering the following stakeholder groups — listed in an
• Instead we mean stakeholders from	order that may reflect the view of the first group:
• typically non-IT business areas	
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 management, i.e., "blie collar" vorkers – and possibly arranged into several stateholder group industing families. e. encourse (passengers and freightors (poople etc., sending and recovery freightor). e. sees (people coming to end off or receive passengers, and people management, i.e., "blie constraints" arrangement, ending for other domains. e. Subtracted offsering is a cut to constraint similar stateholder from domains. e. Subtracted offsering is a cut to constraint similar stateholder from domains. e. Subtracted offsering is a cut to constraint similar stateholder from domains. e. Subtracted offsering is a cut to constraint similar stateholder from domains. e. Subtracted offsering is a cut to constraint similar stateholder from domains. e. Subtracted offsering is a cut to constraint similar stateholder from domains. e. Subtracted offsering is a cut to constraint similar stateholder from domains. e. Subtracted offsering is a cut to constraint similar stateholder from domains. e. Subtracted offsering is a cut to constraint similar stateholder from domains. e. Subtracted offsering is a cut to constraint similar stateholder from domains. e. Subtracted offsering is a cut to constraint similar stateholder from domains. e. Subtracted offsering is a cut to constraint similar stateholder from domains. e. Subtracted offsering is a cut to constraint similar stateholder from domains. e. Subtracted offsering is a cut to constraint similar stateholder from domains. e. Subtracted offsering is a cut to constraint similar stateholder from domains. e. Subtracte house constraint similar stateholder from domains. e. Subtracte h	
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COTSs; 01, the universe of discourse — here the domain.	
 ★ as well as people from the application domains for which the software house makes these products: ◊ customers (clients) and 	
♦ customers (chents) and ♦ users	
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Stakeholder Perspectives	• For each stakeholder group we have to investigate (elicit, acquire, / and analyse) its perspective with respect to
Characterisation 9.155 By a stakeholder perspective we	\star each of the possible domain attributes, as covered next, and
understand	\star each of the possible domain facets, as covered here, and \star each of the possible domain facets, as covered thereafter.
• the, or an, understanding of the domain shared by	• With respect to stakeholder perspectives we may be prepared to
• the specifically identified stakeholder group —	observe
• a view that may differ from one stakeholder group to another	\star that one and the same phenomenon may be considered by two
stakeholder group of the same domain	different groups to possess
· •	♦ not quite commensurate attributes,
	♦ and not quite commensurate facets.
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\star And thus two or more such group perspectives can give rise to	Perspectives of General Applications
♦ inconsistent, and/or	• The stakeholder perspectives for general application domains are
♦ conflicting	• The stakeholder perspectives for general application domains are generally of several concerns:
overall views on domain attributes and facets.	* Client executive and other upper-level management expects
• We shall return to the above issues when we later treat the methodological concerns of domain acquisition and validation.	computing systems to improve their company's competitiveness,
	financial position, etc.
	* Tactical and operational management usually have perspectives that pertain to management and organisational
	issues.
	\star Nonmanagement staff usually have perspectives that pertain
	to their daily work and to its interface with customers.
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* All of the above stakeholder groups have perspectives that / primarily focus on their shared domain: the general application	Example 9.95 Resource Management:
area.	• We now present a rather lengthy example that illustrates the interface between a number of stakeholder perspectives.
\star This is in contrast to the perspectives of stakeholders of the	• The stakeholders are (simplifying):
software house, the developer with whom the client contracts.	 The stateholder's are (simplifying). * an enterprise's top level, executive management (who plan, take
* Besides wishing to secure, in their perspectives, the professional integrity of their company, the <i>software house developer</i>	and follow up on strategic decisions),
perspectives include those of satisfying the client.	\star its line management (who plan, take and follow up on tactical
	decisions),
	\star its operations management (who plan, take and follow up on
	operational decisions) \star and the enterprise "workers" (who carry out decisions through
	tasks).
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• The management groups have the following kinds of functions.	• After some analysis we arrive at the following:
* Strategic management has to do with upgrading or downsizing,	* Let R, Rn, L, T, E and A stand for resources, resource names, spatial
i.e., converting an enterprise's resources from one form to	locations, times, enterprises (with their estimates, service and/or production plans, orders on hand, etc.), respectively tasks (actions).
another — making sure that resources are available for tactical	 SR, TR and OR stand for strategic, tactical and operational resource views,
management.	respectively.
* Tactical management has to do with temporal, typically medium- to long-term scheduling and spatially allocating these	 SR expresses (temporal) schedules: which sets of resources are either bound or free in which (pragmatically speaking: overall, i.e., "larger") time
resources, in preparation for operations management.	intervals.
* Operations management plans final (usually short-term)	TR expresses temporal and spatial allocations of sets of resources, in certain (pragmatically speaking: model finer-grained, i.e., "smaller") time
scheduling and allocation of (resource-consuming) tasks, in	intervals, and to certain locations.
preparation for actual enterprise ("floor") operations.	◇ OR expresses that certain actions, A, are to be, or are being applied to (persumetar paymed) resources in certain time intervals
	(parameter-named) resources in certain time intervals.
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- Management functions:
 - \star Strategic resource management:
 - \diamond srm(rs)(e,e'''').
 - \diamond Let us call the result (e',(srs,sr)).
 - \diamond srm proceeds on the basis of the enterprise: as it is now (e), and as one would like it to become (e''''), as well as its current resources (rs).
 - srm "ideally estimates" all possible strategic resource acquisitions (upgrading) and/or downsizings (divestments) (srs).
 - ♦ And srm selects one desirable strategic resource schedule (sr).



- \star Tactical resource management:
- $\diamond trm(sr)(e,e'''').$
- \diamond Let us call the result (e["],(trs,tr)).
- \diamond trm proceeds on the basis of the enterprise: as it is now (e), and as one would like it to become (e''''), as well as one chosen strategic resource view (sr).
- trm "ideally calculates" all possible tactical resource possibilities (trs).
- \diamond And trm selects one desirable tactical resource schedule and allocation (tr).
- * Again, trm cannot be fully algorithmitised.
- \diamond But some combinations of partial answer computations and decision support can be provided.

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				_

\star Actual enterprise operation:

- ◊ ope,
- \diamond enables, but does not guarantee,
- \diamond some "common" view of the enterprise.
- ope depends on the views of the enterprise, its context, state and environment, e, as "passed down" by management;
- and ope applies, according to prescriptions kept in the enterprise context and state, actions, a, to named (rn:Rn) sets of resources.
- ♦ The above account is, obviously, rather idealised,
- ♦ but, we hope it is indicative of what is going on.

ARE ENGINEERING: Domains, Requirements and Software Design rspectives of General Applications		Volume 3	Department of Computer Science and Engineering Institute of Informatics and Mathematical Modelling Technical University of Denmark	DT
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\bullet We introduce a number of fu	inctions.			,
• These partial, including loose nondeterministic functions sr tactical respectively operation	rm, trm and	orm sta	nd for strategic,	
 tactical, respectively operation Let p be a predicate which d 	letermines wi	hether t	the enterprise can	
continue to operate (with its not.				
• To keep our model small we	have had to	resort t	to a "trick":	
\star putting all the facts knows management to function a			order for	
\star Besides the enterprise itsel	lf, E also mo	dels its	environment:	
\star that part of the world whi	ich affects th	e enterj	orise.	
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\star The "estimation" is heuris	, ·			
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- or i node Enville Envirt Envirt
 - Relating the above schematic example to, for example, the railway domain we may suggest:
 - \star Resources R include access to (not necessarily ownership of) the rail net, rights to rent passenger train carriages and locomotives, staff, monies, etc.
 - \star Strategic resources is, for example, about needing additional or changed rail net access rights, needing further or different kinds of train sets, etc.
 - ★ Strategic resource management, srm, typically brings many operators together, negotiating with rail infrastructure owners about access rights and with train set leasing (and lease finance) companies for rental of train sets, etc. srs:SRS designates all possible outcomes of a company's own strategic planning; sr:SR designates a negotiated solution.

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★ Tactical resources is, for example, now about the rostering of train staff (crew allocation), allocation of train sets to	value $($ enterprise: RS $\xrightarrow{\sim}$ E $\xrightarrow{\sim}$ Unit
maintenance locations, etc.	$enterprise(rs)(e) \equiv$
\star Tactical resource management, trm, typically involves	$\mathbf{if} p(rs)(e) \mathbf{then}$
negotiation with trade unions, with maintenance units, etc.	$\mathbf{let} \ (e',(srs,sr)) = srm(rs)(e,e'''),$
trs: TRS designates all possible outcomes of a company's own	$(\mathbf{e}^{\prime\prime},(\mathrm{trs},\mathrm{tr})) = \mathrm{trm}(\mathrm{sr})(\mathbf{e},\mathbf{e}^{\prime\prime\prime}),$
tactical planning (its negotiating options); tr:TR designates a	$(\mathbf{e}^{\prime\prime\prime},\mathbf{or}) = \operatorname{orm}(\operatorname{tr})(\mathbf{e},\mathbf{e}^{\prime\prime\prime\prime}),$
negotiated solution.	$(e^{m}, rs') = ope(or)(tr)(sr)(e, e', e^{m}, e^{m})$ in
• To give a further abstraction of the "life cycle" of the enterprise, we	let $e^{m}: E \cdot p'(e^{m}, e^{m})$ in
idealise it, as now shown:	enterprise(rs')(e ^m) end end
	else stop end
	p': $\mathbf{E} \times \mathbf{E} \to \mathbf{Bool}$
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• The enterprise reinvocation argument, rs',	• There were two forms of recursion at play here:
\star a result of operations,	\star The simple tail-recursion (i.e., the recursive invocation of
\star is intended to reflect the use of strategically, tactically and	enterprise),
- ··· ·	\star and the recursive "build-up" of the enterprise state e''''.
operationally acquired,	
\star spatially and task allocated and scheduled resources,	• The former is trivial.
\star including partial consumption, "wear and tear", loss,	
replacements, etc.	
• The let $e''''': E \cdot p'(e'''', e''''')$ in shall model a changing	
environment.	
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• The latter is the interesting one:	• We remind the listener that in the previous groupple we are
• The latter is the interesting one:	• We remind the listener that — in the previous example — we are
\star Solution, by iteration towards some acceptable, not necessarily	"only" modelling the <i>domain</i> !
minimal fix-point, "mimics" the way the three levels of	• That model is, obviously, sketchy.
management and the "floor" operations change that state and	• But we believe it portrays important facets of domain modelling
"pass it around, up and down" the management hierarchy.	and stakeholder perspectives.
\star The ope rate function "unifies" the views that different	
management levels have of the enterprise, and influences their	• The stakeholders were, to repeat: strategy ("executive")
decision making.	management (srm, p), tactical ("line") management (trm),
\star Dependence on E also models potential interaction between	operations ("floor") management (orm) and the workers (ope).
enterprise management and, conceivably, all other stakeholders.	• The perspective being modelled focused on two aspects:
sites price management and, concertably, an other bankeholders.	* their individual jobs, as "modelled" by the "functions" (srm, p,
	trm, orm, ope),
	* and their interactions, as "modelled" by the passing around of
	* and their interactions, as indefined by the passing around of arguments $(\mathbf{e}, \mathbf{e}', \mathbf{e}'', \mathbf{e}''', \mathbf{e}'''')$.
455 220, Fac +66 450 8214 © Dime Eginer, Frederij 11, D6-246 Hele, Demark Ernalt, dellen druch, kjernelgend can, dereelbijwer ku UR: waa inn daa da / da	arguments (e, e', e'', e''', e'''). -reference -r
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Important Apple 120, Taple 221, Taple 231,	3.1 Projection of General Againstion Agel 5. 2006, 102.00 Page 106, Taple 20, Fail 40 This of Stationary Stations This of Stationary Stations • We can, of course, define a great number of predicates on the enterprise state and its environment (e:E), • and we can partially characterise intrinsics — facts that must always be true of an enterprise, no matter how. • If we "programme-specified" the enterprise then we would not be modelling the domain of enterprises, but a specifically "business process engineered" enterprise.
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 If the application domain is that of software development itself * either just domain engineering, * or just requirements engineering, * or just software design, * or the first two, the last two, or all three of the above, as is the subject domain of these lectures, 		 * the software house owners and upper management, * the software engineers and their immediate managers, * the technicians who support the work of the software engineers, * and the suppliers of technology (hardware and software) that support the work of management, software engineers and technicians.
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Discussion: Stakeholders and Their Perspectives General	/	Principles, Techniques and Tools
• This lecture has discussed the concept of stakeholders.		Principle 9.37 Domain Stakeholder:
• In subsequent lectures we shall take up the thread and,		 At the very outset of a development project identify all possible and potential domain stakeholders.
occasionally, indicate where we differentiate, in our descriptions, etc., between perspectives of different stakeholders.		It is better to include too many, than forget some who can later
 In a subsequent lecture's treatment of business processes and management and organisation we may occasionally refer to the need for special descriptions of stakeholder perspective. 		create a nuisance, or more, when rightfully intervening.Be prepared, throughout a project, to revise the list of domain stakeholders
need for special descriptions of state-forder perspective.		
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Principle 9.38 Domain Stakeholder Perspective:	—/	Techniques 28 Domain Stakeholder Liaison:
• At the very outset of a development project	·	• Maintain, openly inspectable, lists of all contemplated, respectively
\bullet define, together with designated domain stakeholders,		of all actual domain stakeholders.
 their roles, their "jurisdictions" and their "rights and duties". Be prepared, throughout a project, to revise the roles of domain		 Liaise regularly with all actual domain stakeholders. Inform all other (contemplated) domain stakeholders of "what's
stakeholders	•	going on".Write down in clear (natural, yet legally binding) language the role
		of each actual stakeholder.Maintain a dossier of all communications with all domain stakeholders.
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 rypically such communications deal, as we shall see facer, with: role assignments, 	1	
* acquisition and * validation		
Tools 9.12 Domain Stakeholder Liaison:	•	
• The tools mentioned under information documents (Slide 277) apply equally well here		
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