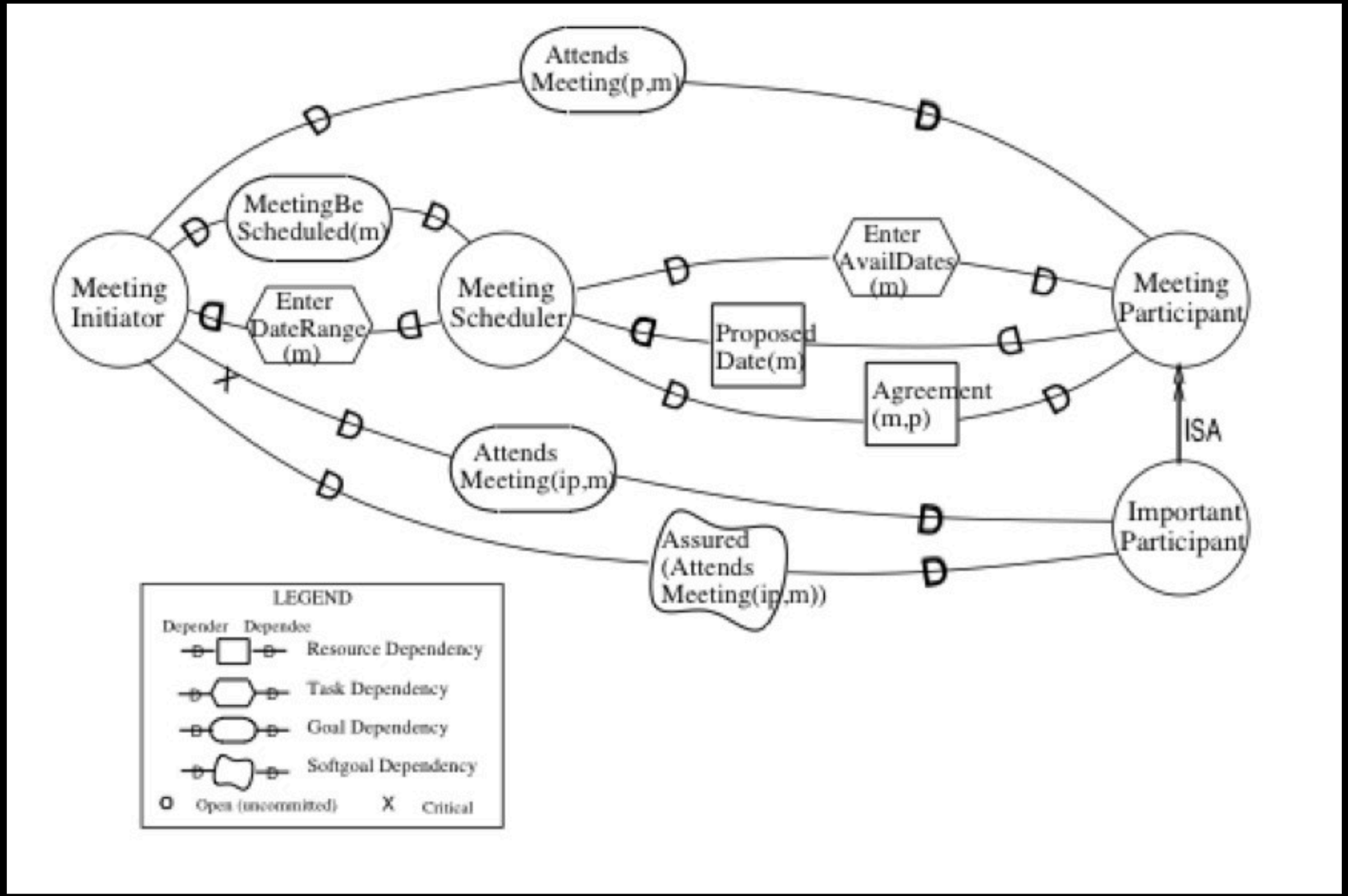
Requirements Specification

Lectures 5b, DAT230, Requirements Engineering
Robert Feldt, 2010-09-14

i*

- http://www.cs.toronto.edu/km/istar/
- Models Agents and their Intentions
- Early Req Specification together with Customers
- 1. Strategic Dependency Model
  - Actors and Dependencies
  - Certain Actions performed by certain Actors
  - Ex: User depends on system to open door to meet goal to enter building
- 2. Strategic Rationale Model
  - Looks inside actors, what drives them

I* example


Attends Meeting(p,m)
MeetingBe Scheduled(m)
Meeting Initiator
Enter DateRange (m)
Meeting Scheduler
Enter AvailDates (m)
Meeting Participant
Proposed Date(m)
Agreement (m,p)
ISA
Attends Meeting(ip,m)
Important Participant
Assured (Attends Meeting(ip,m))
LEGEND
Depender Dependee
Resource Dependency
Task Dependency
Goal Dependency
Softgoal Dependency
Open (uncommitted)
Critical

Formal languages: Z

- Mathematical language for describing computing system
- Model-based, models abstract data type (ADT)
- ADT = system state and operations on it
  - State = state variables and their values
  - Operation = can change state
- Good match to imperative programming languages
- Also extension for OO languages; form of inheritance
- Very mature, used since 1970's

State Transition Diagram (Z example)

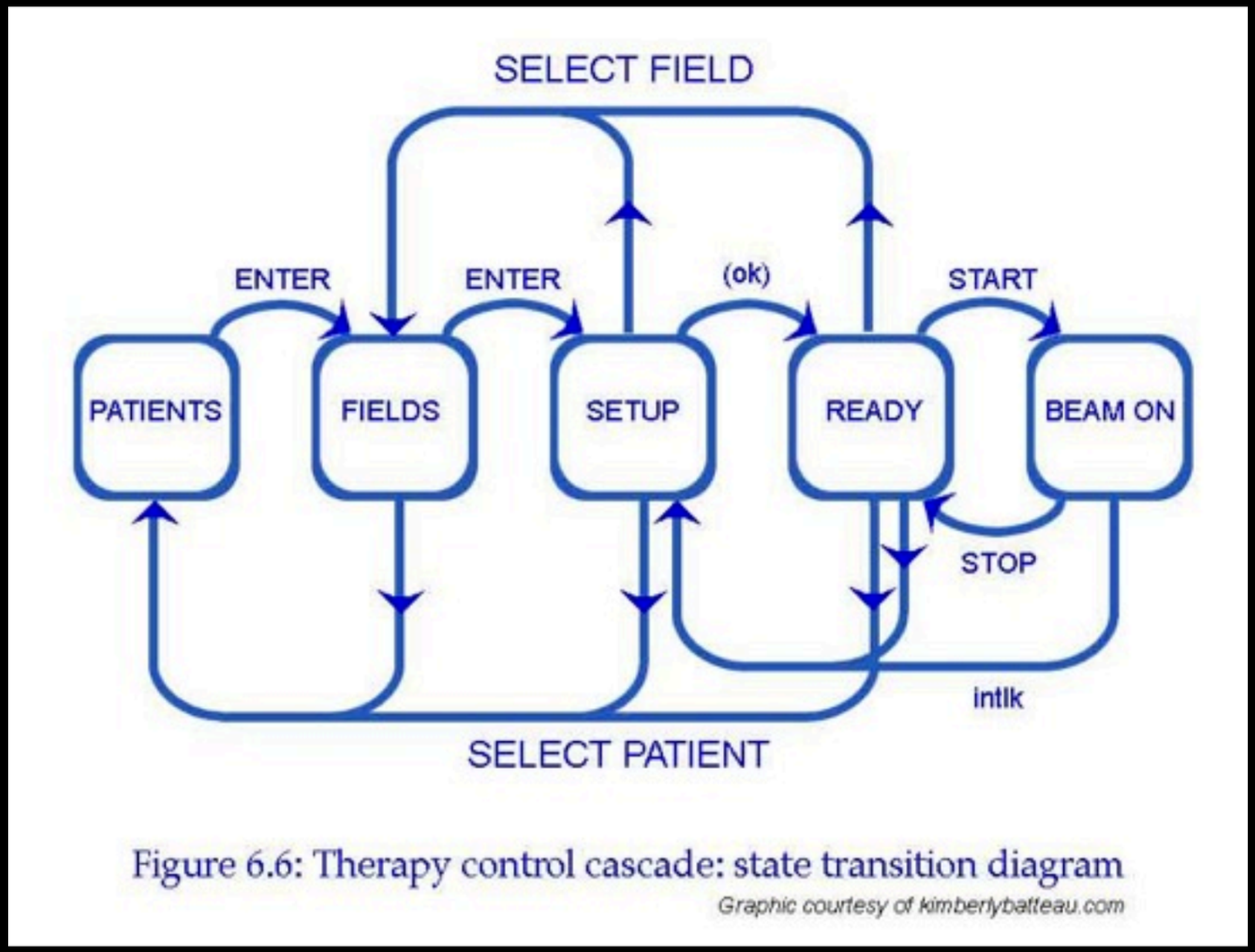


Figure 6.6: Therapy control cascade: state transition diagram

Graphic courtesy of kimberlybatteau.com

From J. Jacky, "The way of Z", chapter 6

State Transition Table (Z example)

	SELECT PATIENT	SELECT FIELD	ENTER	ok	START	STOP	intlk
PATIENTS	---	---	FIELDS	---	---	---	---
FIELDS	PATIENTS	---	SETUP	---	---	---	---
SETUP	PATIENTS	FIELDS	---	READY	---	---	---
READY	PATIENTS	FIELDS	---	---	BEAM ON	---	SETUP
BEAM ON	---	---	---	---	---	READY	SETUP

And now in Z

$STATE ::= patients \mid fields \mid setup \mid ready \mid beam_on$

$EVENT ::= select_patient \mid select_field \mid enter \mid start \mid stop \mid ok \mid intlk$

$FSM == (STATE \times EVENT) \pfun STATE$

$no_change, transitions, control: FSM$

$control = no_change \oplus transitions$

$no_change = \{ s: STATE; e: EVENT \bullet (s, e) \mapsto s \}$

$transitions = \{ (patients, enter) \mapsto fields,$

$(fields, select_patient) \mapsto patients, (fields, enter) \mapsto setup,$

$(setup, select_patient) \mapsto patients, (setup, select_field) \mapsto fields, (setup, ok) \mapsto ready,$

$(ready, select_patient) \mapsto patients, (ready, select_field) \mapsto fields, (ready, start) \mapsto beam_on, (ready, intlk) \mapsto setup,$

$(beam_on, stop) \mapsto ready, (beam_on, intlk) \mapsto setup \}$

Non-functional reqs - customer importance?

NFR type	Avg. weight (of 100)	Std.dev.
Usability	23.21	+/- 13.7
Reliability / security	22.79	+/- 10.6
Performance	22.44	+/- 9.4
Stability / Robustness	19.87	+/- 11.5
Maintainability	11.69	+/- 7.1

149 answers from Swedish industry, Spring 2009

SMART NFRs

- NFRs / QRs should be:
  - Specific = without ambiguity, using consistent terminology, simple and at the appropriate level of detail.
  - Measurable = possible to verify req is met. What tests must be performed?
  - Attainable = technically feasible. What is your professional judgement of the technical "do-ability" of the requirement?
  - Realizable = realistic given available resources (skill, staff, schedule etc).
  - Traceable = connected to sources as well as to later dev artefacts.

PLanguage

- Keyword-based language for requirements
- Developed by Tom Gilb, famous SE consultant
- Used in many large corporations
- Often for Quality Requirements: focus on quantification

PLanguage Keywords

TAG	A unique, persistent identifier
GIST	A short, simple description of the concept contained in the Planguage statement
STAKEHOLDER	A party materially affected by the requirement
SCALE	The scale of measure used to quantify the statement
METER	The process or device used to establish location on a SCALE
MUST	The minimum level required to avoid failure
PLAN	The level at which good success can be claimed
STRETCH	A stretch goal if everything goes perfectly
WISH	A desirable level of achievement that may not be attainable through available means
PAST	An expression of previous results for comparison
TREND	An historical range or extrapolation of data
RECORD	The best-known achievement
DEFINED	The official definition of a term
AUTHORITY	The person, group, or level of authorization

Table 2: Sub-keywords for the METER Keyword

METHOD	The method for measuring to determine a point on the Scale
FREQUENCY	The frequency at which measurements will be taken
SOURCE	The people or department responsible for making the measurement
REPORT	Where and when the measurement is to be reported

PLanguage - Additionals

- Fuzzy: <fuzzy concepts>
- Modifiers: Keyword [Qualifier1, Qualifier2, ...]
- Collections: {item1, item2, ...}
- Source for statement: Statement <- source

PLanguage example

NatLang: "The system must be easy to learn"

StructEnglish: "The system must be used successfully to place an order in under 10 minutes without assistance by at least 80% of test subjects with no previous system experience."

PLanguage example

NatLang: "The system must be easy to learn"

Tag: Learnable
Gist: Ease of learning to use system
Scale: Time for Novice to complete a 1-item order using only onlie help system
Meter: Measurements on 100 novices during UI testing
Must: <7 minutes 80% of the time
Plan: <5 minutes 80% of the time
Wish: <3 minutes 100% of the time
Past [old system]: 11 minutes <- recent site statistics
Novice: **Defined**: A person with <6 months experience with Web applications and no prior exposure to our web application