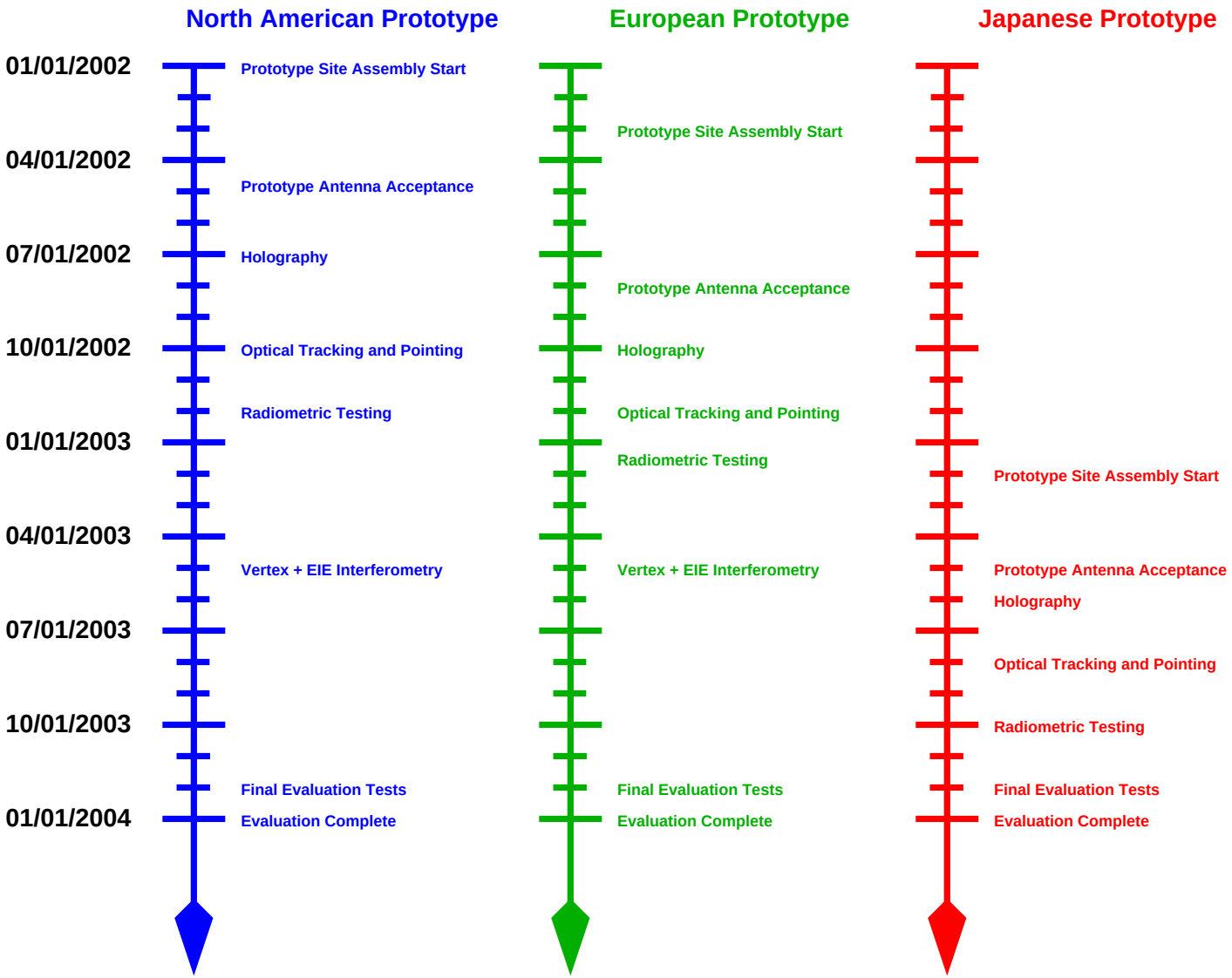
Political

- Japan has joined the project as a full partner
- Construction is at the higher (-10%) budget level, ~$800M
- Can probably afford all discussed scope enhancements
  - ACA, Enhanced/future correlator, receiver bands
  - ASAC “tiger teams” are writing science cases for all enhancements

Timeline

- Test Interferometer timeline driven by antenna delivery
  - Vertex: April ’02
  - EIE: Formally August ‘02, probably noticeably later
  - Mitsubishi: April ’03
- Construction timeline has not formally changed (yet)


North American Prototype
European Prototype
Japanese Prototype
01/01/2002
Prototype Site Assembly Start
04/01/2002
Prototype Antenna Acceptance
07/01/2002
Holography
10/01/2002
Optical Tracking and Pointing
Radiometric Testing
01/01/2003
04/01/2003
Vertex + EIE Interferometry
07/01/2003
10/01/2003
Final Evaluation Tests
01/01/2004
Evaluation Complete
Prototype Site Assembly Start
Prototype Antenna Acceptance
Holography
Optical Tracking and Pointing
Radiometric Testing
Vertex + EIE Interferometry
Final Evaluation Tests
Evaluation Complete
Prototype Site Assembly Start
Prototype Antenna Acceptance
Holography
Optical Tracking and Pointing
Radiometric Testing
Final Evaluation Tests
Evaluation Complete

Software

- First level division of effort between Eu/NA/Japan (40/20/40) accomplished
- Scope enhancements costed
- AIPS++
  - AIPS++/IRAM tests defined tests defined
  - ALMA has inquired about joining the AIPS++ consortium

Task	Years	2-way Baseline (even)	2-way Baseline Reconsidered	3-way Baseline (uneven)	+4 bands	ACA	New Correlator
Management	9	16	16	20			
Science Software Requirements	5	8	8	8	0.5	1	0.5
High Level Analysis	5	4.5	4.5	6	0.5	0.5	0.5
Software Engineering	9	18.5	19	23			
Common Software	5	23.5	23.5	25			
Executive Software			3	3			
Control Software	5	24.5	25	24	0.5	1	3
Correlator Software	5	15	15	15		1	15
Pipeline Software	5	6.5	11	12	1	1	1
Archiving	5	11	11	12		1	1
Scheduling	5	6.7	7	8	1	1	
Observing Preparation and Support	5	7	12	14	0.5	1	2
Off-line Data Processing/Analysis	5	10.5	10	11	0.5	1	1
Reduction User Interface			5	5			
Telescope Calibration	5	6	6	7	1	1	1
Integration and Support	9	31	31	39	0.5	1	1
Phase 2a Dataflow Development	4	0	30	33	1	5	2
Development total		**188.7**	**237**	**265**	**7**	**15.5**	**28**
Maintenance	4	76	56	60	3.5	7.75	5
Operations	5		35	35			
System and network admin (contract?)	5		15	15			
Total		**264.7**	**343**	**375**	**10.5**	**23.25**	**33**

		2-Way Baseline		3-Way Baseline		+ACA		+New Correlator	
Description	Unit Cost	Units	Subtotal	Units	Subtotal	Units	Subtotal	Units	Subtotal
Consoles in S. Pedro, site	20	9	180	9	180				
Remote Consoles (partners)	20	6	120	9	180	1	20		
Remote Operations Consoles	20			9	180	1	20		
Maintenance Computers site	10	8	80	8	80				
S. Pedro computers (scheduling, visitor)	20	4	80	4	80				
S. Pedro development computers (incl VMEs)	10	12	120	12	120	2	20		
S. Pedro engineering test computers	10	5	50	5	50	2	20		
ALMA models with VME, S. Pedro, partners	100	3	300	4	400				
Computing spares (5%)	47	1	47	1.25	58.75				
Construction Upgrades (25%/yr, starting 2006)	188	4	752	5	940				
Development PCs and Workstations	10	20	200	25	250				
Development VMEs	10	20	200	25	250	3	30	2	20
Routers and Switchess	200	1	200	1	200	0.1	20	1	200
One time upgrade of above 3 items	300	1	300	1	300				
Software licenses	300	1	300	1.25	375				
Software maintenance (start 2006)	30	9	270	13.5	405				
Subtotal			**3199**		**4049**		**130**		**220**
Antenna computers (incl. Upgrade and spares)	10	128	1280	128	1280	24	240		
Antenna network concentrator and spare	100	2	200	2	200	0.2	20		
Subtotal			**1480**		**1480**		**260**		**0**
Baseline Correlator data processor	300	1	300	1	300				
Upgrade	150	1	150	1	150			1	300
Subtotal			**450**		**450**		**0**		**300**
Prototype pipeline Beowulf cluster	250	1	250	1	250				
Final pipeline clusters (San Pedro, partners)	250	3	750	4	1000	0.8	200	8	2000
Subtotal			**1000**		**1250**		**200**		**2000**
Prototype archive	250	1	250	1	250				
Production archive (San Pedro, partners)	250	3	750	4	1000	0.8	200	8	2000
Subtotal			**1000**		**1250**		**200**		**2000**
Construction Total			**7129**		**8479**		**790**		**4520**
Operational center(s) (European proposal)			**2334**		**2334**				
Data Communications			**1500**		**2000**				**2250**
Grand total			**10963**		**12813**		**790**		**6770**

	Ph2 Sw effort (2002-10)	Total effort	Years	Europe	Japan	US	Comments	2002-06	2007-10	2011
8.05	Computer Subs. Mgmt	20.0	9	4.0	4.0	**12.0**	US=0.9*9+0.5*9(support), EU=0.4*9	2.2	2.2	
8.10	Science Sw Requirements	8.0	5	**8.0**			(0.5*5=2.5+1*5=5)	1.6		
8.15	H.L.Analysis & Design	6.0	5	**2.0**	2.0	2.0		1.2		
8.20	Software Engineering	23.0	9	**11.0**	4.0	8.0	12 FTEs in 4 years,7 FTEs in other 5	2.6	2.6	
8.25	Common Software	25.0	5	**13.0**	2.0	10.0		5		
8.27	Executive Software	3.0	5	**3.0**				0.6		
8.30	Control Software	24.0	5	4.5	2.0	**17.5**		4.8		
8.35	Correlator Software	15.0	5			**15.0**	(Does not include Future/Enhanced C)	3		
8.40	Pipeline - Heuristics	4.0	5	4.0				0.8		
8.40	Pipeline - Infrastructure	8.0	5			**8.0**		1.6		
8.45	Archiving	12.0	5	**8.0**	4.0			2.4		
8.50	Scheduling	8.0	5	2.0	**6.0**		Eu=design/iterations, most develop. contracted	1.6		
8.55	Obs. Preparation /Support	14.0	5	**10.0**	4.0			2.8		
8.60	Off-line Data Reduction-I/F	3.0	5	1.0		2.0		0.6		
8.60	Off-line D.Reduction-Engines	8.0	5		3.0	**5.0**		1.6		
8.62	Data Reduction User I/F	5.0	5	**5.0**				1		
8.65	Tel. Calibration-Engines	6.0	5	**3.0**	3.0			1.2		
8.65	Tel. Calibration-Interface	1.0	5	1.0				0.2		
8.70	Integration, Test & Support	39.0	9	15.5	8.0	**15.5**	EU Releases, US VLA, US Chile	4.3	4.3	
8.75	Upgrade Science sw (06-10)	33.0	4	13.0	7.0	13.0	1.5(8.10-.15,.25)+50%(8.40-8.65)=31.5		8.3	
8	**Development effort**	**265.0**		**108.0**	**49.0**	**108.0**		39.1	17.4	
8.8	Maintenance from 2007	60.0	4	24.0	12.0	24.0	10%*year of Sw effort(140 FTEs) in Eu,J.,US		15.0	15
8.8	Operations (from 2006)	35.0	5	14.0	7.0	14.0	From 2 to 5 full-time equivalent(in 2010) in Chile		7.0	10
8.8	System & network mgmt	15.0	5				From 1 to 2.5 full-time equivalent, contracted		3.0	5
8	**Total**	**375.0**		146.0	68.0	146.0		**39**	**42**	**30**
	%of total effort			41	18	41	Staff(Eu,J.,US)=	16,7,16		

Role of SSR in Phase 2

- Disband?
- Mid-course corrections?
- Software testing?
- Review role?
  - SSR appoint “project scientist” per level 2 WBS activity?

- SSR should consider this issue