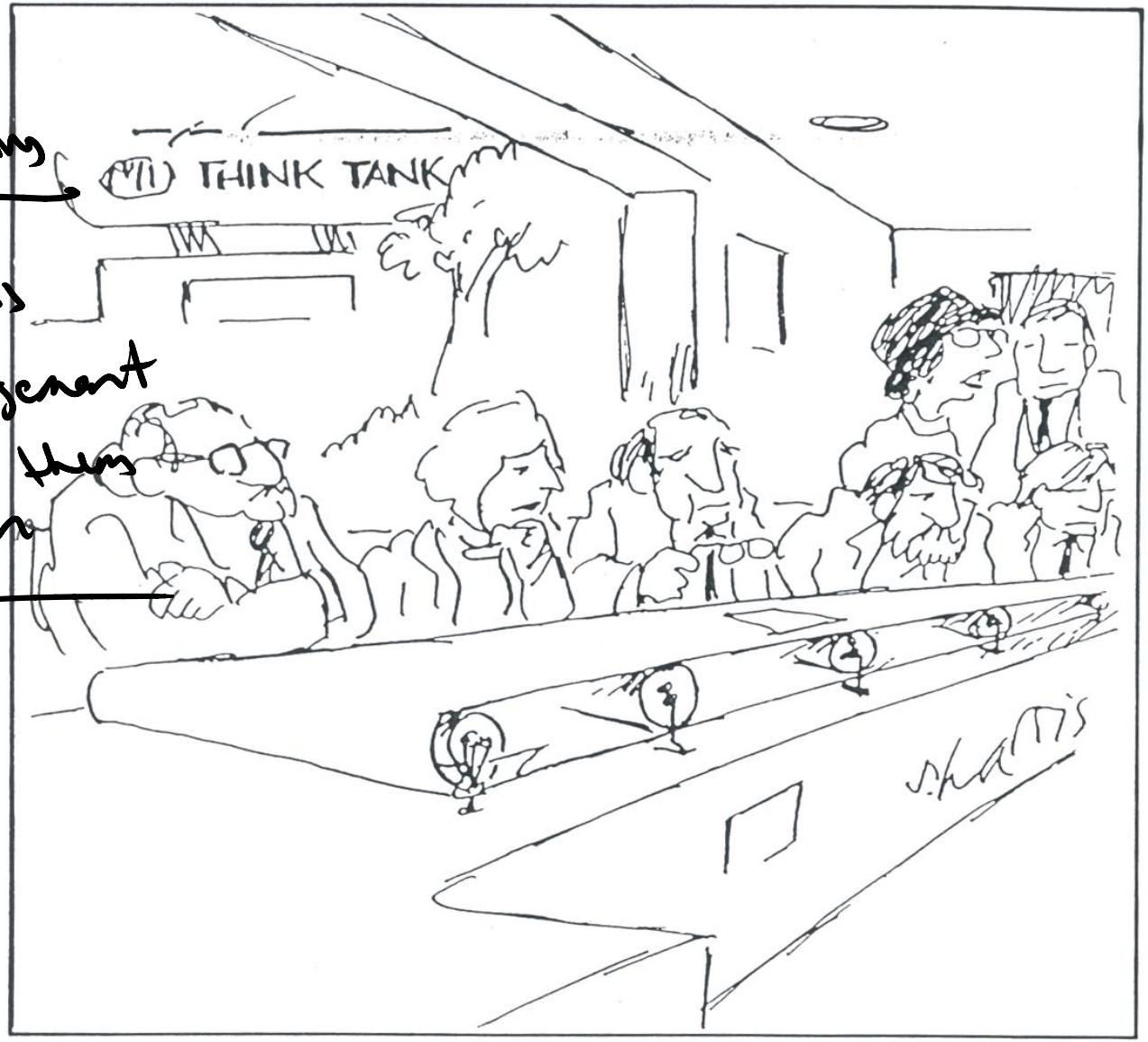
Planning and Prototyping

Welcome to the world of
Project Management

Brainstorming

- ego-less
- no judgement
- write them down

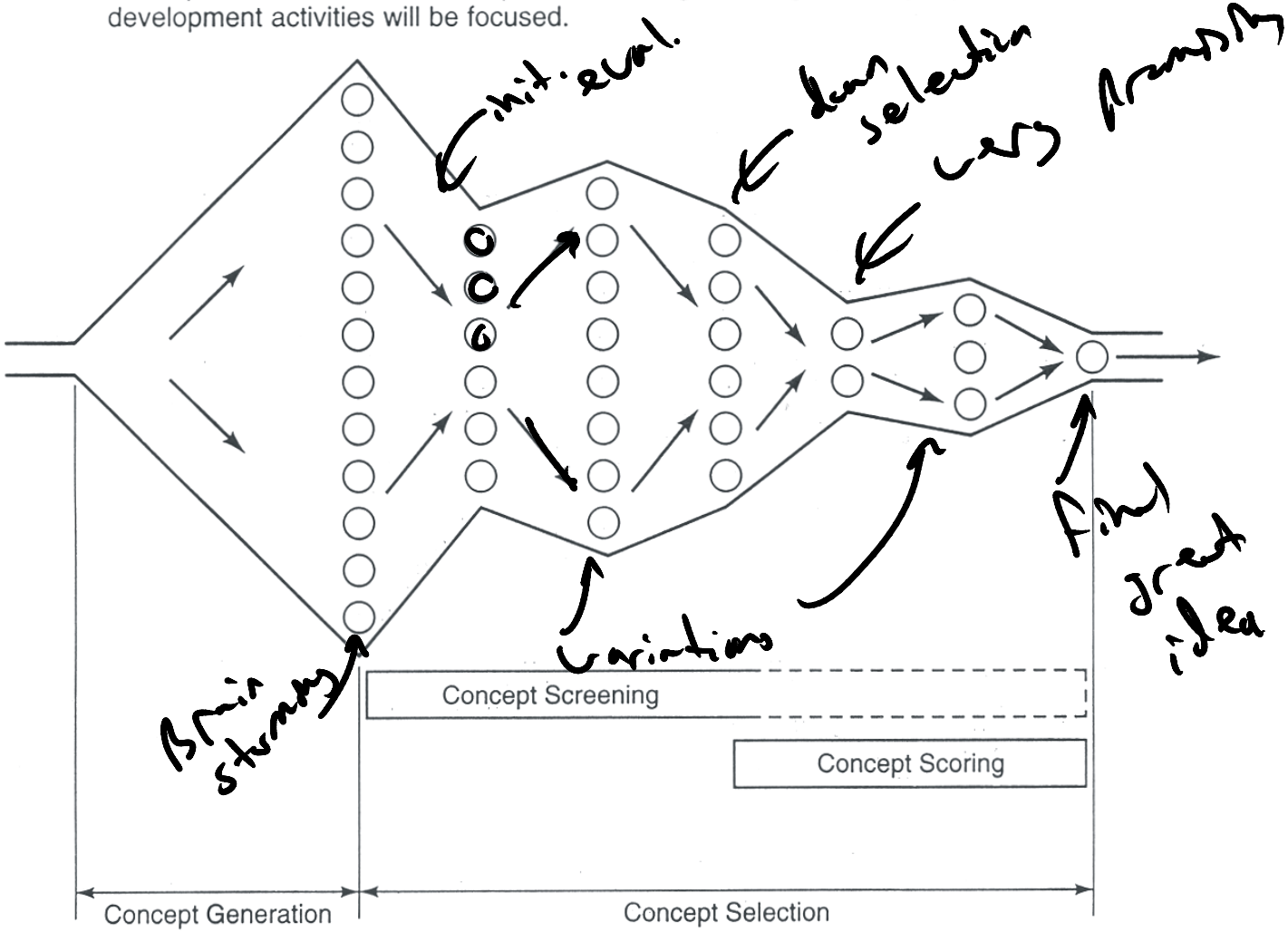
pros & cons



"IT'S OUR NEW ASSEMBLY LINE. WHEN THE PERSON AT THE END OF THE LINE HAS AN IDEA, HE PUTS IT ON THE CONVEYOR BELT, AND AS IT PASSES EACH OF US, WE MULL IT OVER AND TRY TO ADD TO IT."

The Idea Selection Process

EXHIBIT 4 Concept selection is an iterative process leading to a single concept upon which subsequent development activities will be focused.



Rating the Options

Selection Criteria	Concepts						
	A Master Cylinder	B Rubber Brake	C Ratchet	D (reference) Plunge Stop	E Swash Ring	F Lever Set	G Dial Screw
Ease of handling	0	0	−	0	0	−	−
Ease of use	0	−	−	0	0	+	0
Readability of settings	0	0	+	0	+	0	+
Dose metering accuracy	0	0	0	0	−	0	0
Durability	0	0	0	0	0	+	0
Ease of manufacture	+	−	−	0	0	−	0
Portability	+	+	0	0	+	0	0
Sum +'s	2	1	1	0	2	2	1
Sum 0's	5	4	3	7	4	3	5
Sum −'s	0	2	3	0	1	2	1
Net Score	2	−1	−2	0	1	0	0
Rank	1	6	7	3	2	3	3
Continue?	Yes	No	No	Combine	Yes	Combine	Revise

EXHIBIT 5 The concept screening matrix. For the syringe example, the team rated the concepts against the reference concept using a simple code (+ for "better than," 0 for "same as," − for "worse than") in order to identify some concepts for further consideration. Note that the three concepts ranked "3" all received the same score.

More Comprehensive Rating

1-5

Selection Criteria	Weight	Concepts							
		A (reference) Master Cylinder		DF Lever Stop		E Swash Ring		G+ Dial Screw+	
		Rating	Weighted Score	Rating	Weighted Score	Rating	Weighted Score	Rating	Weighted Score
Ease of handling	5%	3	0.15	3	0.15	4	0.2	4	0.2
Ease of use	15	3	0.45	4	0.6	4	0.6	3	0.45
Readability of settings	10	3	0.3	3	0.3	5	0.5	5	0.5
Dose metering accuracy	25	3	0.75	3	0.75	2	0.5	3	0.75
Durability	15	3	0.45	5	0.75	4	0.6	3	0.45
Ease of manufacture	20	3	0.6	3	0.6	2	0.4	2	0.4
Portability	10	3	0.3	3	0.3	3	0.3	3	0.3
Total Score			3.00		3.45		3.10		3.05
Rank			4		1		2		3
Continue?			No		Develop		No		No

SATELLITE MORPHOLOGIC DESIGN SPACE

SUB-FUNCTIONS		SUB-SOLUTIONS 1	2	3	4	5
STRUCTURAL	CONFIGURATION	Sphere	Box	Hex	Panels	Boom
	MATERIAL	ALUMINUM	STEEL	KEVLAR	TITANIUM	COMPOSITE
	DESIGN	SHEET	STRINGERS	TRUSS	ISOGRID	SHADOW
NAVIGATION	ESTIMATION	TRACK	GPS	Celestial Nav		
	CONTROL			ELECTRIC		
ATTITUDE	DETERMINATION	GYRO	SUN SENSOR	EARTH SENSOR	MAGNETOMETER	
	PASSIVE CONTROL	GRAVITY GRADIENT	SPIN	DRAG	MAGNETIC	
	ACTIVE CONTROL	MOMENTUM WHEEL	REACTION WHEELS	TORQUER COILS		
MISSION COMM. & CONTROL	ANTENNA	EARTH COVERAGE	NARROW COVERAGE	PHASED ARRAY	HIGH POWER LOW GAIN	LOW POWER HIGH GAIN
	OPERATION CONCEPT	HIGHLY AUTONOMOUS	SEMI AUTONOMOUS	SKILLED OPERATOR		
	CONFIGURATION	DIRECT CONTACT	ZENIT PIPE	TDRSS		
THERMAL	CONTROL	ACTIVE HEATERS	COATINGS	INSULATION	RADIATORS & LOUVERS	HEAT PIPES
POWER	GENERATION	SOLAR CELLS	Nuclear	Dynamic		
	STORAGE	Primary	Secondary (Recharge)			
Tracking, Telemetry & Command	MODULATION	AM ASK	FM FSK	PM PSK	Subcarriers?	
	TRACK SUPPORT	PRN Code?	Coherent Drive?			
	PROCESSING	Reduction?	COMPRESSION	ENCRYPTION CLOSED / OPEN	CONVOLUTIONAL ENCODING?	AUTHENTICATION & VALIDATION
	DATA	DIGITAL 1 or 0	ANALOG 0-5 V	SERIAL Memory Map 1101001		

Time Management

DILBERT® by Scott Adams

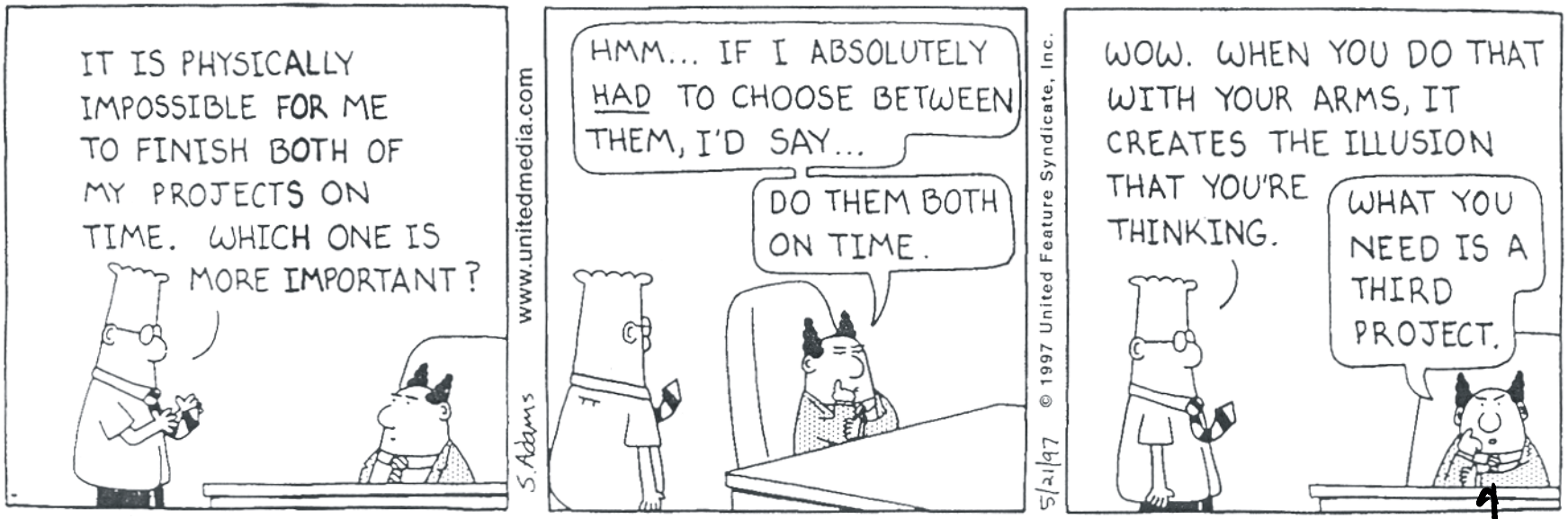


Figure 7–1. Keeping Engineers Busy With Multiple Projects (*Reprinted with permission from United Media.*)

The Basic Gantt Chart

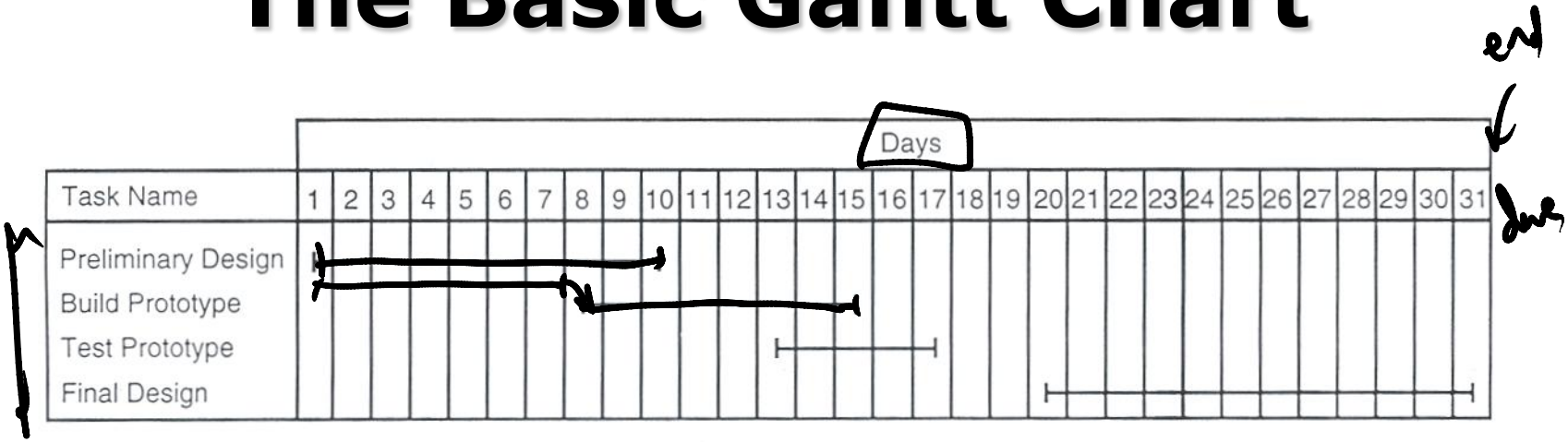


Figure 7–2. Gantt Chart for Automobile Bumper Design Project

More Complete Gantt Chart

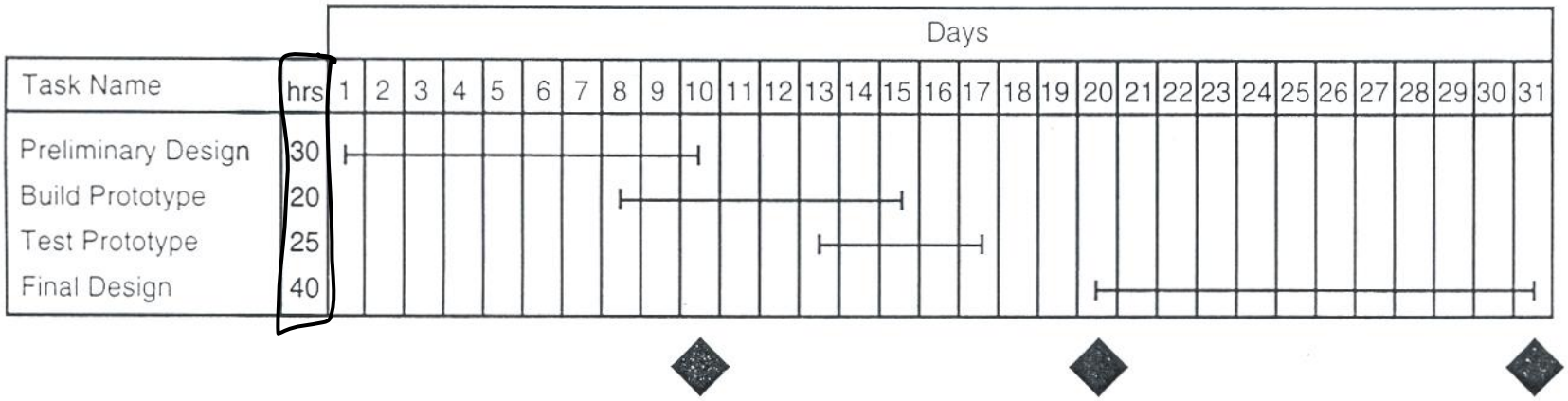


Figure 7–3. Enhanced Gantt Chart for Automobile Bumper Project

Gantt Chart as Tracking Tool

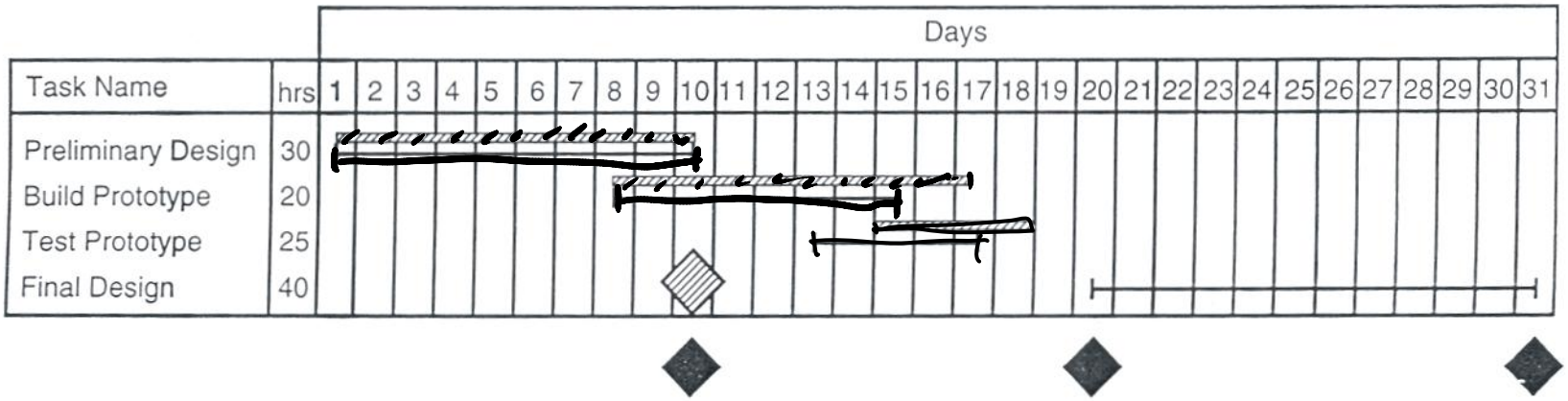


Figure 7–4. Keeping Track of Project Progress on a Gantt Chart

Common Pitfalls

"I ran out of time!"	=> task awareness / manage critical path
"I need the computer too!"	=> coordinate schedules
"It had to do that too?"	=> focus on requirements...
"It would be nice if…."	=> … and only the requirements
"There must be a better way"	=> generate alternatives – early
"Why didn't you do it this way?"	=> trade-off analysis
"Why don't these work together?"	=> manage subsystem interfaces
"But how do I make that?	=> consider fabrication aspects
"I'm not sure what's wrong"	=> consider testing aspects
"It worked once…"	=> test and integrate EARLY

Microsoft Project

- Very common application for project management
- Free to download via the MSDN site.

  http://support.soe.ucsc.edu/software

Video on Design

- Video on design company “Ideo”
- Would be a VERY cool place to work out
- Video is a little dated…

Questions?