A Qualifications Framework for Solid Waste Facilities Managers

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According to European Union (EU) studies, the growth rates of EU waste management industry have been growing significantly over the last years. The sector has a competitive edge globally and a great potential in contributing towards the goals of the EU Lisbon agenda for growth and jobs. The waste management sector is rapidly changing and continues to develop, mainly due to the initiatives and policies adopted in EU and the new technologies and techniques introduced, thus rising a huge need in highly qualified engineers, operational managers and processing technicians all over Europe and the world. The Solid Waste Facilities Managers – Qualifications Framework (SWFM-QF) project aims at developing a European qualification and training framework to address the needs of Facilities Managers in the waste management industry. The project is elaborated within 8 EU countries. In each participating country a survey was carried out among waste management companies, associations, authorities and training organizations to obtain first-hand data on the work requirements and qualifications as well as the VET offers for solid waste management technicians and managers. Based on the results of the survey and direct contacts with the staff of operating solid waste facilities in the 8 EU countries, a European Harmonised Qualifications Framework (HQF) for the occupation of the Solid Waste Manager was developed. During the SWFM-QF project elaboration has also been completed the development of

an Info-Training Toolkit that will have the format of a webpage and will incorporate the curriculum of a vocational training course plus other informational material addressed to Solid Waste Facilities' Manager based on the identified required qualifications.

Keywords: Solid Waste, Management, Facilities, Managers, Qualifications Framework, Vocational Training.

1. Introduction

The Solid Waste Facilities Manager manages the operations of various Solid Waste Management Facilities like: Transfer Stations, Waste Recycling Centres, Landfills, Materials Recovery Facilities, Mechanical Biological Treatment Plants, Incinerators and Composting Plants. According to studies (ECORYS, 2009), waste management is the largest sub-sector of the EU27 eco-industry with a total turnover of €70.5 billion in 2004 and €92.2 billion in 2008. The employment of the sector is estimated at about 845 thousand and 1.467 thousand in respectively 2000 and 2008. Another study (BIO Intelligence Service, 2011) concludes that by achieving full implementation of EU waste legislation, the turnover of waste management and recycling would increase by €5 billion per year and over 400,000 jobs would be created within the period 2008-2020. The waste management industry has changed a lot in recent years and continues to develop as new legislation, technologies, and techniques are advanced.

Introducing integrated waste management approach and replacing landfill with other more advanced waste management techniques have influenced decisively the evolution of the sector. As a result, the "new generation" of the waste management facilities are becoming highly technical worksites implementing innovative solutions and a number of processes on one site. This, in turns, affects the structure of qualifications and the composition of the skills for the professionals in the sector.

Despite the constant increasing need for technically skilled employees to maintain and operate the advanced waste treatment facilities, the qualifications and Vocational Education and Training (VET) frameworks of Solid Waste Facilities Managers (SWFM) have a diversified structure within the EU states and they are not aligned with the European Qualifications Framework (EQF) initiative.

SWFM-QF project covers this gap by developing a common professional qualification framework in line with the directions of the EU educational and training policies. The outcome is a range of standardized profiles suitable for the different levels of SWFM qualifications.

2. The European survey

A survey, in 8 European countries (Bulgaria, Germany, Greece, Hungary, Italy, Lithuania, Poland and the UK), was carried out among waste management facilities and companies, respective business associations and authorities and training organizations to obtain first-hand data on the work requirements and qualifications as well as the vocational training courses provided to solid waste management technicians and managers.

Two different questionnaires were developed. One addressed to solid waste management facilities and another one addressed to VET institutes. The purpose of the questionnaires was to identify and analyze the educational needs and the necessary qualifications of waste management professionals (required knowledge, skills and behaviors) and to recommend new qualifications modules and vocational training programmes in order that Europe creates an extremely competitive and mobile workforce to respond to the new developments in the waste management industry.

In each country the survey was carried out mainly by emailing and contacting focus groups by phone the relevant data and information for the structured questionnaires (for firms, VET-providers, associations) were gathered. The structured questionnaire was changed in some countries to respond better to national needs. The average return rate of all partner countries is seen in Table 1.

Table 1: Overview of quantitative survey results.

	Sent	**Returned**	**Return rate**
Bulgaria	530	200	**37,73%**
Germany	616	68	**11,04%**
Greece	800	104	**13,00%**
Hungary	200	82	**41,00%**
Italy	500	85	**17,00%**
Lithuania	200	68	**34,00%**
Poland	620	93	**15,00%**
UK	600	50	**8,33%**

3. The Comparison Report

Based on the European survey findings, a comparison report was synthesized. The comparison report analyses and compares the qualifications and the national vocational education and training system in the field of waste management, in the abovementioned 8 European countries. SWFM-QF comparison report provides an overview about the current and required qualifications (knowledge, skills and competences) of solid waste facility technicians and managers with regard to:

- Legal aspects: National legal requirements, EU legal requirements, Waste management policy principles and national requirements for waste management procedures;

- Environmental aspects: Environmental impact assessment, Principles of environmental management systems and principles of environmental management accounting; IPPC principles and waste/pollution prevention principles;
- Technical aspects: Principles of waste classification, Technical requirements for equipment and technology, State-of-the-art technologies and monitoring requirements;
- Social aspects: Principles of emergency preparedness and planning of preventive corrective actions, health and safety;
- Economic aspects: Sustainable development, Product life cycle principles, corporate social responsibility and principles of corporate organization and management.

Figure 1 presents a comparison of the importance of knowledge in the above mentioned 5 aspects. The provided numbers are the arithmetic average of each single and answered question, regarding these 5 aspects.

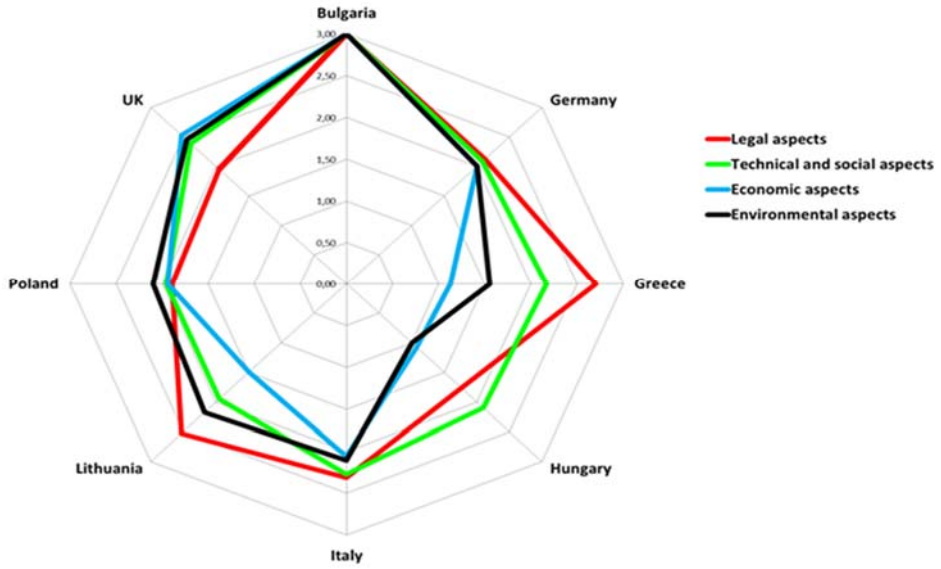


Figure 1: Overview of the scored importance of knowledge in the eight EU member states according to legal, technical and social, economic and environmental aspects.

All aspects are of high importance in Bulgaria, as there is no VET in place and only short courses with duration of one or maximum two days are available. Keeping up with the implementation of the EU reduction and recycling targets, this kind of knowledge is essential. Of more or less high importance are legal aspects in Greece and Lithuania, in contrast to a rather medium importance in Germany, Hungary, Italy, Lithuania, Poland and the UK.

Technical and social aspects are in all states, except Bulgaria, of medium importance. A high disparity exists in Hungary between environmental and economic aspects, with a low importance, in comparison to legal and

technical aspects, with a medium importance. Italy, Germany, Poland and the UK are characterized by a rather medium importance of all compared aspects. In the UK, legal aspects seem to have the lowest importance.

In Greece, of low importance are economic and environmental aspects and of medium importance are technical and social aspects. A similar situation was found in Lithuania, but the disparity between legal and economic aspects is high.

The comparison report results point out the high importance of training, for solid waste management managers, in the following fields:

- National legal requirements and waste management policy principles;
- Health and safety, monitoring requirements, principles of waste classification, principles of emergency preparedness and planning of preventive corrective actions;
- Environmental impact assessments.

According to Figure 2, economic and environmental aspects are valued surprisingly quite low in Hungary and Greece. A quite big gap exists in the UK between the importance the coverage of knowledge in the field of economic and environmental aspects. The reasons are data disparities (little data for the coverage of the analysed topics.). There are mainly no big differences between coverage and importance among the other EU states. It is interesting to point out, that in Greece and Lithuania environmental aspects were scored higher than economic aspects.

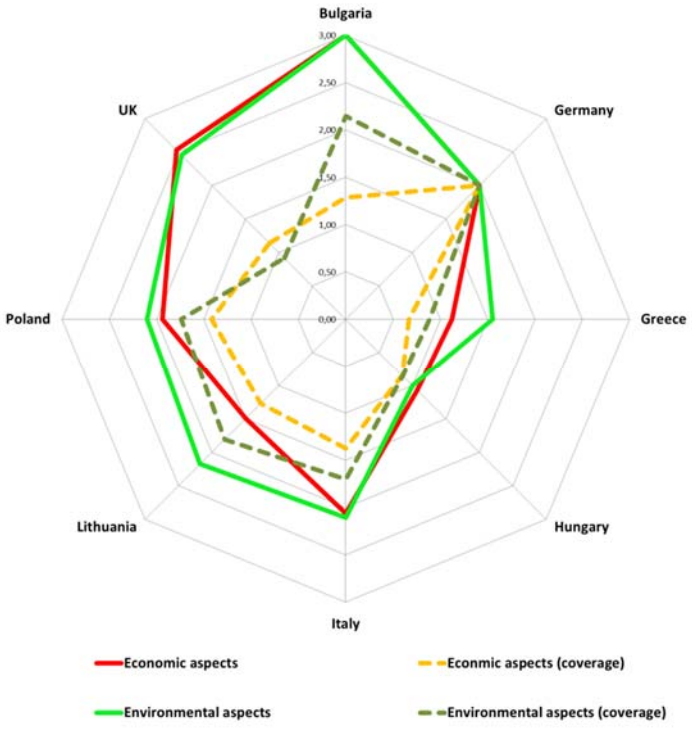


Figure 2: Comparison of importance and coverage of knowledge (economic and environmental aspects).

Figure 3 shows the high importance of health and safety in almost all states. Of rather low to medium interest are skills with regard to life cycle assessments. Waste minimization technology skills are of medium importance, only in the UK the importance is valued as very high.

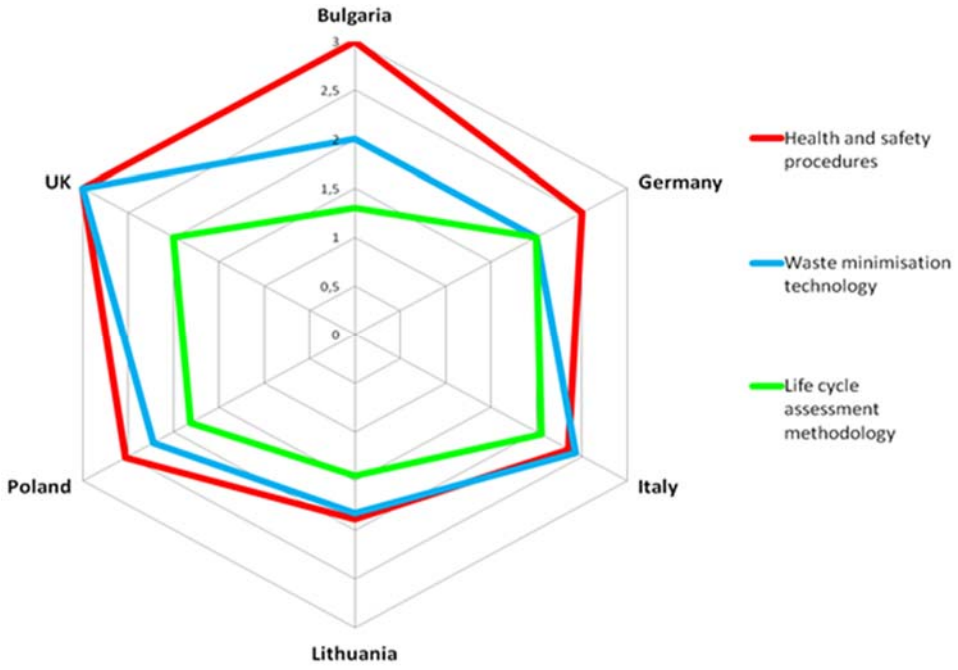


Figure 3: Importance of skills (mainly technical and social aspects, not data for Greece and Hungary).

The implementation of the EU reduction and recycling goals in each EU focus state of this report impacts the national labor markets. The impetus is driver for change and enables to establish a competitive labor market throughout Europe.

In all countries, the participation on VET programs is affordable for technicians and managers of the waste management industry. Therefore the interest to participate could be expected as medium or high. The overall willingness among the analysed EU countries, except for Bulgaria (no data), is reported as good.

Figure 4 provides an overview of the number of identified VET offers for managers in the field of waste management.

It becomes clear that in some countries a lot of offers exist, in other countries only some offers are available. Surprisingly the number of online learning courses is still low. The majority of courses are registered courses.

The accreditation, awarding and quality assurance process is in almost every EU focus country institutionalized. The quality of the provided VET programs rated poor to good. This provides further potential for improvement. Technicians and managers can afford the costs of attending VET programs. The willingness to attend programs is at a medium level, however the VET-offers and the kind of provision has to be improved (online learning).

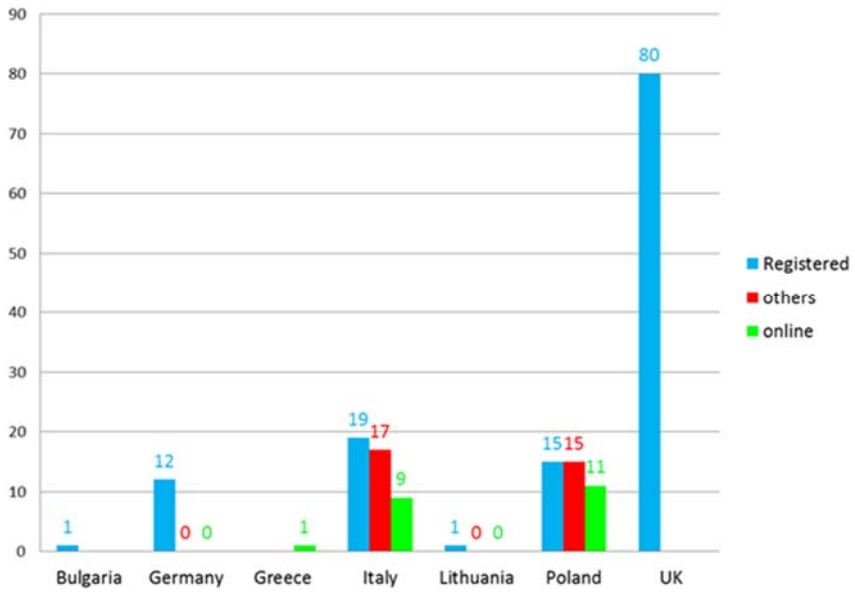


Figure 4: Identified number of VET offers for managers (incl. higher education).

4. The Solid Waste Manager Harmonised Qualifications Framework

Solid waste management incorporates the implementation of different technologies for different and similar types of solid waste. Furthermore, there is significant diversification among EU countries on the adapted solid waste management technologies.

Based on the results of the comparison report and direct contacts with the staff of operating solid waste facilities in the 8 abovementioned EU countries, a European Harmonised Qualifications Framework (HQF) for the occupation of the Solid Waste Manager was developed. The methodology used to compile the SWFM Harmonised Qualifications Framework was based on the methodology implemented for the development of a Professional Profile. A Professional profile is defined as the overall professional functions, activities, tasks that make up the workpiece of a profession or a specialty and the relevant knowledge, skills and competences (abilities) required by a professional to correspond to these functions.

It was clearly revealed that solid waste facilities managers must not only possess technical but also strong administrational and financial management qualifications. Administrative and financial management qualifications are not diversified for different solid waste facilities.

Based on the abovementioned facts, the development of the common administrative and financial management qualifications and then the development of the technical qualifications of a different solid waste management technology and/or facility were decided. Technical management qualifications were developed for the following solid waste management facilities

- Transfer and Waste Sorting station,

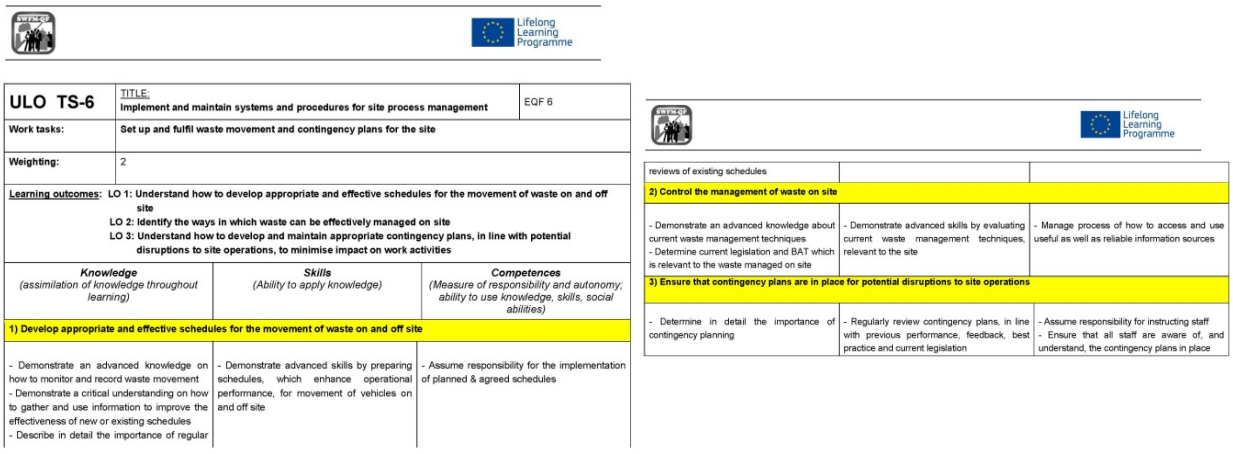
- Sanitary Landfill,
- Incineration,
- Anaerobic Digestion and Mechanical Treatment,
- Recycling,
- Composting.

The identified main common professional qualifications comprise

- Solid Waste Facility Operational Management,
- Human Resources Management,
- Financial and Contractual Management,
- Environmental Aspects Management,
- Health and Safety Issues Management.

The proposed qualifications are described in learning outcomes, since learning outcomes are considered the criteria for the certification and performance-value reflected in the European Qualifications Framework, the common frame of reference levels of qualifications in EU. Learning outcomes are further analysed in knowledge skills and competences descriptors.

Figure 5 illustrates an example of the developed matrix of a technical management qualification for Transfer and Waste Sorting station to set up and fulfil waste movement and contingency plans for the site.



ULO TS-6	TITLE: Implement and maintain systems and procedures for site process management	EQF 6
Work tasks:	Set up and fulfil waste movement and contingency plans for the site	
Weighting:	2	
Learning outcomes:	LO 1: Understand how to develop appropriate and effective schedules for the movement of waste on and off site LO 2: Identify the ways in which waste can be effectively managed on site LO 3: Understand how to develop and maintain appropriate contingency plans, in line with potential disruptions to site operations, to minimise impact on work activities	

Knowledge (assimilation of knowledge throughout learning)	*Skills* (Ability to apply knowledge)	*Competences* (Measure of responsibility and autonomy; ability to use knowledge, skills, social abilities)
1) Develop appropriate and effective schedules for the movement of waste on and off site		
- Demonstrate an advanced knowledge on how to monitor and record waste movement - Demonstrate a critical understanding on how to gather and use information to improve the effectiveness of new or existing schedules - Describe in detail the importance of regular	- Demonstrate advanced skills by preparing schedules, which enhance operational performance, for movement of vehicles on and off site	- Assume responsibility for the implementation of planned & agreed schedules

reviews of existing schedules		
2) Control the management of waste on site		
- Demonstrate an advanced knowledge about current waste management techniques - Determine current legislation and BAT which is relevant to the waste managed on site	- Demonstrate advanced skills by evaluating current waste management techniques, relevant to the site	- Manage process of how to access and use useful as well as reliable information sources
3) Ensure that contingency plans are in place for potential disruptions to site operations		
- Determine in detail the importance of contingency planning	- Regularly review contingency plans, in line with previous performance, feedback, best practice and current legislation	- Assume responsibility for instructing staff - Ensure that all staff are aware of, and understand, the contingency plans in place

Figure 5: A matrix for Transfer and Waste Sorting station to set up and fulfil waste movement and contingency plans for the site.

It is anticipated, the developed qualification frameworks to contribute to a wider understanding of the roles and responsibilities, activities and tasks of waste managers in managing effectively and sustainably different solid waste management facilities.

5. The Info-Training Toolkit

Based on the identified Knowledge, Skills, Competences, an Info-Training Toolkit that have the format of a webpage was developed. The Info-Training Toolkit incorporates:

- The curriculum of the vocational training addressed to Solid Waste Facilities' Manager based on the identified required qualifications.
- Definition of criteria and requirements for the designation and implementation of the vocational training course.
- A Multinational glossary of the relative solid waste management technical terms used in different solid waste management technologies and facilities.

Following the results of the comparison report it may seem obvious that health and safety in the workplace is extremely important, because provision of instruction and training for staff, volunteers and others is necessary to achieve competent, healthy and safe work performance. Therefore an example of the contents of the Info-Training toolkit on Health and Safety issues is included.

5.1. Health and Safety Training.

5.1.1. Training Course's Concept

Health and Safety (H&S) training will enhance managers' comprehension to the critical aspects pertained into personnel's occupational health and safety issues and will provide them the qualifications to develop policies, identify hazardous situations, plan measures and implement actions to ensure the solid waste facility safe operation.

Health and Safety Training courses will provide Solid Waste Managers the necessary qualifications for the:

- Development and implementation of H&S policies and procedures, in line with operational hazards identification, best practices and existing legislative framework
- Operational organisation of Solid Waste Facility management on H&S aspects
- Identification, Assessment and Control of Occupational Hazards associated with Solid Waste Facility (SWF) operational activities
- Effective response and confrontation in case of emergency events
- Effective training of SWF personnel on H&S issues

- Development and implementation of appropriate Occupational Health and Safety management schemes and standards

5.1.2. Training Courses

- Health and Safety (H&S) Legislative Framework
- Solid Waste Facility H&S Organisation
- Methodologies for the Identification and Assessment of Occupational Hazards
- Description of Occupational Hazards in Solid Waste Facilities
- Control of Occupational Hazards
- Health and Safety Audits
- Risk Management
- H&S Training Programs
- Occupational H&S Management Schemes (OHSAS 1801) and Standards (ISO 14798)

6. Conclusion

The sector of waste management is rapidly changing and developing the last years, mainly due to the initiatives and policies adopted in EU and the new technologies and techniques introduced, thus rising a huge need in highly qualified engineers, operational managers and processing technicians all over Europe which now and in the future be only possible through workforce mobility, transparency and mutual recognition of professional qualifications and training. The waste management future prospects seem also to be favourable as key driver is the implementation of European and national legislative framework and especially the forwarding for implementation of modern waste management technologies such as incineration, anaerobic digestion, mechanical biological treatment etc. instead of landfilling.

The research and development of the new proposed professional qualifications for SWFMs and the promotion of the new proposed VET courses for the training of working staff in the field of Waste Management were fully related to the general innovative perspectives and final results of the SWFM-QF project aiming to the creation of new job positions, the strengthening of solid waste management facilities' environmental performance and sustainable development.

SWFM-QF project's structure and partnership including associated partners are directly connected to all interested stakeholders involved in solid waste management and vocational training. SWFM-QF partners already participate actively in large networks of vocational training and Waste Management sectors, thus exhibiting a

full potential to reach all stakeholders not only on regional/national level but also on trans-European and worldwide basis and further disseminate and communicate project's results and the developed, exploitable products (Harmonised Qualifications Framework, Info-Training Toolkit, etc.) that were produced for this purpose.

The project's outcomes will be beneficial in raising transparency for required competences and mobility of professionals in the environmental protection business sector introducing an innovative clearly defined methodology for the creation of a new job profile (SWFM) along with their correlated standardised profiles for different levels of qualifications (EQF Level 6) based on the actual needs of the labor market, across different countries in Europe.

7. Acknowledgements

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