



**Deliverable 12.5:
Updated list of prioritised topics for future guidance
documents**

Work Package 12

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EURAD Deliverable 12.5 – Updated list of prioritised topics for future guidance documents

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ABBREVIATIONS AND DEFINITIONS

CSO	Chief Scientific Officer
GDF	Geological Disposal Facility
KM	Knowledge Management
PMO	Programme Management Office
EURAD	European Joint Programme on Radioactive Waste Management
GBS	Goals Breakdown Structure
MS	Member State
R&D	Research and Development
RD&D	Research, Development and Demonstration
RQM	Requirements Management
RWM	Radioactive Waste Management
URF	Underground Research Facility
WMO	Waste Management Organisation
WP11	EURAD work package (no. 11) State-of-Knowledge
WP12	EURAD work package (no. 12) on guidance development (Guidance WP)
WP13	EURAD work package (no. 13) Training & Mobility

EXECUTIVE SUMMARY

The EURAD Guidance work package (WP12) is developing a comprehensive suite of specific guidance documents that can be used by EU Members States with RWM programmes that are at an early-stage of development, but can be beneficial also to more advanced programmes.

A transparent and justified selection process of topics for the guidance developed within EURAD is essential. For selecting the topic of the pilot guide – in comparison to the topics for the further guides to be developed – a simplified approach was applied. In parallel with the development, review and approval of the pilot guide the selection process for topics of further guides was started. In this process, the lessons learned from the process of selecting and compiling the pilot guide were taken into account.

The starting point for selecting further guidance topics was a literature survey. This can orient the users to what knowledge is available (signposting), which can be used for planning and implementing their radioactive waste disposal programme. Based on the literature survey it was concluded that although available technical documents and guidance are abundant, early-stage programmes or small inventory programmes often face a challenge of information overload and deciphering which sources of information are most accurate and most recent, thus the guidelines should aim at providing concise references to orient the reader.

Using the literature survey material and taking into account the potential topics considered for the pilot guide selection process, the WP12 team identified a list of 10 topics. A consultation process was carried out in which feedback from potential end-users, other EURAD work packages and from the editorial board was used to prioritise topics.

Finally, a consultation with the chief scientific officer of EURAD was organised. Common denominator of majority of suggested topics was identified as requirements management. Based on the discussion with the chief scientific officer the plan is to develop first a general guide on requirements management, which can provide the necessary framework (framework guide) for further specific guides. The framework guide could cover the general role of requirements in the implementation of the geological disposal facility (or any other disposal facility) during all phases. After finalising the framework guide on requirements management (RQM), some examples of RQM application to particular processes in a disposal programme implementation can be defined as topics for further guides (specific RQM guides) to be developed within EURAD and can serve as a basis for guidance development in EURAD2.

For drafting the framework guide a workshop is planned to be organised, where invited experts will share their experience in preselected areas of RQM and structure the topic. The workshop will also provide opportunity for the participants – who could potentially be the end-users of the guides – to share their views concerning the topic and give input for guidance production (so they could be co-authors).

The outcome of the workshop will be incorporated in the guide production process. Taking into account the feedback received from the workshop, the structure of the framework guide will be finalised, and subtopics selected for which sub-guides will be developed by WP12 and other interested EURAD partners.

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1. INTRODUCTION

The importance of Knowledge Management (KM) is recognised by EURAD, the European Joint Programme on Radioactive Waste Management (RWM). KM activities aiming at establishing State-of-Knowledge documents, preparing guidance documents on the needed R&D in the successive phases of a management and disposal programme, and establishing hands-on training and mobility courses. Activities in this field are organised in three dedicated Work Packages (WP) such as State-of-Knowledge (WP11), Guidance (WP12) and Training & Mobility (WP13).

At present, there is no shortage of advice, guidance, experience or management expertise at a European level, although newer RWM programmes are likely to find gaps at a national level as they improve and integrate their pre-disposal activities and begin to implement disposal solutions. [8] Mechanisms for how such programmes can make best use of the available knowledge need to be developed or improved quite urgently.

The EURAD Guidance work package (WP12) is developing a comprehensive suite of specific guidance documents that can be used by EU Members States with RWM programmes that are at an early stage of implementation, but can be beneficial also to more advanced programmes, where the challenge is more the knowledge transfer across generations.

These guides have to be needs driven, meaning, that a wide range of end-users consider the newly developed guides useful for radioactive waste management programme implementation. The guides are self-standing documents but integrated into the broader context of EURAD through the EURAD Roadmap [1]. The Roadmap enables different activities to be linked to the overall RWM process. This linkage provides easier orientation for potential users when they are searching for information on how to start or manage particular activities, taking into account the current best practices [2].

The goals of the guidance documents are to share existing experience and lessons learned and to assist “Transfer of knowledge towards Member States (MS) with early-stage RWM programmes”, as well as “Transfer of knowledge between generations”. Guidance documents should facilitate orientation in the field itself (existing knowledge resources and existing international cooperation and networking) as well as foster understanding of different solutions in different cases and countries. The expected added value is improved information and knowledge transfer between national programmes.

The target end-users of the guides are primarily programme owners and managers responsible for planning and implementing RD&D at a national level, even though they might also be of use to other interested stakeholders. It is important to identify potential end-users' groups [2]:

- The first group consist of end-users who need to start (or substantially change) a radioactive waste disposal programme implementation. This end-user group is characterised by low experience in a particular area. For this group it is important to give basic guidance orientation. The exchange and sharing of knowledge between advanced programmes and early-stage programmes or newcomers to the topics is normal praxis. Positive and even negative (if available) examples may provide useful guidance, but should not be used without taking into account national circumstances. Guides targeted to theses end-users are more general, usually covering broad topics.
- End-users who need to manage knowledge in a relatively narrow area, usually within an established national framework, are typical for the second group. Guides for this group are more detailed in a narrow topic. The level of detail and variance in national circumstances often make it difficult to provide guidance that is valid for implementation of multiple MSs RW disposal programmes.

2. SELECTING THE TOPICS FOR THE GUIDES

The topic selection process has evolved in parallel with the development of the pilot guide. Firstly, an urgent task arose to select a topic for the “pilot guide”. This was made through a simplified selection process (see section 2.1), while the topic for further guides has been selected by applying a more systematic process based on a gap analysis (see section 2.2).

2.1 Topic selection for the pilot guide

A pilot guide was planned to test the guidance development process (and the quality management procedure). For selecting the topic of the pilot guide – in comparison to the topics for the further guides to be developed – a simplified approach was applied. The starting point was the long-list of topics proposed by the EURAD Roadmap Advisory Committee:

- practical issues encountered in establishing a geological disposal facility (GDF) siting programme,
- factors encountered in waste management organization (WMO) interface with government (and EU directives),
- managing interactions in multidisciplinary teams (engineers with sociologists; geologists with physicists; modellers with lawyers),
- means to ensure a constructive interaction between implementer (mostly WMO) and regulator, as well as other stakeholders, to ensure progress in the repository programme without jeopardising the roles and independence between them optimising the regulatory interface,
- managing organisational and mind set transition on the road from research to implementation, i.e., repository construction and operation without losing track of the uniqueness of nuclear waste repositories compared to other kind of nuclear facilities,
- ensuring success in communication,
- establishing and managing programme requirements and how these need to be is linked to the findings of the research development and demonstration (RD&D) programme,
- optimising RD&D spending when budgets are limited,
- approaches to repository optimisation, when should it be done and where should it focus,
- getting the most out of international organisations.

Based on this long-list and taking into account the experience of the WP12 Team a short-list with 3+1 topics was identified:

- Funding and Financing Aspects of Radioactive Waste Disposal,
- Optimization of Disposal of Radioactive Waste,
- Derivation of Requirements for the Disposal System,
- Waste Acceptance Criteria (reserve).

The WP12 team has developed a brief description for the first three topics, which contained among others the rationale behind the proposal, the connection to the EURAD Roadmap themes, subthemes and domains and preliminary screening of existing guidance on the given topic, which is summarised in [3].

The topics of the short list were evaluated against predefined selection criteria, defined by the WP12 team, in a qualitative and semi-quantitative way. Based on this ranking exercise the Guidance WP agreed that the three proposals on the short list were viable. The topic proposals on 'Funding and Financing Aspects of Radioactive Waste Disposal' and 'Derivation of Requirements for the Disposal System' scored very close to each other in the evaluation. Nevertheless, the WP12 team decided to propose the first topic to be developed as a pilot guide as the time period and readiness of resources for its timely development was assessed reasonable by WP12 team experts. Later the title has been modified to "Cost Assessment and Financing Schemes of Radioactive Waste Management Programmes" in order to be in line with EU terminology (e.g., NAPRO Guide [4]), but the content of the pilot guide remained the same.

The proposed topic for the pilot guide was approved by General Assembly 4 on 18th January, 2021 and the guide was delivered in February 2021 [5].

2.2 Topic selection for further guides

In parallel with the development, review and approval of the pilot guide the selection process for topics of further guides has been started. In this process the lessons learned from the process of selecting and compiling the pilot guide were taken into account. One of these was the establishment of an editorial board for assisting, reviewing and orienting the work of the WP12 team.

2.2.1 Selection criteria

Some basic criteria were defined for selecting topics for further guides, clearly linked to and coherent with the EURAD founding documents (Vision document [6], Strategic Research Agenda [7] and EURAD Roadmap [1]):

- Interaction with EURAD WPs: Are there any outputs from EURAD already available to be used for guidance development? How and to what extent are they used?
- Clearly demonstrate European-added value (improved information and knowledge transfer between national programmes and across generations);
- Be meaningful, focused and manageable;
- Are there any identified guidance gaps;
- Each contribution should bring complementarity (avoid duplication, keep clear of disconnected, spread or repeated contributions);
- Responsive to the end-users needs and expectations (effectively assists the targeted end-users in their programme implementation, i.e. be need-driven);
- Importance (it should be evaluated how big an area of the Roadmap is covered by the topic, which is more or less correlates with the aspect of how significant a role the given topic has in RWM programme implementation);
- Urgency in terms of programme implementation stage (in what stage of RWM programme development should the guidance be implemented; when should the guidance on a given topic be ready for the target end-users);
- Expertise (how much expertise is necessary for the development of the given topic outside of the Guidance WP, or outside of EURAD);
- Length of development (based on the preliminary assumptions, how lengthy could the process of development of the guide be) [2].

Additionally, to the selection criteria derived from EURAD founding documents, WP12 team has identified some basic principles for the guides, which should:

- reflect best practice and lessons learned underpinned by solid references;
- be user-friendly;
- be a concise document, with an overview / entry point to the topic;
- learn from experienced actors;
- (documents) be authored by experts;
- remain flexible to adapt to needs and improvements;
- avoid redundancies (e.g., IAEA, OECD/NEA).

Some of these principles influence the topic selection (e.g., avoid redundancies) – so these were taken into account in the selection process – some others (e.g., be user-friendly) were more related to the development of the guides.

2.2.2 Screening of existing guidance literature

The starting point for selecting further guidance topics was a literature survey, which helps orienting users to what knowledge is needed and available, when planning their geological disposal programme. The literature search was made systematic and as comprehensive as possible. In order to establish a sound basis for the mapping of the available guidance and guide-like technical documents, a first step was to perform a detailed search of:

- international regulation documents (ICRP and WENRA);
- international guides (IAEA);
- international guide-like technical documents (IAEA, OECD/NEA, EC Projects);
- national guides, and
- national guide-like technical documents.

Other main sources for the mapping have been former and running EC co-funded projects' documents. Open web was searched to obtain the complete information on the available material related to the establishment of geological disposal.

The existing guides and guide-like documents were linked to the themes, sub-themes and domains of the EURAD Roadmap (signposting). Seven themes have been identified within the EURAD Roadmap Goals Breakdown Structure (GBS) [1]:

1. Managing implementation and oversight of a RWM program;
2. Predisposal (radioactive waste characterisation, processing and storage, and source term understanding for disposal);
3. Engineered barrier system properties, function and long-term performance;
4. Geoscience to understand rock properties, radionuclide transport, long-term geological evolution;
5. Facility design and the practicalities of construction, operation and closure;
6. Siting and licensing;
7. Performance assessment, safety analysis and safety case development.

Signposting provided a hierarchical structure that facilitates definition of topics for further guidance. It allows capturing knowledge with the level of detail that is required by the end-user, from a broad overview towards an increasing level of detail. The classification into seven themes is necessary in order to discretise the huge field of RWM activities and to align the guides with the EURAD Roadmap. Most of the documents found cover some subjects of these themes, not necessarily being specific of one of them, and in most cases touching several themes.

As a result of the signposting a Theme-oriented 'Literature Guidance Catalogue' [8] was compiled, which could provide essential background primarily for counties making a first attempt to set-out their programme towards geological disposal of radioactive waste.

2.2.3 Screening conclusions

The screening of the existing guidance and guide-like technical documents has resulted in a vast quantity of information and knowledge sources that exist in relation to RD&D and technical programme management towards implementation of geological disposal of radioactive waste.

It was observed, that many guides were quite broad in scope, so it was worth judging whether a specific area exists within the broader scope, to which practical guidance could be focussed. If guidance already exists, it can be considered how EURAD can build on it – i.e., what additionally should be done. Moreover, most of the

existing guidance need to be revised and – if needed – supplemented from time to time in the light of progress, new developments and RD&D results.

Based on the literature survey it was concluded that although the available technical documents and guidance are abundant, early-stage programmes or small inventory programmes often face a challenge of information overload, and deciphering which sources of information are most accurate and most recent, thus the guidelines should aim at providing concise references to orient the reader.

Based on the literature screening and taking into account the potential topics considered for the pilot guide selection process, the WP12 team established the following list of topics:

1. Using the safety assessment as a tool to derive requirements for the disposal system elements;
2. Role of implementer in planning and managing repository development programme;
3. Developing strategy for data management and preservation of records and knowledge in the context of radioactive disposal programme;
4. Using the safety case (and safety functions) to prioritize geological disposal RD&D;
5. Developer/ implementer and regulator interactions during the planning, siting, engineering design, RD&D and construction of disposal facilities;
6. Managing interactions in multidisciplinary teams (engineers, geoscientists, sociologists; physicists; modellers, lawyers etc.);
7. Establishing and managing programme requirements and how these need to be is linked to the findings of the RD&D programme;
8. Developing the design basis for a geological repository;
9. Assessing the acceptability of site conditions for the location of a geological repository;
10. Characterization of high-level waste at different management stages.

The list was evaluated against pre-defined selection criteria's (section 2.2.1) based on the expert judgement of the WP12 team members in a qualitative and semi-quantitative way. Each team member could score the topic proposals and the results were discussed at the WP12 web meetings, setting the final guidance priority. It was emphasised that for any guidance document it shall be ensured that it provides an added value to the target end-users (needs driven) in an area, which is not covered by existing guidance (avoid duplication) [2].

3. CONSULTATION PROCESS

3.1 Feedback from end-users and other EURAD WPs

Feedback on the presented list of topics has been asked from the pre-defined end-users, the editorial board (three experts supporting the WP12 team) and the Programme Management Office (PMO) has been asked for commenting the presented list of topics. Beside this, all EURAD R&D and Strategic work packages were requested to indicate if guidance would be useful in their respective technical areas. From EURAD WPs the contribution to the signposting of existing guidance ('please indicate existing documents guidance documents in your field') and 'proposals for topics for further guides' were also asked.

Very limited feedback has been received from the potential end-users and none from other EURAD WPs. A separate discussion was held with the members of the editorial board who provided additional topic proposals to be included:

11. Change management;
12. Integrated role of KM and Roadmap implementation.

3.2 Consultation with Chief Scientific Officer

At this point, a discussion was held with EURAD Chief Scientific Officer (CSO), who provided useful feedback for topic selection that moved the process forward. It was agreed that two topics (No.3 and No.10) should not be preferred as they have been done by others; some of the topics were considered as management issues (No.3 and No.6) and some others could be too country specific to provide general guidance (No.2 and No.5).

From the list of the remaining topics the CSO has suggested to select five – all related to requirements of the programme implementation – and merge those in a systematic way. These merged topics could be developed as further guides within EURAD. These topics, which cover some aspects of Requirements Management (RQM) are as follows:

- Use safety assessment to derive requirements for disposal system elements,
- Using safety case / safety functions to prioritize geological disposal RD&D,
- Establish & manage requirements and their links to RD&D program,
- Develop design basis for geological repository,
- Assessing acceptability of site (conditions) for geological repository.

3.3 Lessons learned from consultation

As mentioned in section 3.1, very limited feedback was received from the targeted end-user groups. This fact has been analysed within WP12 and the conclusions were:

- the end-users shall be carefully identified, case by case;
- only relevant expert(s) shall be contacted within a given organisation;
- the preparation of an extensive and applicable feedback needs time from the expert(s), which has to be financed (this could be a special assignment) and a necessary budget should be allocated for this activity.

A change in guidance preparation was initiated to increase participation of potential end-users in specification of the guide content. Important additional added value of common work on the guide could be networking of involved experts. The work on similar topics could promote creation of a community of practice (see section 4.3).

4. PROPOSAL FOR THE TOPICS OF THE FURTHER GUIDES

4.1 General topic - requirements management

The WP12 team has agreed with the EURAD chief scientific officer on the above-mentioned proposed RQM topics. The plan is to develop first a general guide on RQM, which can provide the necessary framework (framework guide) for the further specific guides. The framework guide should cover the general role of requirements in the implementation of the geological disposal facility (or any other disposal facility) during all implementation phases. After finalising the framework guide on RQM, some examples of RQM application to particular processes in disposal programme implementation can be defined as topics for further guides (specific RQM guides) to be developed within EURAD and can serve as a basis for guidance development in EURAD-2. The very brief description of the topic on RQM can found in the appendix of this document.

4.2 Involvement of experts as authors

It should be mentioned, that the RQM has been considered in the original set of topics for a pilot guide. At that time the WP12 team decided, that there was a too high risk to select that topic as there was not enough

experience in the WP12 team and the involvement of experts, from advanced programme countries, was not foreseen. Now, the situation has changed positively, because the necessary funding has been granted to involve experts from advanced programme countries and a preliminary commitment has been received from an expert, who could potentially be co-author of the RQM guides. WP12 team strongly believes that through the involvement of the relevant expert(s) valuable results can be achieved in the topic of RQM.

4.3 Finalising the structure

As a starting point for drafting the framework guide a workshop is planned to be organised, where invited experts will share their experience on pre-selected areas of RQM and introduce a structure of the topic. The workshop will also provide opportunity for participants – who could potentially be the end-users of the guides – to share their views on the given topics. It might also identify co-authors and reviewers of the planned guide documents.

We believe that by organising such workshops, those experts can be found, who are really interested in the topic and who will become the real end-users of future guides. This could be a starting point to initiate discussions and information exchange between experts representing programmes in different level of advancement (networking, as it is described in [9]) and this should be continued to establish a community of practice in the given field.

The outcome of the workshop will be incorporated in the guide production process. Taking into account the feedback received from the workshop, the structure of the framework guide will be finalised and also those subtopics should be selected for which additional sub-guides will need to be developed by EURAD WP12.

REFERENCES

- [1] EURAD Roadmap; <https://www.ejp-eurad.eu/roadmap>
- [2] P. Ormai, B. Nős, J. Faltejsek, J. Mikšová, N. Železnik, I. Mele, K. Fuzik, P. Carbol, A. Banford, E. Holt; Development of guidance documents in the EURAD and PREDIS projects, EURADWASTE '22, 30 May – 3 June 2022, Lyon, France.
- [3] P. Carbol, J. Faltejsek, B. Nős, J. Mikšová, N. Železnik, O. Tokarevsky, I. Yarmosh; Approved list of prioritized topics for further guidance documents and selection of one topic for the development of a pilot guide D12.3 of the HORIZON 2020 project EURAD. EC Grant agreement no: 847593, 2021
- [4] ENEF (2013), Guidelines for the establishment and notification of National Programmes, European Nuclear Energy Forum, ENEF Working Group Risk, Working Group on National Programmes NAPRO, January 2013
- [5] P. Carbol, J. Faltejsek, I. Mele, N. Železnik, P. Ormai, B. Nős, J. Mikšová, K. Fuzik (SSTC NRS); Guidance on Cost assessment and Financing Schemes of Radioactive Waste Management Programmes D12.4 of the HORIZON 2020 project EURAD. EC Grant agreement no: 847593, 2021
- [6] EURAD Vision document: A step change in European collaboration towards safe radioactive waste, 2019, <https://www.ejp-eurad.eu/publications/eurad-vision>
- [7] Strategic Research Agenda, The scientific and technical domains and sub-domains and knowledge management needs of common interest between EURAD participants, 2019 https://www.ejp-eurad.eu/sites/default/files/2020-01/2. eurad_sra.pdf
- [8] P. Ormai, B. Nős, J. Faltejsek, I. Mele, N. Železnik, J. Mikšová, K. Fuzik, P. Carbol; Guidance and Guide-like documents on Geological Disposal of SNF, HLW and Long-lived Waste - Contribution to the EURAD Roadmap Gap Analyses. Final version as of 25/07/2022 of deliverable D12.7 of the HORIZON 2020 project EURAD. EC Grant agreement no: 847593, (in publishing, 2022)
- [9] EURAD Knowledge Management and Networking Programme. Approved by EURAD General Assembly, 18th January 2020. <https://www.ejp-eurad.eu/publications/eurad-knowledge-management-and-networking-programme>

Appendix: Topic description

Management of requirements during the implementation of a disposal facility – framework guide

Proposal

The proposal is to elaborate a guidance document, which covers the derivation, update and long-term management of requirements for the different elements of the geological disposal system.

Objective

The objective of the guidance is to describe a systematic approach to a generic Requirements Management System for geological disposal facility.

This topic is too broad to be covered in one guide, so the approach is to have a high-level guide (framework guide) on requirements management in general and some underlying specific guides (e.g. for site selection and characterization, for system design and optimisation).

Rationale

This is an overarching topic, covering all the phases of the implementation of a RW disposal facility. This provides the opportunity to define subtopics for the interest of Member States in different stages of programme implementation.

For countries with early-stage programmes, the main interest could be site selection and characterisation, while countries with advanced stage programmes can find interest in system optimisation.

Description

In the Policy, Framework and Programme Establishment phase the focus could be that within the national legislative framework and policy, considering the Member State's national inventory disposal options have to be defined for all waste streams generated in the given country.

The Site Evaluation & Selection phase is specific for a given disposal option. In this phase the main focus is on the site properties and the safety functions, which has a role to fulfil the post-closure safety goals.

In the Site Characterisation phase for a deep geological disposal facility, it is a strategical decision, whether the underground research facility (URF) is designed and excavated so that will be a part of the future repository or not. In case the repository will be extended from the URF all the safety requirements for the future repository shall apply to the URF as well. In case the URF is a separate research facility it has to be proved that all the information gathered in the URF is valid for the future repository site. The pros and cons of the two concepts could be elaborated at this phase. In the second part of this phase, the detailed design and the design basis of the repository has to be defined including the consideration of potential external hazards, which have to be systematically evaluated and be transferred as requirements.

In the facility Construction and Operation phase, based on the predefined and regularly updated requirements the performance targets of the system elements can be defined and the system optimisation could take place.

There are important questions connected to this phase, which could be answered in the framework guide or in specific guides, such as:

- How are the requirements defined during the above-mentioned phases?

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- What is the role of the safety functions and the safety case in the process?
- How is the RD&D programme linked to requirements management and governed to fill the gaps and reduce the uncertainties?
- How should requirements be properly managed over a repository implementation programme?

Experience gained by advanced RWM programmes indicates that RQM should be planned in a holistic way from the start of a programme.

Requirements themselves inevitably evolve as a programme proceeds, typically being rather general or generic at early stages and increasingly specific and well-defined at later stages. This can lead to an increase in the numbers of levels in requirements management hierarchies.

In programmes that are still in an early (i.e., pre-site selection) stage, it may be deemed more important to show adherence to some requirements more than others, with the focus generally being on long-term safety requirements. As the programme proceeds, adherence to other requirements typically gains more weight, e.g., requirements on engineering feasibility and operational safety, affordability and other stakeholder requirements. Programmes at an early phase tend to be RD&D oriented. The requirements guiding such programmes tend to be rather general and generic. At later stages, when programmes become more “project-oriented”, requirements become more precise and stable. Their number increases, particularly those on operational safety and engineering feasibility.

It is important that all types of requirements are represented in Requirements Management Systems throughout the course of a programme, even if some types of requirements are initially only high-level and general in nature, so as not to lose sight of the importance of each type.