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<b>Abstract:</b> The negotiation of components takes the ACCORD project from the stage where awards of components are determined, following peer review, to the delivery of components to Universities, setting in action the R&D activities of the ACCORD project.  In this report, we describe the calendar of this negotiation, the results, and we discuss the lessons learned in this experience.	
<b>Keyword list:</b> Photonic components, Optical components, negotiation of contracts and component fabrication.	



## Disclaimer

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## Table of Contents

<b>DISCLAIMER</b> .....	<b>2</b>
<b>TABLE OF CONTENTS</b> .....	<b>3</b>
<b>1. EXECUTIVE SUMMARY</b> .....	<b>4</b>
<b>2. AGREEMENT FORMS FOR COMPANY AND FOR UNIVERSITY</b> .....	<b>4</b>
<b>3. CALENDAR SCHEDULE DELAYS, WHAT HAS BEEN LEARNED</b> .....	<b>4</b>
<b>3.1 OVERALL CALENDAR</b> .....	<b>4</b>
<b>3.2 PROJECT BY PROJECT ANALYSIS AND CURRENT STATUS</b> .....	<b>7</b>
3.2.1 <i>Project 203: A multi-wavelength, time multiplexed, spectrometer for atmospheric sensing</i> .....	<b>7</b>
3.2.2 <i>Project 301: A high throughput terahertz spectroscopic imaging system for security applications</i> .....	<b>7</b>
3.2.3 <i>Project 304: Quasi-Multiplex CARS Microscopy with High Frame-Acquisition Rate</i> .....	<b>7</b>
3.2.4 <i>Project 308: Integrated time domain optical interleaver for photonic-based full-digital radar receiver</i> .....	<b>8</b>
3.2.5 <i>Project 310: Resonator modes in the presence of passive element for conical refraction</i>	<b>8</b>
3.2.6 <i>Project 312: Adaptive optics for improved resolution in optical sectioning microscopy</i> .....	<b>8</b>
<b>3.3 MAJOR SCHEDULE DELAYS AND PROPOSED SOLUTIONS</b> .....	<b>9</b>
<b>4. PURCHASE AND DELIVERY OF COMPONENTS</b> .....	<b>10</b>
<b>4.1 INTRODUCTION</b> .....	<b>10</b>
<b>4.2 GENERAL PROCEDURES</b> .....	<b>10</b>
<b>4.3 NEGOTIATION PROCEDURES AND RESULTS</b> .....	<b>10</b>
4.3.1 <i>Project 203: A multi-wavelength, time multiplexed, spectrometer for atmospheric sensing</i>	<b>10</b>
4.3.2 <i>Project 301: A high throughput terahertz spectroscopic imaging system for security applications</i> .....	<b>11</b>
4.3.3 <i>Project 304: Quasi-Multiplex CARS Microscopy with High Frame-Acquisition Rate</i> .....	<b>11</b>
4.3.4 <i>Project 308: Integrated time domain optical interleaver for photonic-based full-digital radar receiver</i> .....	<b>12</b>
4.3.5 <i>Project 310: Resonator modes in the presence of passive element for conical refraction</i>	<b>12</b>
4.3.6 <i>Project 312: Adaptive optics for improved resolution in optical sectioning microscopy</i> ...	<b>13</b>
<b>5. CONCLUSIONS</b> .....	<b>14</b>
<b>ANNEX 1 SUMMARY OF OPERATING PROCEDURES</b> .....	<b>15</b>
<b>ANNEX 2 CASCADE TECHNOLOGIES</b> .....	<b>16</b>
<b>ANNEX 3 ONEFIVE</b> .....	<b>18</b>
<b>ANNEX 4 FASTLITE</b> .....	<b>20</b>
<b>ANNEX 5 PGT PHOTONICS</b> .....	<b>23</b>
<b>ANNEX 6 CONEREFRINGENT</b> .....	<b>26</b>
<b>ANNEX 7 IMAGINE OPTIC</b> .....	<b>28</b>



## 1. Executive Summary

Following the award of components, the members of WP-3 began negotiations to specify the terms of the research under contract and the acquisition of components. Five awards were made, and all five projects have been negotiated successfully within the budget of the project. The negotiations were completed within 3 months

Component fabrication time averages to 2 months. Thus there is overall a 4.-month lag between the acceptance of the proposal and the beginning of the research project.

During this period, we changed the negotiation letter to impose fixed maximum delays for returning paperwork. This change had the desired effect, as all subsequent awards were completed within this time. Component costs ranged between 10 k euros for novel optical elements to 35 k euros for a complete optical signal processing system.

## 2. Agreement forms for company and for university

Agreement forms were presented in deliverable 3.2

## 3. Calendar Schedule Delays, What Has Been Learned

This section will detail the overall calendar of the purchasing procedure, provide a project by project breakdown of the major delays encountered, and finally propose procedures which should be put in place for future calls in order to minimise the time required to advance from project award notification to project initiation.

### 3.1 Overall Calendar

Table 3.1 shows the overall calendar for the 6 selected projects from the moment when the various forms were sent to the University or Society (Hold Harmless Agreement, Component Reception, Intellectual Property Agreement, System Certification, Price Certification) until the present. The calendar indicates all the major steps in the prototype purchasing procedure (see key) which have been completed for each project.



### Table 3.1 – Calendar of Purchasing Procedure

Call 2: Project 203 - Cascade Technologies / Strathclyde University

Week number			23	24	25	26	27	28	29	30	31
5	Cascade	Forms sent 25.02.08	Forms signed 02.06.08	Negotiations					PO issued 17.07.08		
	Strathclyde University	Forms sent 25.02.08	Forms signed 03.06.08							Components received 21.07.08	Start of project 02.09.08

KEY:

- Date at which forms were sent to University or Society (Hold Harmless Agreement, Component Reception, Intellectual Property Agreement, System Certification, Price Certification)
- Date at which the signed forms were returned to ACCORD
- Date at which a purchase order was issued by EPIC
- Date at which the components were received by the participating university
- Official start date of the project

Call 3: Project 301 - Onefive / ETZ Zürich  
 Project 304 - Fastlite / IPT Jena  
 Project 308 - PGT / CNIT  
 Project 310 - Conefringent / University Dundee  
 Project 312 - Imagine Optic / IOP Strathclyde



Week number		40	41	42	43	44	45	46	47	48	49
P R O J E C T S  a n d  P A R T N E R S	1	Onefive GmbH	Forms sent 02.10.08 Forms signed 02.10.08	Negotiations		PO issued 23.10.08					
		ETH Zürich	Forms sent 02.10.08	Forms signed 08.10.08							
	2	FASTLITE	Forms sent 02.10.08	Negotiations	Forms signed 16.10.08	PO issued 23.10.08					
		IPT Jena	Forms sent 02.10.08	Forms signed 08.10.08							Components received 24.11.08
	3	PGT	Forms sent 03.10.08		Forms signed 17.10.08	Negotiations				PO issued 25.11.08	
		CNIT	Forms sent 03.10.08		Forms signed 16.10.08						
	4	CONEREFRINGENT	Forms sent 02.10.08	Forms signed 07.10.08	Negotiations					PO issued 24.11.08	
		Univ. Dundee	Forms sent 02.10.08	Forms signed 07.10.08							
	5	Imagine Optic	Forms sent 10.10.08	Negotiations		Forms signed 21.10.08	PO issued 29.10.08				
		IOP Strathclyde	Forms sent 10.10.08								Forms signed 30.11.08



## 3.2 *Project by Project analysis and current status*

The following section will give a summary of the timeline for each project, and the reasons for any delays which were encountered. Based on this analysis, a set of propositions have been formulated in order to anticipate and minimise the effects of the most frequently encountered causes of delay (section 3.3).

### **3.2.1 *Project 203: A multi-wavelength, time multiplexed, spectrometer for atmospheric sensing***

University: Strathclyde University

Components: Developer Laser Module + Quantum Cascade lasers

Manufacturer: Cascade Technologies

**Current Project Status:** Components were delivered and the project started up on 2 September 2008.

The contract forms were sent to the university and company on February 28, 2008. The completed forms were returned by the company on 2 June 2008 and the University on 3 June 2008. Pricing negotiations were initiated on 25 February 2008 and completed on 17 July 2008 (see section 4.3.1). A purchase order was issued by EPIC on 17 July 2008. Components were delivered to the University on 21 July 2008.

### **3.2.2 *Project 301: A high throughput terahertz spectroscopic imaging system for security applications***

University: ETH Zürich

Components: Passively mode-locked ultrafast laser

Manufacturer: OneFive Photonics

**Current Project Status:** At the time of this report, the laser is being assembled, and is scheduled for delivery in February 2009. (16-18 weeks from 1 October 2008).

The contract forms were sent to the university and company on October 2, 2008. The completed forms were returned by the company on 2 October 2008 and the University on 8 October 2008. Pricing negotiations were initiated on 22 September 2008 and completed on 23 October 2008 (see section 4.3.2). A purchase order was issued by EPIC on 23 October 2008.

### **3.2.3 *Project 304: Quasi-Multiplex CARS Microscopy with High Frame-Acquisition Rate***

University: IPT Jena

Components: WR-530-900 Dazzler RF generator prototype

Manufacturer: Fastlite

**Current Project Status:** Prototype delivered - project started on 24 November 2008.

The contract forms were sent to the university and company on October 2, 2008. The completed forms were returned by the company on 16 October 2008 and the University on 8 October 2008.



Pricing negotiations were initiated on 30 September 2008 and completed on 22 October 2008 (see section 4.3.3). A purchase order was issued by EPIC on 23 October 2008. Components were delivered to the University on 24 November 2008.

### ***3.2.4 Project 308: Integrated time domain optical interleaver for photonic-based full-digital radar receiver***

University: CNIT

Components: Waveguide integrated optical interleaver

Manufacturer: PGT Photonics

**Current Project Status:** The purchase order has been placed with PGT Photonics. The kick-off date for the project is being set at this time.

The contract forms were sent to the university and company on October 3, 2008. The completed forms were returned by the company and the University on 16 October 2008. Pricing negotiations were initiated on 2 October 2008 and completed on 17 November 2008 (see section 4.3.4). A purchase order was issued by EPIC 28 November 2008.

### ***3.2.5 Project 310: Resonator modes in the presence of passive element for conical refraction***

University: University Dundee

Components: Experimental setup based on CR Optics experimental kit

Manufacturer: ConeRefringent

**Current Project Status:** The purchase order has been placed; components have been shipped and paid for. The kick-off meeting is now being scheduled.

The contract forms were sent to the university and the company on October 2, 2008. The completed forms were returned by the company and the University on 7 October 2008. Pricing negotiations were initiated on 10 September 2008 and were completed on 24 November 2008 (see section 4.3.5). A purchase order was issued by EPIC 24 November 2008.

### ***3.2.6 Project 312: Adaptive optics for improved resolution in optical sectioning microscopy***

University: IOP Strathclyde

Components: GAO Manufacturing software + GAO hardware prototype renting

Manufacturer: Imagine Optic

**Current Project Status:** The purchase order has been placed.

The contract forms were sent to the university and the company on October 2, 2008. The completed forms were returned by the company on 21 October 2008 and the University on 30 November 2008. Pricing negotiations were initiated on 10 October 2008 and were completed on 21 November 2008 (see section 4.3.6). A purchase order was issued by EPIC 29 October 2008.



### 3.3 *Major Schedule delays and proposed solutions*

**Problem:** Prototype negotiation coinciding with summer vacation period (all projects).

**Solution:** The calendar of the calls for proposals should be designed to avoid the signing of project agreements and pricing negotiations during the summer vacation period, as this often requires the simultaneous presence of several people at the University or Manufacturer. The timing of the second call for research proposals is such that this problem will be avoided.

**Problem:** Initial pricing quotations which are higher than initial estimates given by the company (project 2).

**Solution:** An accurate pricing estimate from the manufacturer should be required in the call for prototypes. If the given estimate is deemed too high for the project budget, the company should be informed that their component lies out with the scope of the ACCORD project and that in order to have details of their price component published on the ACCORD website they will need to adhere to a pre-determined price ceiling. The difference in price between the company's estimate and the amount that the project can pay will either be by the provision of a component with less functionality or will be absorbed by the company, assuming that the research proposal is of enough interest to them. In the case where a project requires several small prototypes (consumable type items, e.g. project 1), the University should be clearly informed as to how many components can be funded by ACCORD.

**Problem:** Delays in the return of signed forms (projects 1, 2 and 5).

**Solution:** Companies and Universities should be informed of a reasonable but strict deadline with respect to the signature of the necessary contract forms. It should be made clear that failure to adhere to this deadline may result in the project being deactivated.

**Problem:** Legal questions and contestation of Project Agreement Forms (e.g. Project 2, Hold Harmless Agreement).

**Solution:** Universities and companies should be made aware at the time of the call for components and call for proposals that certain documents will be required to be signed in order for a project to be accepted. A model of these documents should be available on the ACCORD website and it should be clearly stated that the content of certain documents is non-negotiable and that it is the responsibility of each institution to verify that such documents are acceptable to their legal department.

**Problem:** Long component delivery lead time (projects 2, 3 and 4).

**Solution:** The call for components should include a requirement to state an explicit delivery lead time. It should be indicated that, given the limited time frame of the ACCORD project, failure to comply with a stated lead time may lead to cancellation of the project. An upper limit on acceptable delivery lead times should also probably be stated within the call for components.



## 4. Purchase and Delivery of Components

### 4.1 Introduction

The budget available for component purchase in Call 1 is 104.000 euros. Having selected 5 proposals, it is estimated that the average payment to a component supplier will be 20.000 euros. We anticipated that some systems or components being proposed would be more than this amount, and that some would be less. It is the responsibility of WP3 to match the resources available to the projects that have been approved.

### 4.2 General Procedures

As presented earlier in this document, both the University partner and the Component supplier received a set of forms (see deliverable 3.1, and a summary given in annex 1. that each party must sign in order for the project to move forward. The Component supplier must sign a form that the pricing of the prototype components represents the cost of fabrication of the prototype, and has no relationship in particular to the price that would be proposed for such a component as a commercial product.

Manufacturers were asked to submit an offer. The offer was studied by several team members, always including the project coordinator. The response to the manufacturer was:

- Accept the offer
- Refuse the offer
- Suggest a reduction in the number of components in order to keep the budget in equilibrium.

In this first phase of the project, all three responses were necessary.

Following agreement on the price and the certification by the manufacturer that it was supplying a prototype, we could proceed to issuing a purchase order. In some case an advance partial payment was sent following receipt of an invoice, and accompanied the purchase order. All purchase orders were signed by two people: Thomas Pearsall, the WP3 leader, and by Peter Van Daele, the project coordinator.

The payment for each component was completed on the delivery and acceptance of the components by the university, and the reception of an invoice from the supplier. As before, this payment order is signed by two people: Thomas Pearsall, the WP3 leader, and by Peter Van Daele, the project coordinator.

### 4.3 Negotiation Procedures and Results

#### **4.3.1 Project 203: A multi-wavelength, time multiplexed, spectrometer for atmospheric sensing**

Manufacturer: Cascade Technologies                      University: Strathclyde

The manufacturer was represented by Iain Howieson. Cascade Technologies is located in Scotland and manufactures quantum cascade lasers that emit in the mid IR from 4 to 6  $\mu\text{m}$ . These lasers are candidates for precise atmospheric sensing and detection of pollutants. The university was represented by Paul Tyler of Grants and Contract Management. The research team at Strathclyde is headed by Geoffrey Duxbury and Nigel Langford.



The negotiations were opened on 25 February 2008 and completed on 17 July 2008. Components were delivered and the project started up on 2 September 2008.

Negotiations on this contract concerned both timing and component pricing. We had much difficulty to get response from the university. We discovered that communications were being impeded by an unusual firewall at the University. However, after we solved this problem, communication remained slow and difficult, both with the company and the university. After 2 ½ months of such delay, we sent a letter to both sides to warn that the project would be cancelled if the forms were not received by a fixed date. This seemed to solve everything. We learned that it is important to set a fixed date in order for the documents to be assigned a priority. This is now adopted as standard practice from the outset. The number of components to be supplied was modulated during negotiation to bring the cost to 20 k euros.

The pricing proposal and purchase order may be consulted in annex 2.

#### **4.3.2 Project 301: A high throughput terahertz spectroscopic imaging system for security applications**

The manufacturer Onefive GmbH was represented by Lukas Krainer. Onefive GmbH is located in Switzerland and manufactures fibre laser systems. The university ETZ Zürich was represented by Prof. Peter Günter. The project will use the fibre laser to excite terahertz radiation in specially-prepared semiconductor films.

The negotiations were opened on 22 September 2008 and completed on 23 October 2008.

We held a discussion with Onefive concerning a price for the laser system. Our impression is that this may be one of the very first systems produced. The company did not seem to have a fixed idea about what to charge. The opening offer was 35k euros. We agreed after several discussions on a transfer price of 31k euros, all taxes included. This price is about 20% lower than the commercial price for comparable lasers made by Menlo Systems in Garching.

At the time of this report, the laser is being assembled, and is scheduled for delivery in February 2009. (16-18 weeks from 1 October 2008).

The pricing proposal and purchase order may be consulted in annex 3.

#### **4.3.3 Project 304: Quasi-Multiplex CARS Microscopy with High Frame-Acquisition Rate**

The manufacturer Fastlite was represented by Pascal Tournois. Fastlite is located in Paris and manufactures ultra-fast optical pulse-shaping systems. The university, the IPT Jena was represented by Prof. Jürgen Popp. The project will use the "Dazzler" pulse shaper to enhance CARS (Coherent anti-Stokes Raman Scattering) spectroscopy of peptides. The experiments seek to capture images taken in the time corresponding to one molecular vibration period (about  $10^{-13}$  seconds).

The negotiations were opened on 30 September 2008 and completed on 22 October 2008.

The opening offer from Fastlite for a development prototype was 49k euros. This amount was well over our budget, so we conducted many exchanges to find an acceptable possibility. We identified equipment leasing as an element of a solution. We invested considerable effort into this idea.

Leasing lowers the cash outlay, but raises issues that need consideration. The leased equipment would be shipped to the University of Jena in this case. Who is responsible if the leased equipment is



damaged? ACCORD is relieved of responsibility through the “hold-harmless” agreement. EPIC, who signs the lease agreement, has some responsibility, and so has the university who receives the equipment.

This discussion allowed us to find a transfer price that we could agree on from a budget standpoint: 32k euros. We decided to purchase part of the equipment using ACCORD funding. Fastlite agreed to make a cost-free loan of part of the equipment directly to University of Jena, taking EPIC out of the responsibility question. This arrangement allowed us to conclude negotiations successfully.

The Dazzler prototype has been fabricated and shipped to University Jena on 24 November 2008.

The pricing proposal and purchase order may be consulted in annex 4.

#### ***4.3.4 Project 308: Integrated time domain optical interleaver for photonic-based full-digital radar receiver***

The manufacturer was represented by Marco Romagnoli, Design and Characterization Manager of PGT Photonics, in Italy. PGT Photonics is proposing an optical interleaver for high bit-rate optical time-domain multiplexing. The University, the CNIT was represented by Prof. Giancarlo Prati, President of CNIT in Pisa. The negotiations were started on 2 October 2008, and the negotiations were completed on 17 November 2008.

In these negotiations, PGT proposed a transfer price for the optical interleaver that could be compared to similar products offered on the market commercially. Their offer was sufficiently lower to confirm the condition of assembly cost of the prototype.

The purchase order has been placed with PGT Photonics. The kick-off date for the project is being set at this time.

The pricing proposal and purchase order may be consulted in annex 5.

#### ***4.3.5 Project 310: Resonator modes in the presence of passive element for conical refraction***

The manufacturer was represented by Todor Kirilov. Conerefringent Optics is located in Barcelona and manufactures bi-axial crystals that generate conical refraction. The university was represented by Edik Rafailov. Negotiations started on 10 September 2008 and were completed on 24 November 2008.

Conerefringent Optics can produce many types of crystals and accessories for the study of conical refraction. The University Dundee wanted to have one of each in the beginning, bringing the total to more than 50k euros. This is a project in which the university will characterise the crystals and develop some standard demonstrations for university education. We held discussions with Conerefringent Optics to determine which subset of components would be reasonable for a first set of experiments that would bring some value to the company. When we arrived at this list, for 10k euros, the university agreed on our choice. We have suggested that if the first round of experiments is successful, we could purchase some additional components. In this case, each component is hand-made. There is no difference between a prototype and a product. The company has just opened its doors. They are unique in the photonics marketplace. Thus, they are offering only prototypes for evaluation.

The purchase order has been placed; components have been shipped and paid for. The kick-off meeting is now being scheduled.

The pricing proposal and purchase order may be consulted in annex 6.



#### **4.3.6 Project 312: Adaptive optics for improved resolution in optical sectioning microscopy**

The manufacturer Imagine Optic was represented by Samuel Bucourt. Imagine Optic manufactures deformable mirrors for adaptive optics. The Institute of Photonics of the Strathclyde University was represented by Michael Cannon. Negotiations started on 10 October 2008 and were completed on 21 November 2008.

Imagine Optic proposed a system for 49k euros TTC. Like the Fastlite prototype, this was beyond the project means. So we continued the discussion to see if a smaller or "lighter" version could be offered. We also explored the leasing option. In the end we agreed on a system for 34k euros, part of which will be leased to EPIC. We are still discussing the terms of the lease, and the cost of insurance to cover the lease may have to be added to the final project transfer cost.

The purchase order has been placed on 29.10.08.

The pricing proposal and purchase order may be consulted in annex 7.



## 5. Conclusions

This deliverable gives an overview of negotiation and purchasing process. The first five pairings of components and universities has been completed. All projects have been brought successfully to the start of the R&D phase. The time required for the negotiation plus preparation of prototypes was 5 months. The intervening summer holidays added an additional month to the schedule.

We learned during the negotiation of the Cascade-Strathclyde project reported here that we need to place deadlines up-front on the negotiation time. This helps participants to place a priority on the negotiation, so that it is completed on schedule. This change shortened the negotiation to 2 months, and overall time to 3 months, as compared to 5 months for the first 5 projects.

It is our experience that companies respond more quickly than universities. Companies also appear to be more flexible than universities when it comes to having our agreement forms signed. There are several levels of university bureaucracy involved, while in a company lines for decision-making are clearer.

Company participants also showed flexibility in meeting the budget limitations of the project. In several cases, this resulted in reducing the number of components to be supplied. In other cases, innovation and financial participation of the university helped close the gap between prototype cost and resources available from ACCORD.



## Annex 1 Summary of Operating Procedures

### Purchase of Components and Systems

The purchase of components and systems is a four-step process:

1. A university proposal is selected following proposal review.
2. The corresponding manufacturer is contacted and a negotiation begins to determine the price to be paid.
3. The intellectual property certification is signed by both parties
4. A purchase order is signed by two members of the ACCORD project and sent to the supplier.

### The Supply Agreement

The supply agreement consists of:

- Hold harmless
- Certification of non-commercial availability
- Certification that the device is operational
- Certification of cost price
- Certification of IPR agreement

ACCORD will negotiate a purchase agreement with the supplier. For payment of an agreed price, the supplier will transfer ownerships of the components or system to the European Photonics Industry Consortium (EPIC), with the understanding that the components or system be used exclusively in the ACCORD programme at the site of the University performing the R&D project.

As part of the agreement, the supplier will certify that the components or systems are operational and that they are not available commercially at the time of transfer. The supplier will also certify that the transfer price represents the cost of constructing the prototype.

The price should reflect the marginal cost of producing a few additional prototypes. The price should not be the market value of a comparable component that has been fully tested, qualified and marketed. It is believed by ACCORD that the marginal production cost of prototype components may be a competitive secret. Therefore we ask only each supplying company to sign a statement certifying that the acquisition price represents the marginal cost of production.

The supplier will additionally certify that a satisfactory IPR agreement has been concluded with the University selected for the project.

Finally the supplier will also sign a hold harmless agreement, releasing the ACCORD project and the European Commission from financial responsibility involving the use or misuse of the components or systems.

### Purchase and Payment

The purchase order will be signed by two members of the ACCORD project. The EPIC organisation will then send the purchase order to the supplier and pay for the product under the conditions negotiated with the supplier. Copies of all transaction documents will be filed with the project coordinator.



## Annex 2 Cascade Technologies

### A2.1 Negotiated Price Proposal



### QUOTATION

CUSTOMER DETAILS	
Company	EPIC
Name	Tom Pearsall
Address	17, rue Hamelin 75016 Paris FRANCE Email. pearsall@epic-assoc.com

INVOICE DETAILS	
Our reference	252(a)
Date of Quote	25/06/2008
Customer No.	
Your Reference	

Item	Part No.	Description	Qty	Unit Price	Sub Total	Delivery
1	QC-02-4.86	Quantum Cascade Laser at 4.86um	1	£3 000	£3 000	2 weeks
2	QC-02-6.17	Quantum Cascade Laser at 6.17um	2	£3 000	£6 000	2 weeks
3	QC-02-7.22	Quantum Cascade Laser at 7.22um	1	£3 000	£3 000	2 weeks
4	QC-02-7.46	Quantum Cascade Laser at 7.46um	1	£3 000	£3 000	2 weeks
5		Delivery				See notes
		Total			£15 000	

Notes
<b>Certification</b> – Cascade Technologies will provide certification that the components listed above are non-standard prototypes that are not available on the open market.

<b>GENERAL</b>	This quotation is subject to Cascade Technologies terms and conditions of sale unless otherwise agreed in writing.
<b>WARRANTY</b>	Each laser is warranted for one year.
<b>VALIDITY</b>	25th of June 2008
<b>PRICES</b>	All prices are specified in UK Sterling exclusive of VAT.
<b>DELIVERY</b>	Delivery will be charged at cost. Delivery is 2 weeks from order date.
<b>PAYMENT</b>	Terms agreed as per Accord program

YANN HAMONOU  
Marketing Associate

it A, Logie Court  
Stirling University Innovation Park  
Stirling FK9 4NF  
Scotland - UK

Tel. +44 (0)1786 447 721  
www.cascade-technologies.com



## A 2.2 Purchase Order



## PURCHASE ORDER

PURCHASE ORDER #2008\_001

From : EPIC European Photonic Industry Consortium  
17 rue Hamelin  
75016 Paris - France

Date :
17/07/2008
Authorized by:
Thomas Pearsall EPIC Peter Van Daele IMEC
Order Contact Person:
Addressee:
Bill Buckie
Delivery time:
2 weeks

To : Cascade Technologies  
Mr. Bill Buckie  
Finance Director  
Unit A, Logie Court - Stirling Innovation Park  
Stirling FK9 4NF - Scotland - UK

Quotation n° 252  
dated 25/06/2008

DESCRIPTION	Part No.	Quantity	Unit Price	Sub Total excl. VAT
Developer Laser Module	LM-03-D	1	£3 500	£3 500
Quantum Cascade Laser at 4.86um	QC-02-4.86	1	£2 500	£2 500
Quantum Cascade Laser at 6.17um	QC-02-6.17	2	£2 000	£4 000
Quantum Cascade Laser at 7.22um	QC-02-7.22	1	£2 500	£2 500
Quantum Cascade Laser at 7.46um	QC-02-7.46	1	£2 500	£2 500
Delivery (see delivery note)				
			total excl. VAT	£15 000
			VAT 17.5%	£2 625
			total incl. VAT	£17 625

VAT: EPIC as a non-profit organisation is not VAT registered

Warranty: Each laser is warranted for one year

Prices: All prices are specified in UK Sterling pound exclusive of VAT

Delivery: Delivery will be charged at cost. Delivery is 2 weeks from order date

T.P. Pearsall / EPIC

Peter Van Daele / IMEC

Date:



## Annex 3 Onefive

### A 3.1 Price Proposal

Onefive GmbH  
 Oberwiesenstrasse 5  
 8057 Zürich  
 Switzerland  
 phone: +41.43.53836.57  
 fax: +41.43.53836.66  
 e-mail: [contact@onefive.com](mailto:contact@onefive.com)  
[www.onefive.com](http://www.onefive.com)



#### Quotation

T.P. Pearsall  
 Secretary General  
 European Photonics Industry Consortium  
 17, rue Hamelin  
 75016 Paris  
 FRANCE

Zurich, 29.09.2008

Quote No: 2008-058

Contact Person: Dr. Lukas Krainer, Tel: +41 43 538 38 57

Pos	Quantity	Item Description	Unit Price	Total Price
1	1	<b>Origami - 15</b> Part# OR/SM/50/15560/200/100/FS  Passively mode-locked ultrafast laser with following specifications: Pulse repetition rate frequency 50 MHz +/-2 MHz Average optical output power > 90 mW Pulse duration < 200 fs Center wavelength out of laser oscillator 1556 +/- 10 nm Transform-limited pulses Free-space output, M <sup>2</sup> < 1.1 Polarization extinction ratio > 20 dB Internal isolation stage with > 30 dB isolation	EUR 30'900.00	30'900.00
2	1	Handling	€ 100.00	100.00
3	1	Shipping to ETH Switzerland, Zürich		Free of charge

**Total EUR 31'000.00**  
(incl. VAT 7.6%)

Shipment includes:  
 Laserhead (approx. size: 250 x 250 x 54 mm<sup>3</sup>)  
 Laserdriver (approx. size: 165 x 105 x 44 mm<sup>3</sup>)  
 Power supply and cables

Delivery: 16-18 weeks ARO

#### Terms:

- Payment terms: net 30 days after date of shipment
- This quotation is valid for 60 days
- Warranty period: 12 months after date of shipment
- Onefive Terms and Conditions ([http://www.onefive.com/pdf/Onefive\\_TermsAndConditions.pdf](http://www.onefive.com/pdf/Onefive_TermsAndConditions.pdf))

**A 3.2 Purchase order****PURCHASE ORDER**

PURCHASE ORDER #2008\_003

From : EPIC European Photonic Industry Consortium  
17 rue Hamelin  
75016 Paris - France

Date :	23/10/2008
Authorized by:	Thomas Pearsall EPIC Peter Van Daele IMEC
Order Contact Person:	
Addressee:	Dr. Lukas Krainer
Delivery time:	16-18 weeks ARO

To: ONEFIVE GmbH  
Dr. Lukas Krainer  
CEO  
Overwiesenstrasse 5  
8057 Zürich - Switzerland

Quotation N° 2008-058  
dated 29/09/2008

DESCRIPTION	Quantity	Unit Price	Sub Total excl. VAT
Origami - 15 Part# OR/SM/50/15560/200/100/FS	1	28,718 €	28,718.00 €
Passively mode-locked ultrafast laser with following specifications: Pulse repetition rate frequency 50 MHz +/- 2 MHz Average optical output power > 90 mW Pulse duration < 200 fs Center wavelength out of laser oscillator 1556 +/- 10 nm Transform-limited pulses Free-space output, M2 < 1.1 Polarization extinction ratio > 20 dB Internal isolation stage with > 30 dB isolation			
Handling	1	93.00 €	93.00 €
Shipping to ETH Zürich, Switzerland	1		Free of charge
		total excl. VAT	28,811.00 €
		VAT 7.6%	2,190.00 €
		total incl. VAT	31,000.00 €

VAT: EPIC as a non-profit organisation is not VAT registered

Warranty: 12 months after date of shipment

Delivery: 16-18 weeks ARO - Shipment includes: Laserhead (approx. size: 250 x 250 x 54 mm<sup>3</sup>), Laserdriver (approx. size: 165 x 105 x

Power supply and cables

Payment terms: net 30 days after date of shipment

T.P. Pearsall / EPIC

Peter Van Daele / IMEC

Date:

European Photonics Industry Consortium (EPIC)  
17 rue Hamelin 75016 PARIS France

Association de loi de 1901 créée le 10 décembre 2003 - Publiée au Journal Officiel le 10 Janvier 2004  
N° Siret : 480 890 741 00011 - Code NAF : 913E



## Annex 4 Fastlite

### A 4.1 Price Proposal



Date: September 29th, 2008  
Total pages (including this one): 2+1

**From: FASTLITE/Pascal Tournois**  
**Tel number: +33 1 69 33 36 42**  
**Fax number: +33 1 69 33 30 98**

**to the attention of:**  
**T.P. Pearsall, General-Secretary**  
**European Photonics Industry**  
**Consortium**  
**17, rue Hamelin**  
**75016 Paris, France**  
**Telephone: +331 45 05 72 63**  
**e-mail: [pearsall@epic-assoc.com](mailto:pearsall@epic-assoc.com)**

**SUBJECT: Official quotation referenced QPT 080929-b**

**Enclosed: -Dazzler system referenced WR-530-900 specifications target (1 page)**

Dear Mr. Tom Pearsall,

Following to our recent discussion, you will find here after our quotation referenced QPT 080929-b referring to the delivery of Dazzler pulse shaper RF generator prototype.

The combination of the quoted Dazzler pulse shaper RF generator prototype with a suitable crystal module forms a complete Dazzler pulse shaping system. The complete Dazzler pulse shaping system aims at fulfilling the target specifications here enclosed.

Fastlite shall loan, at its own risks, the appropriate Dazzler crystal module to the Institute for Photonic Technology Jena and the Friedrich-Schiller University Jena for the duration of the ACCORD project. Fastlite indeed agrees to hold harmless the companies and institutions forming the ACCORD project from any damages and liabilities that may occur to the Dazzler crystal module for the time of the ACCORD project.

This quotation refers to:  
-The delivery of a Dazzler pulse shaper RF prototype  
-The one year warranty

Should you have any concerns or comments, please feel free to contact us.  
Best regards.

Pascal TOURNOIS

***FASTLITE***

45-47 rue Croulebarbe  
75013 Paris  
Tel. +33 (0)1 45 30 12 96  
Fax :+33 (0)1 45 30 12 97  
e-mail : [info@fastlite.com](mailto:info@fastlite.com)

**QUOTATION QPT 080929-b****a) Specifications**

The combination of the quoted Dazzler pulse shaper RF generator prototype with a suitable crystal module forms a complete Dazzler pulse shaping system. The complete Dazzler system prototype aims at fulfilling the target specifications here enclosed (see spec WR-530-900-2.pdf)

**b) Price, terms and conditions**

Dazzler pulse shaper RF generator prototype	29 000 Euros
Value Added Taxes (19.6%)	5 684 Euros
<b>Total price</b>	<b>34 684 Euros</b>

This total price includes delivery of the Dazzler pulse shaper RF generator prototype at the Institute for Photonic Technology Jena and the Friedrich-Schiller University Jena, and a one year warranty.

**c) Deliveries**

The delivery time is 2 months at reception of the order.

**d) Payment terms and conditions:**

Payment conditions: Payment 30 days net, date of invoice

**e) Offer validity:**

90 days

***FASTLITE***

45-47 rue Croulebarbe  
75013 Paris  
Tel. +33 (0)1 45 30 12 96  
Fax : +33 (0)1 45 30 12 97  
e-mail : [info@fastlite.com](mailto:info@fastlite.com)



## A 4.2 Purchase order



## PURCHASE ORDER

PURCHASE ORDER #2008\_002

From : EPIC European Photonic Industry Consortium  
17 rue Hamelin  
75016 Paris - France

Date :	22/10/2008
Authorized by:	Thomas Pearsall EPIC Peter Van Daele IMEC
Order Contact Person:	
Addressee:	Pascal Tournois
Delivery time:	2 months

To : FASTLITE  
Mr. Pascal Tournois  
Sales & Marketing Manager  
45-47 rue Croulebranche  
75013 PARIS - France

Quotation referenced QPT 080929-b  
dated 29/09/2008

DESCRIPTION	Quantity	Unit Price	Sub Total excl. VAT
Dazzler pulse shaper RF generator prototype <i>according to DAZZLER™ WR--530--900 specifications attached</i>	1	29,000 €	29,000.00 €
Delivery (see delivery note)			
		total excl. VAT	29,000.00 €
		VAT 19.6%	5,684.00 €
		total incl. VAT	34,684.00 €

VAT: EPIC as a non-profit organisation is not VAT registered

Warranty: one year

Delivery: 2 months from order date. Total price includes delivery of the Dazzler Pulse shaper RF generator prototype at the Institute for Photonic Technology Jena and the Friedrich-Schiller University Jena.

T.P. Pearsall / EPIC

Peter Van Daele / IMEC

Date:



## Annex 5 PGT Photonics

### A 5.1 Price Proposal



Milano, 24 Nov. 2008

To the kind attention of:

**T.P. Pearsall**  
Secretary General  
European Photonics Industry Consortium  
17, rue Hamelin  
75016 Paris  
FRANCE

**Miguel Llera**  
University of Applied Science  
Haute Ecole Arc Ingénierie  
Rue Baptiste-Savoie 26  
2610 St-Imier  
Switzerland

**Reference: Quotation for the offering of professional services relating to the manufacturing optical chips made by integrated photonics circuit on glass on silicon platform.**  
Quotation number **QF0801030**.

Dear Dr. Pearsall and Llera,

As per your kind request, please find enclosed our offer for the supply of PGT Photonics optical chips within the framework of the *ACCORD* project.

#### TECHNICAL DESCRIPTION and SPECIFICATIONS

To perform the activity in subject of the present Offer **QF0801030**, PGT Photonics will take as a reference the Technical Specifications, gathered and organized within the *ACCORD* proposal.

A short device description follows:

The fabricated device is a waveguide integrated optical interleaver based on glass on silicon technology. Time domain interleaver is commonly used to generate a higher repetition rate pulse train starting from a lower frequency input one.

**PGT photonics S.p.A.**  
Viale Sarca, 222 - 20126 Milano - Italy Tel. +39 02 64421 - Fax +39 02 64427811 - [www.pgt-photonics.com](http://www.pgt-photonics.com)  
Capitale Sociale Euro 6.010.000,00 - Codice Fiscale, Partita IVA e Iscrizione al Registro delle Imprese di Milano: 05874100968  
**Direzione e coordinamento di CyOptics Inc.**



UNI EN ISO 9001:2000  
Certificate N. 9110.PGT



Pending on the targeted application, different multiplication (interleaving) factors may be used. The fabricated device is a 40:640 GHz repetition rate interleaving prototype.

The interleaver provided by PGT consists of a cascade of 4 unbalanced Mach Zehnder interferometers. The amount of unbalancement of each Mach Zehnder interferometer serves to multiply by a factor of two the repetition rate of the incoming stream. The cascade of 4 provides therefore a multiplication factor equals to  $2^4$  i.e. 16 times the input.

Technical specifications are:

Wavelength range – 1540 ÷ 1560 nm

Dispersion in the wavelength range < 0.1 ps/nm

Max attenuation – 15 dB

Polarization - linear

Time delay on 1<sup>st</sup> MZ – 12.5 ps ± 0.1 ps

Time delay on 2<sup>nd</sup> MZ – 6.25 ps ± 0.1 ps

Time delay on 3<sup>rd</sup> MZ – 3.12 ps ± 0.1 ps

Time delay on 4<sup>th</sup> MZ – 1.56 ps ± 0.1 ps

#### PRICING and TERMS OF PAYMENT

PGT Photonics Quotation for the activities described, within the above described TECHNICAL DESCRIPTION and SPECIFICATIONS, is the following:

25.000 (twenty-five thousand) EUR

The device is ready to be delivered. The payment of the full amount is required within 30 days after Offer **QF0801030** acceptance.

#### VALIDITY OF THE PRESENT OFFER

The present Offer **QF0801030** will remain effective and valid till Jan 30<sup>th</sup>, 2009.

**PGT photonics S.p.A.**  
Viale Sarca, 222 – 20126 Milano – Italy Tel. +39 02 64421 – Fax +39 02 64427811 – [www.pgt-photonics.com](http://www.pgt-photonics.com)  
Capitale Sociale Euro 6.010.000,00 – Codice Fiscale, Partita IVA e Iscrizione al Registro delle Imprese di Milano: 05874100968  
**Direzione e coordinamento di CyOptics Inc.**



**A 5.2 Purchase Order****PURCHASE ORDER**

PURCHASE ORDER #2008\_006

From : EPIC European Photonic Industry Consortium  
 17 rue Hamelin  
 75016 Paris - France

Date :	25/11/2008
Authorized by:	Thomas Pearsall EPIC Peter Van Daele IMEC
Order Contact Person:	
Addressee:	Marco Romagnoli
Delivery time:	ready to be delivered

To : PGT Photonics S.p.A.  
 Mr. Marco Romagnoli  
 Viale Sarca, 222  
 20126 Milano  
 Italy

Quotation QF0801030  
 dated 24/11/2008

DESCRIPTION	Quantity	Unit Price	Sub Total
Waveguide integrated optical interleaver based on glass on silicon technology. The device is a 40:640 GHz repetition rate interleaving prototype	1	25,000 €	25,000.00 €
		total excl. VAT	25,000.00 €
		VAT	dna
		total incl. VAT	25,000.00 €

VAT: EPIC as a non-profit organisation is not VAT registered  
 Warranty: one year  
 Delivery: immediate  
 Payment terms: within 30 days after acceptance of offer QF0801030

T.P. Pearsall / EPIC

Peter Van Daele / IMEC

Date:



## Annex 6 Conerefringent

### A 6.1 Price Proposal

# CROPTICS

CONEREFRACTING OPTICS S.L.  
Av. Cubelles 28  
08800 Vilanova i la Geltru – SPAIN  
VAT: ESB63292239  
Phone: +34 93815 6839; Email: sales@croptics.eu

### COMMERCIAL OFFER for starting of ACCORD project "Dundee University – CR Optics"

Date: November 23, 2008

To: Dr. T. P. Pearsall  
General Secretary  
European Photonics Industry  
Consortium  
17, rue Hamelin  
75016 Paris  
N.I.F.:

REFERENCE	CONCEPT	Price in Euro
Email by T. P. Pearsall dated 21 <sup>st</sup> Nov. 2008	1. Experimental setup based on CR Optics experimental kit with high brightness fiber coupled diode lasers.	3,000.00
	2. Demo-sample (10 milliradians misalignment) with cross section 3x4mm and length about 15mm, AR coated at 1064nm.	1600.00
	3. Precision element (1.5 milliradians misalignment) with cross section 7x9mm and length 28mm.	3,400.00
	4. Precision element (1.5 milliradians misalignment) with cross section 7x9mm and length 18mm.	2,500.00
	Note: The above setup and crystal elements will be packed in hand carrying flight case.	

Total: 10,500

Payment terms: Prepayment  
Delivery: Two-three weeks ARO  
Transport: TBD

Bank address: Mercat Vilanova, Av. Francesc Macia 10, 08800 Vilanova i la Geltru, Spain  
BIC: CAIXESBB  
IBAN: ES42 2100 3088 6822 0020 2796

**A 6.2 Purchase Order****PURCHASE ORDER**

PURCHASE ORDER #2008\_005

From : EPIC European Photonic Industry Consortium  
17 rue Hamelin  
75016 Paris - France

<b>Date :</b> 24/11/2008
<b>Authorized by:</b> Thomas Pearsall EPIC Peter Van Daele IMEC
<b>Order Contact Person:</b>
<b>Addressee:</b> Todor Kirilov
<b>Delivery time:</b> 2-3 weeks ARO

To : Conefringent Optics S.L.  
Dr. Todor Kirilov  
Av. Cubelles 28  
08800 Vilanova i la Geltru  
Spain

Quotation  
dated 23/11/2008

DESCRIPTION	Quantity	Unit Price	Sub Total
Experimental setup based on CR Optics experimental kit	1	3,000 €	3,000.00 €
Demo-sample (10 milliradians misalignment) with cross section 3x4MM and length ab. 15mm,AR coated at 1064nm	1	1,600 €	1,600.00 €
Precision element (1.5 milliradians misalignment) with cross section 7x9mm and length 28mm	1	3,400 €	3,400.00 €
Precision element (1.5 milliradians misalignment) with cross section 7x8mm and length 18mm	1	2,500 €	2,500.00 €
<i>Note: the above setup and crystal elements will be packed in hand carrying flight case</i>			
		total excl. VAT	10,500.00 €
		VAT	dna
		total incl. VAT	10,500.00 €

VAT: EPIC as a non-profit organisation is not VAT registered  
Warranty: one year  
Delivery: 2-3 weeks ARO  
Payment terms: Prepayment

T.P. Pearsall / EPIC

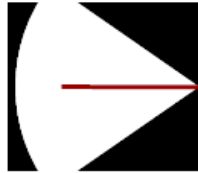
Peter Van Daele / IMEC

Date:



## Annex 7 Imagine Optic

### A 7.1 Price Proposal



# Imagine Optic

18, rue Charles De Gaulle - 91400 Orsay - France  
tel : +33 (0) 1 64 86 15 60 - fax : +33 (0) 1 64 86 15 61  
e-mail: [contact@imagine-optic.com](mailto:contact@imagine-optic.com)

DATE: Oct 29th 2008

### QUOTATION n° 0810.033

Attention to: Thomas Pearsall  
Company: EPIC  
Address: 17 rue Hamelin - 75783 Paris Cedex 16  
Tel: +331 45 05 72 63  
Fax:

Copy to:  
Company:  
Tel:  
Fax:

Dear Sir

Please find below our offer for the following items  
contact: [sbucourt@imagine-optic.com](mailto:sbucourt@imagine-optic.com) / tél: +33 1 64 86 15 60

All the prices below are given in €

item	Type - Description	Unit Price	Q	Price
<b>Genetic Adaptives Optics GAO</b>				
01	<b>GAO manufacturing</b> including genetic algorithms software, adaptation and integration excluding hardware deformable component	21 000,00	1	21 000,00
02	<b>GAO prototype renting</b> hardware prototype with amortating rate 33% (3 years) cost 22500 euros - 1 year renting	7 500,00	1	7 500,00

#### General conditions

payment term: 40% upon order and 60% upon delivery  
tax: not included (VAT 19,6%)  
delivery: Ex Works  
delivery date: to be defined, midst of january 09  
quotations validity: 6 weeks, quotation date  
our VAT number:Fr 73 410 072 532

<u>TOTAL</u>	
TOTAL NET (€):	28 500,00
VAT (€):	5 586,00
<b>TOTAL (€):</b>	<b>34 086,00</b>



## A 7.2 Purchase Order



## PURCHASE ORDER

PURCHASE ORDER #2008\_004

From : EPIC European Photonic Industry Consortium  
17 rue Hamelin  
75016 Paris - France

Date :	29/10/2008
Authorized by:	Thomas Pearsall EPIC Peter Van Daele IMEC
Order Contact Person:	

To : Imagine Optic  
Dr. Samuel Bucourt  
CEO  
18, rue Charles De Gaulle  
91400 Orsay – France

Addressee:	Samuel Bucourt
Delivery time:	Mid-January 2009

Quotation N° 0810.033  
dated 29/10/2008

DESCRIPTION	Quantity	Unit Price	Sub Total excl. VAT
GAO manufacturing <i>Including genetic algorithms software, adaptation and integration excluding hardware deformable component</i>	1	21,000 €	21,000.00 €
GAO prototype renting <i>Hardware prototype with amortating rate 33% (3 years) Cost 22500 euros - 1 year renting</i>	1	7,500 €	7,500.00 €
		total excl. VAT	28,500.00 €
		VAT 19.6%	5,586.00 €
		total Incl. VAT	34,086.00 €

VAT: EPIC as a non-profit organisation is not VAT registered  
Warranty: one year  
Delivery: to be defined, midst of January 09  
Payment terms: 40% upon order and 60% upon delivery

T.P. Pearsall / EPIC

Peter Van Daele / IMEC

Date: