

Project Co-ordinator Details

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Executive Summary

- The ViSiCAST TESSA system was one of a number of Gold Medal winners of the British Computer Society IT Awards and won a top prize at the final exhibition and awards ceremony.
- The Annual Project Review was successfully completed and the project was recommended to continue.
- An initial demonstration of closed signing by direct transmission of avatar motion parameters took place at IRT following integration of the TV and UEA software.
- The Avatar Wrapper Control and Weather Forecast script generator are ready for final integration with the generic avatar player from Televirtual and WWW browsers.
- IBM Via Voice has been chosen as the speech recognition package for the less constrained face-to-face system.
- An MPEG-4 compliant *Visia* model has been released internally at INT within a prototype MPEG-4 SNHC player with VRML scene integration, interactive editing of animation parameters, and coding/decoding of BAPs/FAPs.
- A new project standard Bones Animation Format (BAF) has been established for exchange and manipulation of sign files. The project has developed a BAF file player and a converter from sign files to BAF and the *Visia* model has been converted to BAF for use with MPEG-4.
- Slow progress on standardising captured sign files during post-processing has delayed some deliverables. The project will bring forward efforts to automate calibration of the capture system, building on the BAF standard.
- A prototype synthetic signing avatar is under development, generating BAF data for a number of BSL signs.
- A file archive has been established at UEA for interchange of data and software.
- Project recruitment is now almost complete, though delays have caused some rescheduling of activity.

1 – Overview

1.1 Objectives

Objectives	Progress towards achieving objectives
	<p>ViSiCAST will develop, evaluate and apply realistic virtual humans (avatars) to the generation of European deaf sign languages. The gesture description language and the associated real-time virtual humans will be used in the human-computer-interface of many applications.</p> <p>In the Applications Work Packages, ViSiCAST will:</p> <p>1. Enhance the status of Europe's deaf citizens by improving their access to public services and entertainment, and enable them to develop and consume their own multimedia content for communication, leisure and learning. It will build applications for the signing system for:</p>
1.1 Television	<p>WP1: Television and Broadcast Transmission</p> <ul style="list-style-type: none"> • Software for compression of the avatar animation parameter stream was refined and documented by UEA, in liaison with TV. The integrated broadcast system prototype was delivered to IRT by TV along with animation files for a new broadcast test sequence that was scripted and captured to accompany an existing broadcast clip. • Implementation and optimisation of DSP software continued at IRT. The software will: process a transport stream containing multiple programmes at rate up to 38 Mbs; extract the contents of one program within the transport stream for substitution by DSP created data at rate up to 2 Mbs; and send the modified transport stream to a decoder unit. The system handles error checking and will address synchronisation of signing and video streams. The DVD receiver plug in was successfully installed and ViSiCAST data transferred. • Installation and integration of the TV and UEA software took place leading to an initial demonstration of closed signing by direct transmission of avatar motion parameters. Milestones leading to D1-1 were completed. • A beta version of an MPEG-4 Video player <i>DirectShow</i> was released internally at INT. The player provides interface to the previously released prototype of MPEG-4 Video codec. Optimisation of block DCT during the period yielded a 15% time reduction.
1.2 Multimedia and the Internet	<p>WP2: Multimedia and WWW Applications</p> <ul style="list-style-type: none"> • Progress was made at IvD in editing the motion components which had been captured in the previous period for the translation of weather reports into Sign Language of the Netherlands (SLN) • A mapping was developed for mapping text-to-gesture to serve as input for the software implementation of weather reports and shipped by IvD to UEA. • The generic Active X player developed by TV in WP4 was tuned for use on the WW. Resolving some stability issues partly related to conflict with earlier installation required considerable effort. • The Avatar Wrapper Control and Weather Forecast script generator developed at UEA are ready for final integration with the Active X player and WWW browsers. Prototype versions have been distributed to IvD and UH for testing. Sign Lexicons for the Weather Forecast Demonstrator were further developed; • Editing of captured data for DGS version of weather forecast model has progressed at UH where grammar adaptations to match the revised

	<p>text-to-gesture mapping from IvD. A set of BSL weather signs has been captured at UEA.</p>
<p>1.3 Face-to-face transactions</p>	<p>WP3: Face-to-Face Transactions</p> <ul style="list-style-type: none"> • The Visia/Tessa2 Avatar player was supplied to UEA by TV to allow integration of the latest ViSiCAST technology into the unconstrained system (D3-1). • A new set of signs for the Post Office application was motion-captured at UEA in collaboration with the RNID. The purposes were to respond to problems identified during the June evaluation and to use the recording format for the Visia/Tessa2 avatar. The process of editing and integrating the new signs proved more complex than expected • Work on the less constrained recognition system (D3-2) continued with evaluation of commercial speech recognition packages for accuracy and for appropriateness of their API for the project. IBM Via Voice was preferred marginally to the Dragon and Microsoft systems. • Theoretical work on understanding how to map spoken phrases to signs continues, focussing on techniques for mapping from spoken fragments to “routes”. • UEA has requested responses from Post Office clerks about the way in which they phrase questions and comments during a transaction. The responses will be used in the design of a language model suitable for integration into the IBM speech recogniser package. This will lead to a first trial of an unconstrained system using a statistical language model but with a restricted vocabulary.
<p>In the Research Work Packages, ViSiCAST will:</p>	
<p>2 Develop systems for the generation, storage and transmission of virtual signing. 3 Refine user-friendly methods for capturing signs</p>	<p>WP4: Animation and Modelling</p> <ul style="list-style-type: none"> • Development of an MPEG-4 SNHC player continues at INT including optimised rendering capabilities, VRML scene integration, interactive editing of animation parameters and coding/decoding of BAPs/FAPs. An MPEG-4 compliant <i>Visia</i> model has been released internally at INT. • Work continues at TV on the generic Active X player for application workpackages. Some issues remain concerning stability in WWW browsers and combination of sign files from different capture sessions. Release 4 of all current applications, with latest graphic models, animation controls and examples, has been distributed to partners. • A meeting was held at INT, Évry, to consider animation of HamNoSys through SiGML. The project will use a new Bones Animation Format (BAF) for exchanging, manipulating, and playing sign files. A file archive has been established at UEA for interchange of data and software. • For interchange with MPEG-4, the Visia model has been created in BAF format for the MPEG-4 base position for INT. A program to convert sign files to BAF has been produced by TV and a simple BAF file player has been released by UEA. The prototype synthetic signing avatar (M4-5) is under development at UEA and can now generate BAF-format data for a number of BSL signs.

	<ul style="list-style-type: none"> Avatar technology development at TV has focussed on automatic integration of 3D characters into the ViSiCAST system. Investigation of improved motion capture technology is investigating issues for video-based capture of major body moves. A system based on Active Appearance Models (AAMs) at UEA for facial tracking is under evaluation for integration in the capture system.
<p>4 Create a machine-readable notation to describe sign-language gestures (hand, face and body) which can be used to retrieve stored gestures or to build them from low-level motion components. 5 Use this descriptive language to produce tools that can translate from both speech and text into signing.</p>	<p>WP5: Language and Notation</p> <ul style="list-style-type: none"> Proposed HamNoSys refinements (M5-3) draft internal evaluation finished and circulated to selected expert HamNoSys users for additional feedback. Literature review of agreement (AGR) structure encodings for sign languages with prototype HPSG implementations as AGR structures started at UH and UEA for D5-3. Further development of NL-to-DRS translation software continues at UEA. Translation software now incorporates a pronoun resolution scheme. Documentation of internal language processing software tool interfaces is available. Rachel Sutton-Spence has expressed an interest in providing to ViSiCAST, through RNID, the BSL expertise required for monitoring sign-capture and input to development of the BSL lexicon (WP5).
<p>6 Trial and evaluate the Application prototypes</p>	<p>WP6: Trials and Evaluation</p> <ul style="list-style-type: none"> Interviews for Community Evaluation Officer to take place at RNID in January. Delays possible due to need for interpreters at interview.
<p>7 Ensure effective management, external communications and publicity for the project</p>	<p>WP7: Project Management, External Communications and Publicity</p> <ul style="list-style-type: none"> The Annual Project Review was successfully completed. The project was recommended to continue. Some clarification about the degree of coverage of European sign languages was provided. The Post Office and TV manned demos and for IST Conference in Nice. Demos and presentation were also prepared for the RNID Exhibition and conference, London.
<p>8 Ensure appropriate exploitation and dissemination of results</p>	<p>WP8: Exploitation and Dissemination</p> <ul style="list-style-type: none"> Demos were prepared by UEA and TV for the British Computer Society IT Awards Exhibition. The TESSA system was one of a number of Gold Medal winners and won a top award at the final ceremony. A Consortium Meeting was held at Nice to coincide with the IST Conference. Partners considered options for commercial exploitation of ViSiCAST, including a number of early opportunities. We are concerned to establish synergy with the W³C Web Accessibility Initiative and to co-operate with the EU initiative e-Europe to consider providing signing on EU websites. We have established a working group on European disability legislation.

1.2 Milestones

<i>Milestone</i>	<i>Planned date</i>	<i>Actual date</i>	<i>Comments</i>
M4-4 Motion File Player Avatar	04.00	04.00	Initial release of Visia Avatar Player from TV.
M3-5 Approach to	10.00	10.00	Analysis of potential statistical techniques

Unconstrained Speech Recognition			and investigation of suitable speech recognition tools.
M1-3 Interim Transmission Demonstration	11.00	12.00	Initial demonstration system tested at IRT laboratories.
M1-1 TV Broadcast Specifications I	12.00	12.00	Transmission of Avatar motion data through MPEG-2 multiplex using TS packets.
M4-5 Initial SiGML Driven Avatar	12.00	12.00	System for investigating synthetic sign generation from SiGML elements to VRML and BAF files.

1.3 Deliverables

<i>Deliverable Code & Name</i>	<i>Planned date</i>	<i>Actual date</i>	<i>Comments</i>
D8-1 Exploitation Plan	06.00	06.00	Framework for identifying potential products from ViSiCAST
D8-2 Marketing Plan	06.00	06.00	Framework for identifying markets for ViSiCAST technology.

1.4 Deviations from Plan

<i>Causes and Description</i>	<i>Corrective actions</i>
Signs captured for WP2 and WP3 have required more intensive effort in post-processing than anticipated, leading to some delays.	Effort will be devoted in WP4 to techniques for automatic calibration and normalisation of signs at an earlier stage than originally planned.
D2-1: Internet Browser Plugin Planned Month 12. Revised Month 15. Integration of UEA and Televirtual controls proved unexpectedly difficult due to stability problems relating to interaction with previously installed software.	Extra time allowed to permit integration of sign lexicons, and typical WF www pages. A new Milestone will evaluate the public Weather Forecast system building on the deliverable. Time is allowed to investigate mechanisms for distributing software to users.
M2-2: Initial WWW Demonstrator New Month 20.	Evaluation of the Weather Forecast system replaces evaluation of the plugin alone.
M6-5: Evaluate Initial WWW Demonstrator. Planned Month 13. Revised Month 21.	
M2-3: SiGML Editing Tool Planned Month 33. Renumbered from M2-2.	

<p>D5-1: Interface Definitions Planned Month 12. Revised Month 15. Of the four parts of this report, one is completed, two are ready in draft version, one needs one person month to be completed.</p> <p>M5-2: Agree Lexicon Format Planned Month 10. Revised Month 15.</p> <p>M5-3: Initial HamNoSys Refinements Planned Month 11. Revised Month 15.</p> <p>M5-4: HamNoSys Face and Body Extensions Planned Month 12. Revised Month 15.</p>	<p>The main reason for this delay is the late recruitment at UH primarily due to the job market situation for IT in Germany. Measured by person months consumption, the WP is still ahead of plan.</p> <p>By shifting self-investment time into the first 18 months of the project, it has been possible to avoid delays that would have major impact on other work. The person months not used in 2000 will be used for an extra recruitment for the timeframe 10.2001-12.2002 when the self-investment needs to be reduced to the planned figures due to other commitments.</p>
<p>D5-3: Prototype English Text to SiGML Translator Planned Month 18. Revised Month 19.</p> <p>M6-11: Evaluate Prototype English Text to SiGML Translator Planned Month 19. Revised Month 20.</p>	<p>There is some effect on the Prototype English Text to SiGML Translator and its evaluation.</p> <p>The original aim of this deliverable was to document the path half-way to the final deliverable Del. 5-4, with about half the size of the lexicon, and only easier parts of the grammar implemented. However, it turns out to be essential to first cope with the "difficult" parts of sign language grammar, e.g. classifier verb constructions first. Hence the name of the Deliverable no longer refers to a specific number of lexicon entries.</p>
<p>D1-1: Direct Sign Transmission Demonstrator Planned Month 12. Revised Month 15.</p>	<p>A prototype demonstrator for the deliverable was achieved as M1-3 reported above. It has been decided that further work would be beneficial to demonstrate very low bandwidth transmission of signing using advanced compression techniques. The exiting techniques require much less than the bandwidth required for quarter-screen video while the planned compression promises bandwidth similar to a speech channel.</p>
<p>M6-10: Evaluate Direct Sign Planned Month 11. To be discarded.</p>	<p>Technical deliverable. Does not require user evaluation.</p>

2 – Contractual Arrangements

In order to contribute to the additional milestone M2-2, IvD plans to increase its effort from 48 to 50 months. This can be realised within the existing IvD budget by altering the balance of staff costs.

3 - Project Meetings (held and foreseen)

<i>Title</i>	<i>Data and Place</i>	<i>Main conclusions</i>
Consortium Meeting.	05.10.00 to 06.10.00 München.	Workpackage meetings for WP1 and WP4 and preparation for Annual Project Review.

Annual Project Review.	13.10.00 Brussels.	Presented the WP2 work on the browser plug-in for the weather report in sign language. Presented work in progress on Broadcast prototype demo.
WP4: Technical meeting on "Animation of SiGML/Synthesis of Signing".	18.10.00 UEA Norwich	The meeting discussed several possible techniques for driving a signing avatar from the SiGML notation, with a view to meeting milestone M4-5 (and its successors).
IST Conference.	06.11.00 to 08.11.00 Nice.	Presentation of ViSiCAST. WP8 meeting to discuss exploitation.
Visit to INT of WP4 participants.	17.11.00 INT, Évry..	WP4 meeting to consider options for synthesis of signs. Exploration of existing MPEG-4 tools.
Consortium Meeting.	11.01.01 to 12.01.01 RNID, London, UK	Workpackage and Consortium Business Meetings.
Consortium Meeting.	26.04.01 to 27.04.01 INT, Évry, Paris	Workpackage and Consortium Business Meetings.
Consortium Meeting.	05.07.01 to 06.07.01 ITC, Winchester	Workpackage and Consortium Business Meetings.
Consortium Meeting.	27.09.01 to 28.09.01 UKPO, London	Workpackage and Consortium Business Meetings.
Consortium Meeting.	10.01.02 to 11.01.02 IRT, München	Workpackage and Consortium Business Meetings.

4 - Dissemination / Promotional Information

4.1 Conferences and/or Workshops attended/organised/foreseen by the project

<i>Date</i>	<i>Title</i>	<i>No</i>	<i>Number of persons attended + other information</i>
12.10.00 13.10.00	RNID Hear for All.		Demos and Conference Presentation. TV.
12.10.00	Deaf Awareness Week Event, Caerphilly		ViSiCAST Presentation
13.10.00 14.10.00	ViSiCAST exhibition, Islington Business Design Centre		ViSiCAST Presentation
14.10.00 15.10.00	Nation Federation of Sub Postmasters Exhibition		ViSiCAST Presentation
18.10.00	Islington Council Deaf Awareness Event		ViSiCAST Presentation
23.10.00 27.10.00	54 th MPEG Meeting, La Baule, France		Participation to MPEG-4 SNHC and MPEG-7 groups. Marius Preda from INT has been designated as co-chair of MPEG-4 SNHC Group.
02.11.00	British Computer Society IT Awards	2	Participation in competition, exhibition, presentations and awards: ViSiCAST won the UK's top IT award
05.11.00 08.11.00	IST 2000 Conference, Nicet	1	Manned Stand, Demos.
13.11.00 15.11.00	ASSETS 2000 (4th International ACM Conference on Assistive Technologies)	1	"The Development of Language Processing Support for the ViSiCAST Project" R Elliott, JRW Glauert, JR Kennaway, I Marshall.
16.11.00	Post Office Disability Conference,	1	Manned stand, Demos to major retailers of

	Milton Keynes		prototype retail system.
13.11.00 15.11.00	ASSETS 2000 (4th International ACM Conference on Assistive Technologies)	1	“The Development of Language Processing Support for the ViSiCAST Project” R Elliott, JRW Glauert, JR Kennaway, I Marshall.
15.01.01 19.01.01	55 th MPEG Meeting, Pisa, Italy		Participation to MPEG-4 SNHC and MPEG-7 groups.

4.2 Articles Published, Press coverage, development web sites, etc.

<i>Date/ Type</i>	<i>Details</i>
14.11.00	“Development of Language Processing Support for the ViSiCAST Project” presented at ASSETS 2000.
02.11.00	The ViSiCAST TESSA system wins BCS Gold Medal, then a top BCS IT Award for 2000 in the UK.
11.00	Throughout early November, project achieved major press and trade coverage following its triumph in the BCS top national awards competition. Included major two-page feature in “The Times”
12.00	Interview held by Deutschlandfunk in preparation for a feature report on ViSiCAST for the radio news magazine “Forschung aktuell” to be broadcast in Jan 2001.

5 – Main results

<i>Description</i>	<i>Details</i>
Top IT Award	<ul style="list-style-type: none"> The ViSiCAST TESSA system was one of a number of Gold Medal winners of the British Computer Society IT Awards and won a top prize at the final exhibition and awards ceremony.
Direct Signing Transmission.	<ul style="list-style-type: none"> An initial demonstration of closed signing by direct transmission of avatar motion parameters took place at IRT following integration of the TV and UEA software.
MPEG-4 SNHC Player	<ul style="list-style-type: none"> An MPEG-4 compliant <i>Visia</i> model has been released internally at INT within a prototype MPEG-4 SNHC player with VRML scene integration, interactive editing of animation parameters, and coding/decoding of BAPs/FAPs.
Bones Animation Format	<ul style="list-style-type: none"> A new project standard Bones Animation Format (BAF) has been established for exchange and manipulation of sign files. The project has developed a BAF file player and a converter from sign files to BAF and the <i>Visia</i> model has been converted to BAF for use with MPEG-4.
Synthetic Signing Avatar	<ul style="list-style-type: none"> A prototype synthetic signing avatar is under development, generating BAF data for a number of BSL signs.

6 – Project Effort

The cumulative figures brought forward from the third quarter differ from those reported previously. The figures for IvD have been corrected since the second quarter figures that were reported had accumulated the first two quarters instead of only reporting second quarter figures.

Table 6.1 Indicative Effort for the reporting period (Decimal Person Months)

Q4 October to December 2000

Work Packages		1	2	3	4	5	6	7	8	TOTAL	
P No	Short Name	Staff Name									
1 ITC	2 IRT	Nick Lodge									
		Werner Brückner	1.36								1.36
		Ittmann	1.73							1.73	
		Zistler	0.12							0.12	
		Christoph Dosch	0.32							0.32	
		Huber									
		Schäfer	0.44							0.44	
		Remus	2.14							2.14	
3 TV		Steve Cullingford	1.10	0.06	0.06	1.15				2.37	
		Dan Archer				0.08				0.08	
		Ben Lambert									
		Matthew Simper									
		Farzad Pezeshkpour									
		Steve Pye							0.06	0.06	
		Sanja Rankov				2.66	0.03		0.17	2.86	
		Marcus Tutt				0.11				0.11	
		Jamie Warren			0.05	0.10			0.02	0.17	
		John Clark									
		Mark Wells	0.11	0.03	0.06	1.06			0.40	1.66	
	4 UH		Volkert Backs		1.45			1.29			2.74
			Hortensia Popescu		0.58			0.58			1.16
			Constanze Schmaling		0.24			1.29			1.53
5 UEA		Richard Kennaway				2.43				2.43	
		Silko Kruse	2.37							2.37	
		Anne Anderson						0.59		0.59	
		Mike Lincoln			3.27					3.27	
		Eva Safar		0.11			2.56			2.67	
		Nuno Dionisio	0.18	1.00	0.07	1.29	0.65			3.19	
		Barry Theobald				2.07				2.07	
		Kevin Parsons		2.89						2.89	
	6 INT		Françoise Prêteux	0.50							0.50
			Nicolas Rougon	0.25			1.00				1.25
		Marius Preda	0.50			1.50	0.50			2.50	
		Caroline Petitjean	1.00			2.00				3.00	
		Titus Zaharia									
7 IvD		Han Frowein		0.78				0.28		1.06	
		Margriet Verlinden		1.36				0.15		1.51	
		Rick van Dijk									
		Erik Borgstein									
8 UKPO		Corrie Tijsseling		1.26						1.26	
		Jo Coy			0.05					0.05	
		Alan Kennedy			0.05				0.23	0.28	
		Rebecca Kent						0.05		0.05	
		Eleri Turnstall			0.15					0.15	
9 RNID		Amy Hunter					0.82			0.82	
		Helen Hickey					0.26			0.26	
		Carolyn Richards									
Total			12.12	9.76	3.76	15.45	6.90	1.08	1.02	0.93	51.02

Table 6.2 Indicative Effort for the reporting period (Person Hours)

Q4 October to December 2000

P No	Short Name	Work Packages								Total		
		1	2	3	4	5	6	7	8	P	A	
1	ITC	Nick Lodge										0.0
		WP Actual Hours										0.0
		Planned Hours							191.0			191.0
2	IRT	Werner Brückner	182.3									182.3
		Ittmann	232.0									232.0
		Zistler	16.5									16.5
		Christoph Dosch	42.5									42.5
		Huber										
		Schäfer	59.5									59.5
		Remus	287.0									287.0
WP Actual Hours	819.8									819.8		
Planned Hours	223.0						15.0	15.0		253.0		
3	TV	Steve Cullingford	144.0	8.0	8.0	151.0						311.0
		Dan Archer				10.5						10.5
		Ben Lambert										
		Matthew Simper										
		Farzad Pezeshkpour										
		Steve Pye								7.5		7.5
		Sanja Rankov				348.5	4.0			22.5		375.0
		Marcus Tutt				15.0						15.0
		Jamie Warren			6.0	13.0				3.0		22.0
		John Clark										
		Mark Wells	15.0	3.5	7.5	139.5				52.5		218.0
		WP Actual Hours	159.0	11.5	21.5	677.5	4.0			85.5		959.0
Planned Hours	36.0	103.0	39.0	507.0		26.0	8.0	15.0		734.0		
4	UH	Volkert Backs		187.0				166.0			353.0	
		Hortensia Popescu		75.0			75.0				150.0	
		Constanze Schmaling		31.0			166.0				197.0	
		Actual Hours Total		293.0			407.0				700.0	
Planned Hours		293.0			407.0				700.0			
5	UEA	Richard Kennaway				333.9					333.9	
		Silko Kruse	326.0								326.0	
		Anne Anderson							81.5		81.5	
		Mike Lincoln			450.0						450.0	
		Eva Safar		15.0			352.5				367.5	
		Nuno Dionisio	25.0	138.0	10.0	178.0	89.0				440.0	
		Barry Theobald				285.0					285.0	
		Kevin Parsons		397.0							397.0	
		WP Actual Hours	351.0	550.0	460.0	796.9	441.5		81.5		2680.9	
Planned Hours		413.0	481.0	275.0	412.0	138.0			1719.0			
6	INT	Françoise Prêteux	63.6								63.6	
		Nicolas Rougon	31.8			127.2					159.0	
		Marius Preda	63.6			190.8	63.6				318.0	
		Caroline Petitjean	127.2			254.4					381.6	
		Titus Zaharia										
		WP Actual Hours	286.2			572.4	63.6				922.2	
Planned Hours	99.0			424.0	57.0	14.0	14.0	28.0	636.0			
7	IVD	Han Frowein		94.0					33.0		127.0	
		Margriet Verlinden		163.0					18.0		181.0	
		Rick van Dijk										
		Erik Borgstein										
		Corrie Tijsseling		151.0							151.0	
WP Actual Hours		408.0						51.0	459.0			
Planned Hours		408.0						51.0	96.0	555.0		
8	UKPO	Jo Coy			7.0						7.0	
		Rebecca Kent							7.0		7.0	
		Eleri Turnstall			21.0						21.0	
		Alan Kennedy			7.0					32.0	39.0	
		WP Actual Hours			35.0					39.0	74.0	
Planned Hours						16.0	16.0	16.0	48.0			
9	RNID	Amy Hunter						100.0			100.0	
		Helen Hickey						32.0			32.0	
		Carolyn Richards										
		WP Actual Hours						132.0			132.0	
Planned Hours						174.0		65.0	239.0			
Total Actual	1616.0	1262.5	516.5	2046.8	916.1	132.0	132.5	124.5		6746.8		
Total Planned	358.0	1217.0	520.0	1206.0	876.0	368.0	295.0	235.0		5075.0		
Last Period Accum. Actual Total		2615.0	2101.0	1180.4	2713.5	2643.6	272.7	809.8	757.3		13093.3	
Last Period Accum. Planned Total		2615.0	2101.0	1180.4	2713.5	2643.6	272.7	809.8	757.3	13093.3		
Accumulated Actual Hrlly Total		4231.0	3363.5	1696.9	4760.3	3559.7	404.7	942.3	881.8		19840.1	
Accumulated Planned Hrlly Total		2973.0	3318.0	1700.4	3919.5	3519.6	640.7	1104.8	992.3	18168.3		