



XLS Cost-Benefit Analysis & Update on Greek Activities

Angeliki Karagiannaki, Dimosthenis Kotsopoulos

Athens University of Economics & Business - AUEB

Evangelos Gazis

Institute of Accelerating Systems & Applications - IASA

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Outline

1. Review of Chapters for D7.2
2. Cost-Benefit Analysis – CBA for XLS
3. Questionnaire for CBA
4. Questionnaire – study case: Laser/Photocathode
5. Market-, SWOT-, Analysis and Transfer technology
6. Time plan for data collection and analysis



Draft work on D7.2

Review of the Chapters:

Market **A**nalysis – **MA** (in detail for some key applications)

SWOT **A**nalysis – **SA**

Cost-**A**nalysis – **CA**

Benefits **A**nalysis – **BA**

Costs **vs** **B**enefits – **CBA**

Risk **A**nalysis – **RA**

Technology **T**ransfer – **TT** (to be added, based on IPRs)



Cost-Benefit Analysis for XLS

In the frame of the chapter: Cost-Analysis, the AUEB team has initiated a CBA study for our project, based mainly to the published work by

M. Florio and E. Sirtori, ***“The Evaluation of Research Infrastructures: a Cost-Benefit Analysis Framework”***, XI Milan European Economic Workshop, Università degli Studi di Milano, 22-23 giugno 2012

The results of this study will seriously help the update of the chapters: Market and Cost Analysis and in second level of importance the chapters: SWOT- and Risk Analysis plus the Transfer Technology



Questionnaire for CBA Data to collect .xls

Input needed from XLS Partners:

For CBA (Costs – Benefits)

For SWOT (Components & Applications)

For CDR (Exploitable Assets)

For TT (Intellectual Property – IPRs)

Collected Data (separate excel sheets):

Exploitable assets per WP

TRL Progress per Asset

Exploitation Mechanisms per Asset

IPR Agreements

XFEL Costs

Market Analysis per Exploitable Asset



Data to collect “questionnaire”

Exploitable Assets per WP

	WP _x
Exploitable asset title	
Exploitable asset acronym	
Exploitable asset description	
Exploitable asset category (type, e.g. hardware, software, industry standard, Features description (what is it, what it does, etc.)	
Potential users / Market target	
Added value to the industry	
Potential benefits to the project	
Potential benefits to end-users	
Time to market	
Owner (s)	



Exploitable Assets WP3

	WP3	WP3
Exploitable asset title	Methodology - Process to utilize LASER 1/LASER2 for XLS-FEL	Methodology - Process to utilize PHOTOCATHODE1/PHOTOCATHODE2
Exploitable asset acronym	M-P L1, M-P L2	M-P PH1, M-P PH2
Exploitable asset description	Simulation-Validation Procedure to apply Ti-Sapphire / Yb:Ca2F	Simulation-Validation Procedure to apply Cu /Cs2 Te
Exploitable asset category (type, e.g. hardware, software, industry standard, etc.)	Industry Standard	Industry Standard
Features description (what is it, what it does, etc.)	Testing of Innovative Conditions Procedure of Operating a LASER1/LASER2 illuminating photocathode to extract photoelectrons	Testing of Efficient Conditions Procedure of Operating Photocathode 1/Photocathode 2 illuminating to extract photoelectrons
Potential users / Market target	Research enterprises and laboratories	Research enterprises and laboratories
Added value to the industry	very SMALL	very SMALL
Potential benefits to the project	very SMALL	very SMALL
Potential benefits to end-users	LARGE	LARGE
Time to market	immediate	immediate
Owner (s)	COMPACTLight Consortium	COMPACTLight Consortium



Data to collect “questionnaire”

TRL Progress per Asset

Assessing the innovation market potential of the assets through TRL scale levels:

NOTE: You should indicate in the "Asset Name" column all the results/assets achieved. Afterwards, you should indicate by putting a cross in the TRL level of the asset previous to Compact, and which is the current TRL degree obtained through the work done. In some cases, we have results/assets developed entirely new within the project, and in other cases, some assets/results come from other research projects, or even commercial software of some companies, so for that reason, we should have a clear vision of the Technology Readiness Level (TRL) to assess which is the positioning of the solution compared to the market situation to assess whether this solution could apply different exploitation mechanisms.

Asset name	TRL 1	TRL 2	TRL 3	TRL 4	TRL 5	TRL 6	TRL 7	TRL 8	TRL 9
M-P L1									
M-P L2									
M-P PH1									
M-P PH2									
Time-line Scale									
“Before” Compact		X							
“Applying” Compact		X							



TRL Progress per Asset

Assessing the innovation market potential of the assets through TRL scale levels:

NOTE: You should indicate in the "Asset Name" column all the results/assets achieved. Afterwards, you should indicate by putting a cross in the TRL level of the asset previous to Compact, and which is the current TRL degree obtained through the work done. In some cases, we have results/assets developed entirely new within the project, and in other cases, some assets/results come from other research projects, or even commercial software of some companies, so for that reason, we should have a clear vision of the Technology Readiness Level (TRL) to assess which is the positioning of the solution compared to the market situation to assess whether this solution could apply different exploitation mechanisms.

Asset name	TRL 1	TRL 2	TRL 3	TRL 4	TRL 5	TRL 6	TRL 7	TRL 8	TRL 9
M-P L1					X			X	
M-P L2					X			X	
M-P PH1					X			X	
M-P PH2					X			X	
Time-line Scale									
"Before" Compact		X							
"Applying" Compact		X							



TRL Progress per Asset

TRLs EXPLAINED

Lower TRL

Further research

Policy use

Educational training

Higher TRL

Product development

Standardization

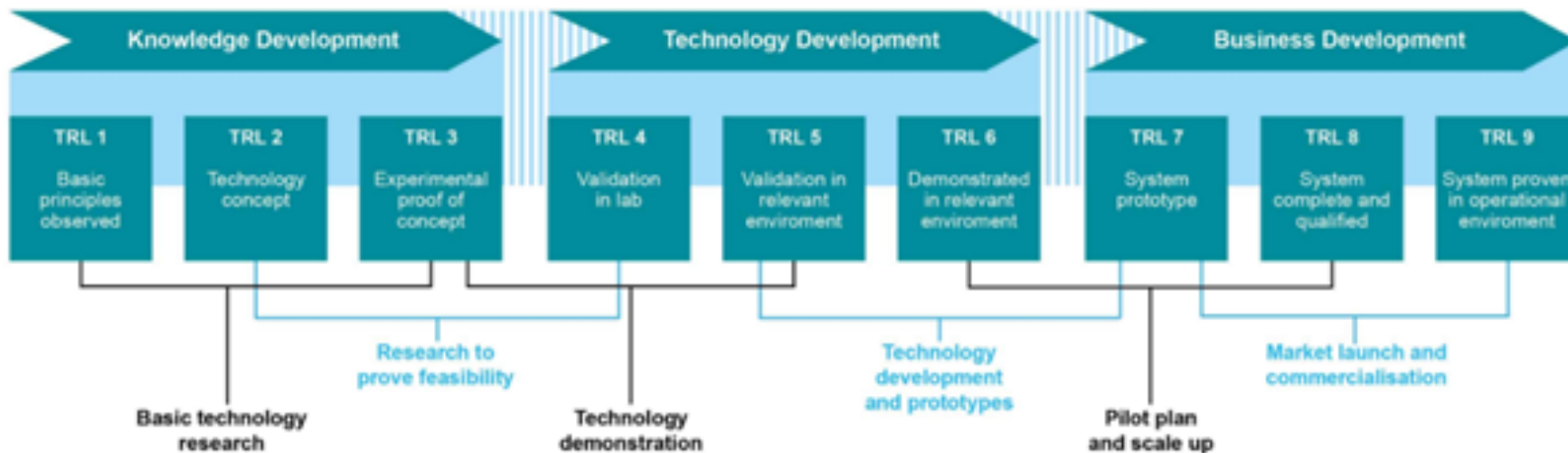
IP assignment (transfer of ownership)

Joint venture

License Agreements

Spin-off

Technology Readiness Level (TRL)





Data to collect “questionnaire”

Exploitation Mechanism per Asset

Using as a reference "Exploitation mechanisms list" in the DIRECTIONS section below this table, you should select which mechanisms you are envisage to apply to the asset to exploit or commercialize it depending on your company or institution strategy. You can take into the consideration the different TRL level of your products and services to select the most appropriated mechanisms for your asset as we have suggested. Otherwise, you can choose depending on your own strategy. Please, you can also add other mechanisms which are not being listed, feel free to introduce them.

Exploitable Asset	Exploitation mechanism	Ownership	IP protection

Provide a more detailed description on how you plan to apply the selected exploitation mechanism:

- Asset A: Product Development

Explanation: [complete]

- Asset A: Further research

Explanation: [complete]



Exploitation Mechanism per Asset

Using as a reference "Exploitation mechanisms list" in the DIRECTIONS section below this table, you should select which mechanisms you envisage to apply to the asset to exploit or commercialize it depending on your company or institution strategy. You can take into the consideration the different TRL level of your products and services to select the most appropriated mechanisms for your asset as we have suggested. Otherwise, you can choose depending on your own strategy. Please, you can also add other mechanisms which are not being listed, feel free to introduce them.

Exploitable Asset	Exploitation mechanism	Ownership	IP protection
M-P L1	Internal Product Development	XLS: 100 %	X
M-P L2	Internal Product Development	XLS: 100 %	X
M-P PH1	Internal Product Development	XLS: 100 %	X
M-P PH2	Internal Product Development	XLS: 100 %	X

Provide a more detailed description on how you plan to apply the selected exploitation mechanism:

- Asset A: Product Development
Explanation: [complete]
- Asset A: Further research
Explanation: [complete]



Data to collect “questionnaire”

Exploitation Mechanisms

A. Commercialization and exploitation mechanisms for Lower TRL:

- Policy use
- Further research
- Educational training

B. IP commercialization and exploitation mechanisms for Higher TRL:

- Internal Product Development
- License and franchising agreement
- Transfer of ownership or IP assignment
- Standardization or Patents
- Spin-off Company



Exploitation Mechanism per Asset

DIRECTIONS

Depending on the TRL level, different mechanisms or forms to exploit the IP might arise. **Depending on the TRL obtained by each of the result developed within TT, there are more suitable mechanisms to commercialize or exploit the results.** The following figure (below the point B) represents the position of the different mechanisms listed in comparison with the TRL level:

A. Commercialization and exploitation mechanisms for Lower TRL:

- Policy use: using the know-how generated in the project such as: Lessons learned, Recommendations, or End-users surveys among others, to transform them into concrete Policy Recommendations to the European Commission (EC) or related agencies to enhance the policy-making aspects in further EU research programs or initiatives related to the sector or could be re-used in cross-sectorial scenarios.
- Further research: taking the technical outputs generated to continuous developing by re-using in coming R&D&I funding calls to extend the functionalities and applications of the result. Furthermore, the entity (public or private) could decide to invest efforts in improving its technology development internally within the company.
- Educational training: this means using the results generated by disseminating and propa-gates within the scientific community of the Universities or Research centers: Curricula training, Courses, Seminars, and Workshops, Conference papers, etc.

B. IP commercialization and exploitation mechanisms for Higher TRL:

- Internal Product Development: this form requires that the organization has necessary skills and resources for manufacturing and supplying the products/services and may lead to its possible business growth through the current product and service portfolio of the company. Thus, the piece of SW or HW developed could be improve or add new functionalities or services to the current systems so its improvement eases the transformation into business out-comes.
- License and franchising agreement: the organization allows a third party to have access and utilize its IP for a certain time period in return for financial compensation (e.g. royalties on products sales or payment of a lump sum), under specific conditions and terms (exclusivity or non-exclusivity of the licensed technology, restriction to a particular purpose, like development or selling purposes, etc.). This instrument is usually used when the partner has not the necessary financial or technical capability to directly exploit the IP asset.
- Transfer of ownership or IP assignment: the ownership of the IP asset is permanently transferred to an assignee in return for a payment of a lump sum, royalties, or a combination of both. The assignee acquires the full rights to dispose of it. It may also happen that the as-signor is licensed back.



Data to collect “questionnaire”

IPR Agreements

Description of the components IPR			
BACKGROUND			
Exploitable Asset	Previous Knowledge title	Describe Knowledge	Ownership (partner(s) bringing knowledge)
FOREGROUND AND IP PROTECTION			
Exploitable Asset	Foreground title	Describe Foreground	Ownership and IPRs



IPR Directions

Description of the components IPR			
BACKGROUND			
Exploitable Asset	Previous Knowledge title	Describe Knowledge	Ownership (partner(s) bringing knowledge)
M-P L1	well known	well known	existing
M-P L2	well known	well known	existing
M-P PH1	well known	well known	existing
M-P PH2	well known	well known	existing
FOREGROUND AND IP PROTECTION			
Exploitable Asset	Foreground title	Describe Foreground	Ownership and IPRs
M-P L1	well known	well known	none
M-P L2	well known	well known	none
M-P PH1	well known	well known	none
M-P PH2	well known	well known	none



Data to collect “questionnaire”

Market Analysis per Exploitable Asset

Exploitable Asset	Application	Market Size (if known) expected number of clients	Market Size (if known) expected yearly income



Market Analysis per Exploitable Asset

Exploitable Asset	Application	Market Size (if known) expected number of clients	Market Size (if known) expected yearly income
M-P L1	X-FEL Injector Operation	10 existing + 5 future infrastructures	Equal to ~1 FTE / client
M-P L2	X-FEL Injector Operation	10 existing + 5 future infrastructures	Equal to ~1 FTE / client
M-P PH1	X-FEL Injector Operation	10 existing + 5 future infrastructures	Equal to ~1 FTE / client
M-P PH2	X-FEL Injector Operation	10 existing + 5 future infrastructures	Equal to ~1 FTE / client



Data to collect “questionnaire”

XFEL Parts Costs

The costing plan is based on the XLS machine layout and arranged in a four level structure.

			XLS PBS Structure	last update 17.1.2020			
			Level 1	Level 2	Baseline	Upgrade 1	Upgrade 2
CODE	Responsibility		Machine Sector	System			
ROOT			XLS				
1	WP3	M. Ferrario	Linac0		✓	✓	
2	WP4	W. Wuensch	Linac1		✓	✓	
3	WP4	W. Wuensch	Linac2 and Linac3		✓	✓	Linac4
4	WP6	A. Aksoy	Bunch Compressors 1 & 2		✓	✓	✓
5	WP6	A. Aksoy	Kicker and Spreader		✓	✓	✓
6	WP2	J. Clarke	FEL 1 & FEL 2	Seeding Systems			✓
6.1	WP5	F. Nguyen		Undulators 1 and 2	✓		
6.2	WP5	F. Nguyen		FEL 1 and FEL 2 Vacuum System	✓		
6.3	WP6	A. Aksoy		Beamline Quadrupoles	✓		
6.4	WP6	A. Aksoy		Beam Instrumentation System	✓		
7	WP2	V. Goryashko	Photon Beam line 1 and 2				
7.1				Pink/mono beam line FEL 1	✓		✓
7.2				Pink/mono beam line FEL 2	✓		✓
7.3				Pink/mono beam line FEL 1-2	✓		
8	WP6	A. Aksoy	Beam Dumps		✓		
9	WP1	G. D'Auria	Machine Control and Protection		✓		
10	WP2	J. Clarke	Civil Engineering		✓		
11	WP2	J. Clarke	Infrastructure and Services				
11.1				Electricity			
11.2				Survey and Alignment			
11.3				Fluids			
11.4				Transport / installation			
11.5				Safety			
12	WP1	G. D'Auria	Access Control and Safety				
				Access Safety & Control System			
				Technical Alarm System			



Time plan for data collection and analysis

The time plan of our work:

CBA : June READY with questionnaire for our partners

Questionnaire Answers: by Sept 2020

Questionnaire Analysis: by Nov 2020

Market-Analysis

Cost-Analysis (in cooperation with Carlo)

SWOT-Analysis, Transfer technology



by Dec 2020

Probable update of the accelerator deliverables in Dec 2020,
Re-Analysis of our CBA results



Thank you!

CompactLight@elettra.eu

www.CompactLight.eu



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Back-up slides