SEVENTH FRAMEWORK PROGRAMME

Research Infrastructures

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PRACE-3IP

PRACE Third Implementation Phase Project

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[35]   5PM - web-based, http://www.5pmweb.com/

List of Acronyms and Abbreviations

AISBL	Association International Sans But Lucratif (legal form of the PRACE-RI)
BoD	Board of Directors
BSC	Barcelona Supercomputing Center (Spain)
CEA	Commissariat à l'Energie Atomique et aux Energies Alternatives
CoE	Center of Excellence
CPU	Central Processing Unit
CSF	Critical Success Factors
EC	European Community
EESI	European Exascale Software Initiative
EFQM	European Foundation for Quality Management
EPCC	Edinburg Parallel Computing Centre (represented in PRACE by EPSRC,United Kingdom)
ESFRI	European Strategy Forum on Research Infrastructures created roadmap for pan-European Research Infrastructure.
ETP	European Technology Platform
FAQ	Frequently Asked Questions
GB	Giga (= 2^{30} ~ 10^9) Bytes (= 8 bits), also GByte
Gb/s	Giga (= 10^9) bits per second, also Gbit/s
GB/s	Giga (= 10^9) Bytes (= 8 bits) per second, also GByte/s
GENCI	Grand Equipement National de Calcul Intensif (France)
GFlop/s	Giga (= 10^9) Floating point operations (usually in 64-bit, i.e. DP) per second, also GF/s
HPC	High Performance Computing; Computing at a high performance level at any given time; often used synonym with Supercomputing
HR	Human Resources
ISC	International Supercomputing Conference; European equivalent to the US based SC0x conference. Held annually in Germany.
KB	Kilo (= 2^{10} ~ 10^3) Bytes (= 8 bits), also Kbyte
KPI	Key Performance Indicator
MFlop/s	Mega (= 10^6) Floating point operations (usually in 64-bit, i.e. DP) per second, also MF/s
Petaflop/s	Peta (= 10^{15}) Floating point operations per second
Exaflop/s	Exa (= 10^{18}) Floating point operations per second
Open R&D	Open Research & Development. The existing industrial access within PRACE
PATC	Prace Advanced Training Center
PDCA	Plan, Do, Check, Act (Organisational Model)
PEST	Political, Economic, Societal, Technological
PI	Principal Investigator
PPP	Public Private Partnership
PRACE	Partnership for Advanced Computing in Europe; Project Acronym
PSNC	Poznan Supercomputing and Networking Centre (Poland)

RADAR Results, Approaches, Design, Assessment, Revision (Methodology derived from the EFQM Model)

SNIC Swedish National Infrastructure for Computing (Sweden)

SWOT Strengths, Weaknesses, Opportunities, Threats

Tier-0 Denotes the apex of a conceptual pyramid of HPC systems. In this context the Supercomputing Research Infrastructure would host the Tier-0 systems; national or topical HPC centres would constitute Tier-1

Executive Summary

After almost four years of functioning as a legal entity, PRACE has successfully dealt with the inherent difficulties of creating an international research infrastructure. The amount of effort invested in managing this achievement has been exceptional and at this point in time, while PRACE is finalising its strategy beyond the initial period, it is advisable to consider options for systematising internal processes and optimising their management while achieving a higher rate of effectiveness and leadership of a world class research infrastructure. This document reports the result of research work in the area of excellence frameworks for organisations with a world leadership objective and associated management techniques. It also provides a tailored advice for PRACE to be considered in the short-to medium- term. This exercise, however, does not represent an obligation for the association, that may consider accepting, modifying, or indefinitely delaying its implementation.

The proposed guidelines and actions are based on the EFQM Excellence Framework Model, used by over 30000 European organisations. This model identifies the organisational and management elements that excellent organisations have in common. It delivers a guideline for those organisations that aspires to evolve towards excellence. Based on the EFQM model, WP2 created a survey for PRACE submitted to the Chairman of the Board of Directors who provided feedback on the importance and maturity of each element of the model. On the basis of this, WP2 developed the different organisational elements highlighted in the EFQM model. Depending on the relevance assessed, some elements have been developed further than others. The list of elements is as follows:

- Vision: providing guidelines and motivation of an agreed view.

- Values: providing guidelines and motivation of PRACE values.

- Policies & Processes: providing methodology for designing, monitoring and improving PRACE processes.

- KPI ScoreCard design: providing guidelines for integrating the use of KPI as a regular tool in PRACE management; both for evaluating the external impact as well as internal operations.

- Management Process: suggesting a general management process based on roles and tasks including other elements developed in the document.

- Risk Management: providing guidelines for risk evaluation when analysing and designing processes for PRACE.

- Management process assessment: providing guidelines for integrating an assessment sub-process for the different management processes.

- Management of priorities: providing guidelines for a methodological treatment of priorities.

- Human Resources management: providing guidelines for defining PRACE processes related to skills management, appraisal processes and fostering a cooperative and creative culture.

- Financial management: highlighting the key elements to be considered in defining financial processes.

- Stakeholders management: providing guidelines and tools to leverage PRACE's relationship with stakeholders; defining a general process for managing them.

- External factors analysis: providing guidelines to analyse relevant external factors for PRACE to be considered in Strategic reviews and stakeholders management.

- Partnership management: providing guidelines and a suggested process for managing partnerships in PRACE in a process-oriented manner.

- Partnership selection and acquisition: providing guidelines in this sub-process of the partnership management.

- User analysis: providing guidelines on how to analyse and leverage information on users for the benefit of PRACE, its users and Stakeholders.

- Marketing management: providing guidelines on which information to use and how to use it to better promote and build the PRACE brand.

This document has been conceived as a reference guide for further work in developing a more process oriented organisation. The different elements are often related and it is advisable to read the entire document to have all the necessary elements in mind to implement the mechanisms described.

1 Introduction

1.1 Managing a Research Infrastructure

The PRACE Research Infrastructure has been operating since 2010. Its management has been based on the creation of a dedicated team that manages access to PRACE resources, while strategic management has taken place at Council level. This approach has been successful in the start-up phase; however, in a long term perspective, it is worth considering ways in which the management of the infrastructure can be improved.

Sustaining and providing access to a world class Research Infrastructure is at the core of PRACE. Starting up the Research Infrastructure is just a first step with particular requirements. However, a sustainable professional and competitive organisation requires proactive efforts to achieve flexibility to adapt to changes, effectiveness in communications to create awareness, strategic vision to drive the operation to high-impact outcomes and to ensure a future as a provider of a world class Research Infrastructure. These efforts are much different from those needed in the start-up phase, and RI Management can highly benefit from properly adapted best practices and excellence models used by management in public and commercial organisations.

In this vein, the Ramiri and Ramiri two projects [1] aimed to deliver a training and networking programme for people involved in planning and managing international research infrastructures within the EU. Both projects funded by the EC under FP7 ran a set of workshops and developed reference material relevant for the management of organisations such as PRACE. Within Task 2.3 of PRACE-3IP that has produced this deliverable, this material has been reviewed, adapted and extended to suit the particular needs of PRACE.

As stated in the Ramiri handbook [2] in the lifetime of a RI there are several stages at which the focus of managers need to be different, e.g. in regards to finances: from lobbying for the construction funding, to achieving longer-term sustainability, to either decommissioning or re-building an upgraded facility. Whatever the stage, there is a constant need for development: people, technology, services, cost structure, organisation, efficiency, etc. The management of RIs needs to assimilate this need – being dynamic is one key requirement. Even if things look

stable, something is constantly burning underneath. This is typical for innovative organisations that always want to find a better way of doing things. To set the direction and also to meet the internal expectations, the target setting and strategy need to be both challenging and clearly communicated, and inclusive of the staff, the external users and stakeholders involved in developing it. In this development preparedness for the unexpected, making scenarios in advance to tackle the more common as well as the less common challenges must be an integral part. During the RI lifetime unplanned events are likely to happen and having developed a plan of action in advance rather than deciding on actions in panic mode is highly likely to result in a better response outcome. Ensuring the commitment of funding bodies and users is key to success and sustainability. Making sure the management serve and respond to the changing needs of the users and stakeholders and do not consider their support automatic is critical. Management must be engaged in a constant dialogue with the funding and steering bodies and make understand their objectives as they evolve, and Be prepared to discuss and constructively argue about some of them in case they do not appear optimal giving the insight and expertise the RI management processes of user resource and service needs, operational and technology constraints, while being sensitive to external advices potentially offering new and innovative solutions for many aspects of the RI and its management, operations and evolution.

1.2 The approach followed

The goal for Task 2.3 PRACE-3IP has been to develop recommendations and guidelines for enhanced (optimal), PRACE management processes and supporting tools. The review of the Ramiri projects material made clear that useful recommendations and guidelines needed to be comprehensive; hence the next logical step for advancing in our objective was to search for an excellence framework to be adopted. Such frameworks provide comprehensive guidelines for the management of an organisation. Amongst the considered excellence frameworks ([3],[4],[5] amongst many others) we decided to select one that, apart from being widely used and proved, would not be too rigid in its implementation. The objective was to select concepts in the excellence framework as basis for methodological support for the PRACE management in evolving PRACE into a more process-oriented organisation. The official certification in the selected framework was excluded as an option since it was perceived not to be advantageous for PRACE now and its medium term future.

1.2.1 *The EFQM Model*

the EFQM [6](European Foundation for Quality Management) Excellence model Used by over 30,000 organisations in Europe for the last 20 years was selected to guide our development of recommendations and guidelines for PRACE. it has been fine-tuned over this time incorporating experiences and lessons learned by member organisations. The EFQM model is a practical, non-prescriptive framework that enables organisations to:

- Assess where they are on the path to excellence; help them to understand their key strengths and potential gaps in relation to their stated Vision and Mission.

- Provide a common vocabulary and way of thinking about the organisation that facilitates the effective communication of ideas, both within and outside the organisation.

- Integrate existing and planned initiatives, removing duplication and identifying gaps.

- Provide a basic structure for the organisation's management system.
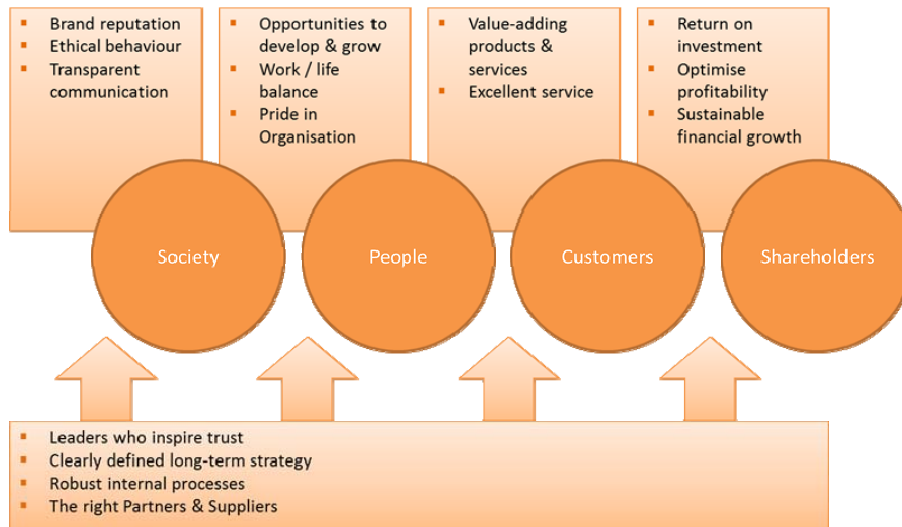
Figure 1: Vision of the EFQM Model Usefulness

Whilst there are numerous management tools and techniques commonly used, the EFQM Excellence Model provides a holistic view of the organisation and it can be used to determine how these different methods fit together and complement each other.

1.2.2   The RADAR Logic

As part of the EFQM Model, its RADAR logic offers a structured approach to improve the performance of an organisation. It also can help to lead change and manage improvement projects. The RADAR logic has a loop structure to be applied to virtually any aspect of an organisation. As stated in the RADAR bibliography [7], its value compared to other permanent improvement cycles (e.g. PDCA-from ISO9001) is illustrated by describing incomplete cycles:

Dreamer loop: *Plan, Sing, Hope, Forget, Cry: in this first case, there is a Chief planning a lot of things in his own head, telling all his followers his marvellous plans at a dinner and being satisfied to have sold dreams. Persuaded that things are going on, he forgets them till a shock awakes him. Then it only remains for him to cry.*

Slogger loops: *Plan, Do, Hope, Forget and Cry: in this second case the author of the plans takes care to deploy them. But after having started things, he hopes for quick and consistent effects and results. Then, alarmed by other problems or attracted by other opportunities, he forgets them till a shock awakes him. Then it remains for him to cry.*

Accountant loops: *Plan, Do, Check, Forget, and Cry: in this third case, action is accomplished. Persuaded that things are going on, people forget them till a shock awakes them. Then it only remains for them to cry.*

Improver loops: *Plan, Do, Check, Act, and Cry: in this fourth case, action was accomplished and the lessons were learned. But there is no preparation for the next challenge when the shock arrives. Then it only remains to cry if you are not aware of what to do in front of the new context.*

A way of closing the loop is to make the system self-organise and twist it somehow into the RADAR loop: results, approach, deployment, assessment and refinement.
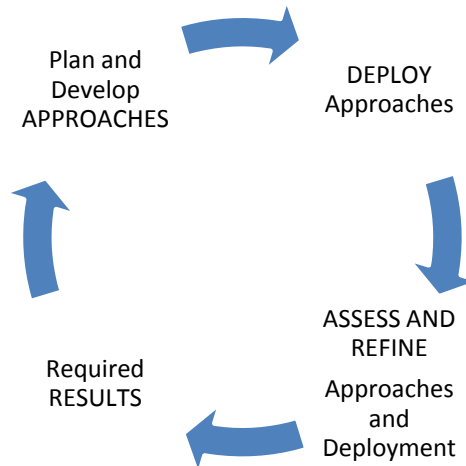
Figure 2: The RADAR loop

Results phase: In this phase, the organisation determines the Results to be achieved as a part of the strategy. It is determined what the right things to do are instead of how to do them. Examples: Do we want to reduce costs? Do we want to increase the user base? Do we want to involve more countries?

Approaches phase: Once these objectives are laid down, the organisation must define, plan and develop Approaches that make it possible to attain the awaited results. To select the best approaches, the organisation should apply benchmarks against the best practice owners globally. Selecting the right approaches requires organising business intelligence about the state-of-the-art of the functions and processes.

Deploy phase: Organisations should Deploy these approaches in a systematic way to ensure results. The control of project management is imperative to be effective and efficient in this endeavour. All processes, all performance teams, all co-workers must be involved. It requires strong project planning, management and control, relationship skills to involve everyone, troubleshooting competences, and resources as well as partnerships management.

Assess phase: When feedback arises from Deployment, the organisation measures its performance. Managers with co-workers Assess the results obtained to identify priorities for improvements or necessary adjustments.

Refine phase: Refine the approaches and the way they are deployed to make the practices evolve or change, including the practice of self-assessment, not to measure performance, but to collectively define the strengths and areas of improvement for the organisation. This needs to be done taking into account not only what happened inside our area, but also the evolution of the context.

1.2.3   *The assessment of PRACE based on the EFQM Model*

The EFQM excellence model is based on a set of underlying principles which are the essential foundation of achieving sustainable excellence for any organisation. Based on these principles, we have formulated a set of questions addressed to the management of the PRACE RI. Some of these questions were taken directly from the EFQM assessment model (used to assess the level of excellence of an organisation), while some others were adapted to fit the

current level of development of PRACE AISBL. We did seek to ensure that the questions covered the whole spectrum of fundamental concepts of the EFQM excellence model.

Once the questionnaire was developed, the Chairman of the BoD of PRACE was asked to respond to each of the questions, assessing the level of maturity of the association on a particular topic (*Development level*) and the importance of working towards its development (*Priority*).

Some questions were much more specific than others, but all of them were considered sufficiently important to be part of the questionaire, and recommendations and guidelines have been developed to all questions by the working group. The questionnaire consisted of the following questions:

Strategy

1. Do you have an Explicit Definition of Vision?
2. Do you have an Explicit Definition of Values?
3. Do you have policies/processes documented and updated?
4. Do you know who the different customer groups are, both existing and potential, and anticipate their different needs and expectations?
5. Do you develop marketing strategies to promote the products and services to target customers and user groups?
6. Do you have a view of long and short term priorities?
7. Have you established an appropriate network to enable to identify potential partnership opportunities to enhance the capabilities and ability to generate additional stakeholder value?
8. Have you developed the portfolio in line with the changing needs of existing and potential customer groups?
9. Have you designed mechanisms to understand future scenarios and effectively manage strategic operational and financial risks?
10. Do you identify, analyse and understand external indicators, such as global and economic, market and societal trends, which may affect the organisation?

Management

11. Have you explicitly designed a management process?
12. Have you defined and used a balanced set of results to review the progress of the management system and performance?
13. Have you designed financial planning, control, reporting and review processes to optimise the use of resources?
14. Do you monitor financial and non-financial Outcomes demonstrating the success of the organisation's deployment of their strategy, and identifying where development is needed to achieve the strategic goals?

Stakeholders

15. Do you use approaches to understand, anticipate and respond to the different needs and expectations of their key stakeholders?

16. Do you establish appropriate networks to enable them to identify potential partnership opportunities to enhance their capabilities and ability to generate additional stakeholder value?
17. Do you continually monitor and review the experiences and perceptions of their customers and ensure processes are aligned to respond appropriately to any feedback?
18. Do you analyse data and information regarding existing and potential partners' core competencies and capabilities to understand how they complement the organisation's capabilities?

Human Resources

19. Have you clearly defined the skills, competencies and people performance levels required to achieve the Mission Vision and strategic goals?
20. Have you ensured that people have the necessary resources, competencies and empowerment to maximise the customer experience?
21. Do you inspire people and create a culture of involvement, ownership, empowerment, improvement and accountability through their actions, behaviours and experience?
22. Do you use a structured approach for generating and prioritising creative ideas? Test and refine the most promising ideas, allocating resources to realise them within appropriate timescales?

Once the assessment by the BoD Chairman was made, the working group developed recommendations and guidelines for every question to aid PRACE management to advance the organisation from the current development status to a more mature one, hence advancing towards excellence. Where perceived reasonable, a RADAR based approach has been suggested. What follows in this document are the recommendations and guidelines for each one of the questions asked (the elements) including the BoD Chairman responses.

2 Elements analysed

Each element indicates the question and the category to which it refers in the EFQM excellence model, as well as the assessed importance and development assessed by the Chairman of the BoD. We also provide the working group assessment on how PRACE could advance its excellence status of the element. The order of the elements in this section is in some cases different from the order of the questions in the questionnaire (see previous section 1.2.3). This reordering was made for a more logical introduction of the concepts used than that in which they appear in the order of the questions in the questionnaire. The following graphic summarises the elements explained and their relationship:
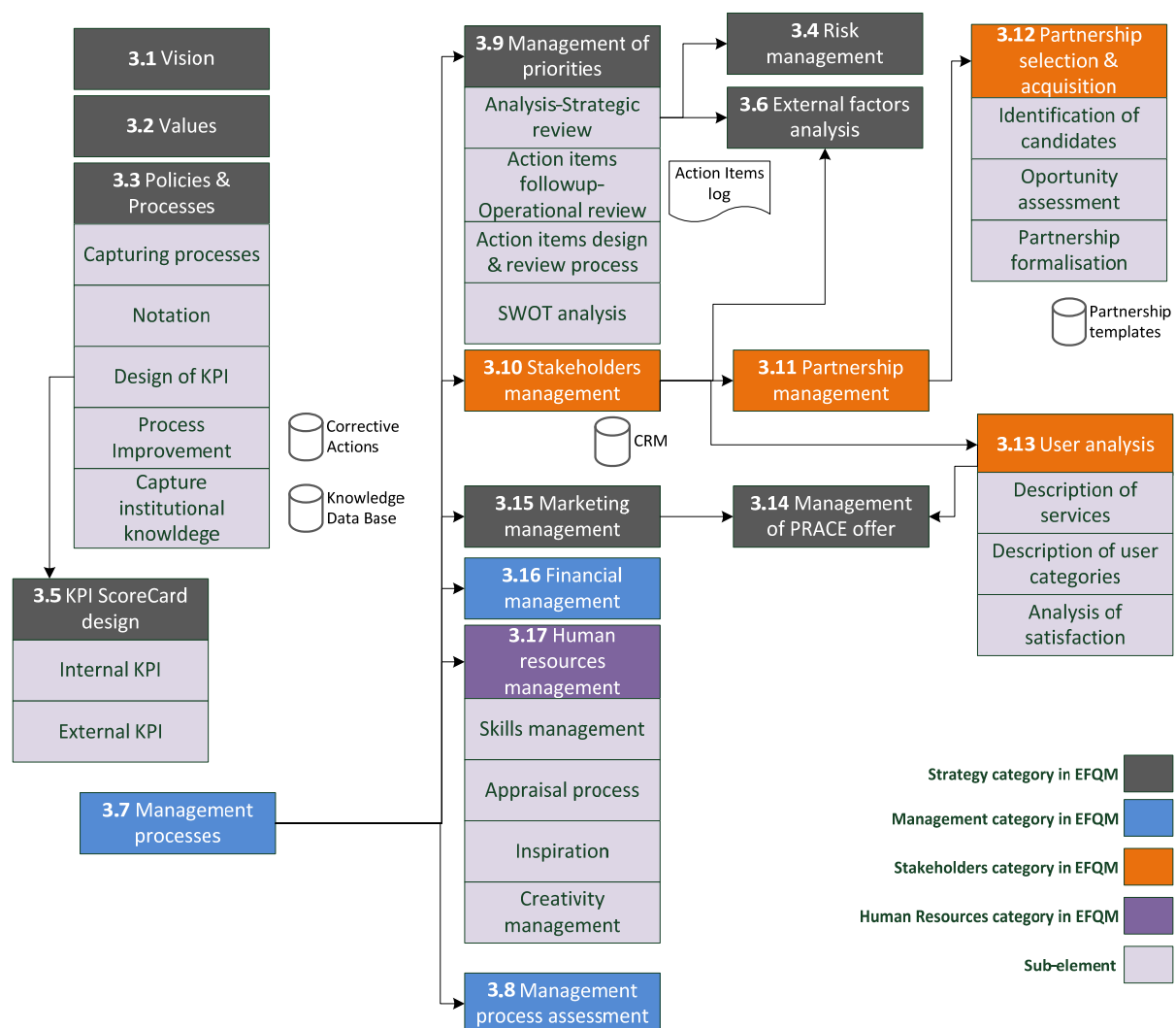

Figure 3: Relationship between elements explained

2.1 Vision

Category: Strategy

Question: Do you have an explicit definition of Vision?

Priority assessed: top

Development level assessed: 3/5

By its very nature, an organisation such as PRACE AISBL will face the challenge of maintaining a common vision, not necessarily because of fundamental differences but rather vision of PRACE AISBL not necessarily being aligned that of the participating parties that in many cases have broader objectives. In particular, when an organisation faces changes, funding renewal or change of participants, a common, written, vision is desirable in order to maintain a common focus. It is important to differentiate between vision and mission, the vision-statement describes where PRACE AISBL wishes to be within a reasonable timeframe, e.g. 3-5 years. It is of the utmost importance that all members share the common vision and have the PRACE AISBL vision in mind at all times when making decisions, whether directly or indirectly PRACE AISBL related.

The vision may include many components but it should include critical issues, e.g.: does the vision of PRACE AISBL include coordination with national/local activities and collaboration towards common goals, or is it to work towards a common transnational infrastructure with a shared leadership? Should the research that is supported by PRACE AISBL be limited to some fields or scientific areas? Should research proposals and industrial proposals be evaluated by the same metrics or should different standards be used to promote different end goals? Should the organisation simply work within existing EU procurement rules, or should it attempt to influence these rules to better suit procurement of complex, large scale, innovative, computing infrastructures?

The original PRACE vision has been often condensed to: "Enable and support European global leadership in public and private research and development." While this is a good vision since it is easy to communicate and agree upon, it is very inclusive and every perceptions of PRACE may be considered in-line with this vision statement. However, for the management of the organization more detailed vision statement of what the goals of the organisation are and what means are available to reach these goals is of great value and necessary for efficiency and for reducing uncertainty and confusion. A short vision statement should be an extract from a more descriptive statement.

Several aspects of the PRACE AISBL statutes, i.e. 3.1ab, 3.2abcd, 3.4, 3.5, 6.2abc could be reformulated as easily communicated vision statements with a limited scope.

The literature contains many guides of vision statement creation. Some consultants are specialised in this task. we suggest using a simple guide such as the one provided in the following reference and appointing a leader for this task with a time frame for producing a written fully supported PRACE vision: *Guidelines for developing a vision statement* [8]. Examples for reference on vision statements can be found here: [9].

2.2 Values

Category: Strategy

Question: Do you have an explicit definition of Values?

Priority assessed: top

Development level assessed: 0/5

Successful organisations, both public and private, with few exceptions have a clear understanding of the values around which they base both their internal interactions – e.g. between staff – and their external interactions – e.g. between suppliers and customers or the general public. Values are important because they are qualities that define people, organisations and, products and services at a very basic level. An organisational value is "a belief that a specific mode of conduct is preferable to an opposite or contrary mode of conduct" according to Rokeach [10], the values that people or organisations set are the foundations on which much of their success (or lack of it) is built on. The following discussion focuses on the values of organisations and how to define them properly can greatly assist organisations in making clear strategic decisions.

As a key task, the leaders of PRACE would need to set clear values for the organisation and demonstrate the use of those values. In doing so, they become a central part of the life of the organisation, supporting its growth and success. Strong organisational values have shown their importance in businesses and public institutions, and this is the reason why their explicit definition is encouraged.

In organisations that have a clear value structure that is shared by all employees, the understanding of those values can greatly speed up and improve decision taking at all levels. Often, in organisations that benefit from this, the values have been defined by, shared and understood by employees that subsequently use them on a day-to-day basis.

Research has shown that many organisations can break their values down into three types:

1. Physical
2. Organisational
3. Psychological

Physical values may include: orderliness, punctuality, quality of service, reliability, responsiveness, and maximisation of the use of resources. Organisational values may include: quality and diversity of communication, cooperation, and coordination. Psychological values may include: creativity, continuous improvement, integrity, openness, respect and service to society. All of these are examples and most organisations will have a different set of values specifically chosen to reflect the purpose of that organisation.

A short survey of corporate websites shows that many organisation defines short, easy to remember values. Coca Cola is typical example of such an organisations. Its values are listed as:

- *Leadership:* The courage to shape a better future
- *Collaboration:* Leverage collective genius
- *Integrity:* Be real
- *Accountability:* If it is to be, it's up to me
- *Passion:* Committed in heart and mind
- *Diversity:* As inclusive as our brands
- *Quality:* What we do, we do well

Smaller organisations also take this approach. For example, the Information Services department at a PRACE partner University has the following values:

- *Delivering excellent services:* We take pride in providing a professional service which meets the needs of our users.
- *Effective team working:* We contribute and collaborate effectively within and across our teams.
- *The individual:* We treat each other with respect and appreciate everyone's strengths and contribution.
- *Effective communication:* We embrace effective and open communication as critical to achieving success.
- *Continuous improvement:* We continuously develop and improve our services in line with our vision, mission and goals.

The definition of values which represent the PRACE organisation must take into account its specific features and structure, vision and mission. For example, they must reflect how it wants to be seen by its users and how it wants to serve them. These values cannot be set in this document – they must be discussed by the organisation and agreed on by those who make it what it is. This need not be a complex process but it should be an inclusive one. In a dedicated workshop, a decision on PRACE values could be reached in hours. In this process, PRACE could consider the assistance of a facilitator trained in working with organisations to consider what their values are. The outcome should be a small set of values which can be clearly articulated and remembered by everyone inside PRACE so that the organisation is represented by the values it chooses.

2.3 Policies and processes

Category: Strategy

Question: Do you have policies/processes documented and updated?

Priority assessed: top

Development level assessed: 2/5

Excellent organisations maintain a clear strategy and supporting policies to achieve the Mission and Vision of the organisation. It is necessary to translate the strategies into aligned processes, projects and organisational structures, ensuring changes can be implemented with appropriate speed throughout the value chain.

Strategies need to be deployed through supporting policies in a structured manner to achieve the desired set of results, with clearly defined "cause and effect" relationships. processes need to be constantly improved. change needs to be effectively managed through structured project management.

In this vein, the organisation shall be process-oriented, and processes and policies can be described to rule it. It is necessary to ensure process owners understand their role and responsibility in developing, maintaining and improving processes. It is also necessary to develop a meaningful mix of process performance indicators and related outcome measures, enabling the review of the efficiency and effectiveness of the key processes and their contributions towards the strategic goals (see element 0).

The suggested management methodology is based on the RADAR logic (see section 1.2.2). All aspects of the organisation can be driven in this 5 phase loop, and the management of PRACE is encouraged to select the elements to be radarised and develop plans for them.

Some of the elements analysed in this task are proposals for a radarisation of a particular aspect of the organisation.

2.3.1 *Capturing and classifying existing processes*

Apart from the suggestion to use RADAR logic, PRACE is encouraged to start collecting information on what and how things are done by all in the organisation, and capture that in a general process map. This will enable developing a clear structure for the activities of the organisation, which elements can be improved, restructured or even eliminated. To map this information, we propose using a logic structure based on the ISO 9004.2009 standard. This structure is based on a flow diagram of processes. A description of this mechanism and several examples are provided in this deliverable. To complete this task, it is necessary to gather information on the different actors. The following form could be used as template for gathering this information.

For each person:

- Name of the person
- Role
- Name of direct responsible
- Processes

For each process:

- Name of the process
- Description
- Mission
- Owner
- Providers of input+ object of input
- Recipients of output + object of output
- Periodicity/Timing of the process

Once data is collected, it would be possible to structure processes of different nature:

Strategic processes: Those that guide the organisation. They depend on the management.

Operational processes: Those that represent the operational activities of the organisation - they are usually cyclic and customer-oriented (i.e. user-oriented).

Support processes: Those that represent the activities that help to develop operative processes. They may be subcontracted externally.

Figure 3 provides an example of process breakdown according to the named categories.

2.3.2 *Notation suggested for process representation*

Each of the existing, or designed processes shall be further described using a standardized syntax. We propose the usage of a syntax based on the ISO 9004.2009. This lightweight approach is suggested as a starting point for the organization to easily adopt a management methodology. The suggested mechanism is based on flow diagrams with the following elements:

Beginning and end of the process — Represents the origin or the termination of a process. Identifying the start or end of an activity

Activity — Represents an activity, although it could also represent a set of activities

Alternative process — Represents an activity of the process that represents other existing process

Document — Represents a document related with an activity. It is usually an input or an output of an activity

Multidocument — Represents a variety of documents being related to an activity at a time

Database — Represents a database, and usually indicates the introduction or registry of electronically stored data.

Decision — Represents a decision between activities of a process. It is used when, after performing an activity, there are two options to continue the process; it can generate a question with two possible answers, a positive one and a negative one. The positive open a certain line of activities and the negative opens a different one.

Register of stored data — Represents a registry of data, documents, instructions, etc. Related to a certain activity of a process.

⟶ — Represents a product flow, information, etc. between activities in a process. The direction indicates the sequence in which activities are executed.

Certain activities could be further defined in a different diagram with the same type of graphic.

2.3.3 *Design of KPIs for processes*

For the Assessment phase of the RADAR cycle (or even if no RADAR process is used), it is useful to have Key Performance Indicators in place for the process. For each process a set of these indicators could be pre-identified and captured in a table such as the one below:

Indicator	How is it computed	Periodicity	Responsible actor	Threshold value
Ex: Satisfaction survey to users	Ex: Number of good/normal/bad opinions gathered. Weighted on the size of the project	Ex: Yearly	Ex: Peer Review officer	Green: 5% or less of bad opinions Amber: between 5 to 10% of bad opinions Red: more than 10% of bad opinions

Table 1: Example of a KPI Card for a process

More details on KPI design and analysis are provided in element 2.5.

2.3.4 *Mechanism suggested for process improvement*

The management of systematic monitoring of organisational processes for their improvement requires a continuous effort. Based on best practices, our advice is for PRACE to assign a person to be responsible for maintaining process documentation and ensure each process is properly monitored. The creation of a database/folder/registry/repository is suggested to store for easy access the information on processes (corrective actions database).

A continuous process shall be set to capture:

- Issues
- Corrective actions used to address issues

These items shall be captured in a database or file in an easy to access manner so that anyone involved in a process can log data in, and ideally review other entries.

Different types of issues logged could include:

- Any defect in relation to a process (e.g.: a member of PRACE not circulating requested information on time)
- Non-compliance with objectives (e.g.: peer review process delayed)
- Complaints (ex: from users of the infrastructure)

A periodic review of the contents entered can be made to remove duplicated entries and to extract input to be used in the review of other processes. Also, for some of the issues identified, a solution can be defined and put into practice. The tracking and result should be logged in this same database. (there are general methodologies to address issues, e.g. *The 7-Step Problem Solving Method* [11]). A possible template of data to request for each entry in the log could be:

- Issue name
- Process name
- Person reporting
- When has the event happened
- Description + evidence + Corrective actions taken
- Status (open, in progress, closed/solved)

2.3.5 *Mechanisms suggested to capture institutional knowledge*

Knowledge bases are commonly used to complement a help desk facility. Similar to an FAQ (frequently asked questions), a knowledge base is designed to organise and present the most common questions or problems and an explanation of how to solve them. A knowledge base usually stores troubleshooting information, how-to articles, user manuals, and answers to frequently asked questions. We consider that a knowledge base would be useful for PRACE for two different purposes:

1- To capture the organisation's know-how and keep this knowledge as a legacy for lowering the impact of having employee replacements, substitutions, promotions, etc.

2- To provide an online reference to stakeholders (users, members, etc.) involved in different processes of the association, providing FAQ, or general knowledge search to improve communication efficiency and effectiveness.

From an operational perspective, a search engine is typically used to locate information in a system, or users may browse through a custom classification database. There are different off-the shelf options available in the market - as a reference, here we provide some of the most well-known options:

HelpJuice [12]: SaaS option that provides a powerful tool for searching knowledge within the database, and introducing new items. HelpJuice is especially good for creating a knowledge base for HPC users and reduce the number of support tickets to be answered.

Zendesk [13]: SaaS option that provides a powerful tool for mainly managing support tickets, although it also provides functionality for developing a knowledge base.

Knowledge Base Manager [14]: The tool provides a wiki-style knowledge base, with advanced features for ranking articles (entries), make advance searches, manage visibility of articles, etc.

Other options: kpublisher [15], Novosolutions [16]

If PRACE is not prepared to invest in a commercial tool until the concept is validated, our advice is to start with a simple free tool to identify the particular needs, and on the basis of the experience gained with the tool, make an educated choice. a simple open source wiki (e.g. MediaWiki [17]) could be used.

2.4 Risk Management

Category: Strategy

Question: Have you designed mechanisms to understand future scenarios and effectively manage strategic operational and financial risks?

Priority assessed: low

Development level assessed: 0/5

Risk should be managed continuously at an organisation-wide level. There exist many critical risks that an organisation like PRACE faces. For example: resource risks (inadequate staffing, inadequately trained staff, etc.), IT risks (hardware, software), schedule risks (unrealistic schedule, inadequate schedule estimates, etc.), compliance risks (lawsuits, etc.). Those considered critical in our assessment are strategic risks (competition, business context, etc.) operational risks (all risks related to processes) and financial risks (liquidity, funding, etc.).

In order to design a mechanism to understand future scenarios and manage risks, it is advisable to define RADAR processes for risk assessment and management. The purpose of these processes is to make PRACE management complete awareness of the risks PRACE is exposed to, in order to make decisions about them, to reduce them, and to improve the most efficient control methods of them. A particular case of application of risk management is identified in the management process suggested in section 2.7. The management process foresees a Strategic Review (2.9.1section) that needs to take into consideration risks in order to decide the objectives. A procedural manner of evaluating risks them can significantly contribute to the analysis and enhance the quality of the Strategic Review.

Next, we describe the different phases of a general radarisation of a risk management processes:

Results phase: It is necessary to define what management wants to do regarding the risks. Possible goals could be:

- Create and update continuously a list of key risks that PRACE faces
- Analyse, understand their source and root causes
- Avoid the risks that can be avoided
- Reduce risk likelihood
- Migrate the impact and reduce consequences of risks that cannot be avoided
- Continuously communicate on risks

Each result targeted can be a different radar process. Risk management is not a goal per se. It has to be aligned with the organisation's overall business strategy. It is also necessary to avoid the temptation to devote more time managing risks than doing business.

Approaches phase: To manage risks a four stage approach can be used:

1. Risk identification: answering "What can happen?" and "How can it happen?" questions.
2. Risk analysis: that is a systematic use of available information to determine how often events may occur and the importance of their consequences.
3. Risk treatment involves the decisions that are made about how to treat risk that have been previously identified and prioritised.
4. Risk monitoring consist in checking, supervising, observing critically or recording the progress of treating risks on a regular basis in order to identify change and improve.

Depending on the Result targeted, it may be necessary to first define a process for risk identification (step 1). For many Results targets it will also be necessary to define approaches to assess quantitatively the risk (step 2). One of the easiest standards to adopt and adapt to the context of PRACE is the Failure Modes and Effects Analysis (FMEA) calculation:

$$\text{Level of risk} = \text{severity} * \text{occurrence} * \text{detectability}$$

For step 3, different elements could be considered for defining the approach:

- Avoidance: whenever something cannot be proposed ensuring a high degree of safety, it should choose avoidance as a risk management technique

- Modification: changing an activity or a process to make it safer for all involved

- Retention: decide that since other techniques available aren't suitable, it is better to retain the risk of harm or loss

- Transfer: involves sharing risk with another organisation through a contract (like insurance companies)

Deploy phase: Risk management should be everyone's business, not just the responsibility of some managers. Risk identification should be carried out with a maximum of people involved through focus group discussions, brainstorming, inspections, surveys, historical failure analysis and other techniques. Then managers' and experts' focus groups can effectively perform risk assessment with tables helping determining the level of risks:
- Likelihood table: almost certain, likely, possible, unlikely, rare,
- Consequences table: extreme, very high, medium, low, negligible

To help decision-making, risks can be classified into categories: extreme risks, high risks, major risks, significant risks, moderate risks, low risks and trivial risks.

Risk treatment deployment can take place in different ways:
- Definition of an annual risk treatment plan

- Project risks prevention plan (approaches to prevent risks)

- Permanent incidents and failures management

- Training and exercises for the workforce

- Back-ups, recovery planning

- Risk signalisation, warnings, etc.

- Insurance contract underwriting. etc.

Assess phase: Depending on the result targeted, the assessment phase shall contain one of the following elements:
- Perceived quality measurement. Answering questions such as: "do you believe that PRACE's risk map is exhaustive?", "do you feel concerned by risks in PRACE?", "are you involved in risk treatment projects?")

- Performance measurements. Analysing, for example: number of identified risks, percentage of identified risks that are assessed, number of inserted remarks, etc.

- Improvement measurements. Analysing, for example: risk level reduction over a year, residual risk level, assessment methods improvement, level of achievement of risk reduction project goals, etc.

- Compliance measurements. Analysing for example: compliance with all identified obligations in the legal areas.

Refine phase: The risks faced by PRACE have to be re-examined periodically to ensure that the way in which they are managed remains valid and effective. Also the risk management process has to be reviewed at least annually, addressing the following questions:

- Are the methods of risk identification still appropriate for new risks?

- Are the assessment approaches adapted to decision-making?

- Are the risk treatments effective and efficient in minimising the risks?

- Do the risk treatments comply with legal requirements?

- Are the incidents or failures systematically used for organisational learning?

On the basis of the answers to the above question, modification of the approaches and their deployment can be considered.

2.5 KPI ScoreCard design

Category: Strategy

Question: Do you monitor financial and non-financial Outcomes demonstrating the success of the organisation's deployment of their strategy, and identifying where development is needed to achieve the strategic goals?

Priority assessed: high

Development level assessed: 0/5

As stated in section 0, KPI based analysis is advised in general to assess the performance and results of a process. Key Performance Indicators (KPIs) are the metrics an organisation uses to track its performance internally across all operational areas and externally to measure the achievement of its Mission/Vision/Objectives. We can differentiate two types of KPIs:

- Internal KPIs should reflect an organisation's Objectives, but they are also used to track the performance of operational processes and related systems. As indicated in 0, KPIs on the process performance should be defined by the respective process owners and mapped onto the organisation's Process Map. Possible areas for KPIs are: Peer Review, Customer Satisfaction, Financial Performance, and HR Performance.

- The external KPIs reflect the organisation's ability to achieve the desired impact. They can also be considered as impact assessment factors or variables. Deliverable 2.4 [18] provides a detailed description on these variables for PRACE. More background material can be found in Deliverables from task 2.4 from PRACE-1IP project ([30],[31],[32])

KPIs, together with the Critical Success Factors/Objectives and the Action Log, should form a part of the Operational Review (see section 2.9.2). A workshop should be organised with the participation of PRACE Projects in order to identify the KPIs to be tracked. At a later stage, new KPIs could be added, or KPIs could be amended on review by the Operational Review or Management Board.

The KPI ScoreCard is a spread-sheet that allows tracking the values of all the KPIs defined on a regular basis, e.g. weekly or fortnightly. For example, as the Peer Review is one of the core processes of PRACE, its turnaround time and volume, quality and related customer

satisfaction levels could be expressed through KPIs. As another example, the impact of PRACE can be measured through the number of awards received by projects supported by PRACE and this information could also feature on the Card. The KPI ScoreCard should provide a comprehensive overview all the strategic and operational areas of the organisation, together with its external impact (e.g. social, economic, and technological).

When possible, each KPI should have a target value (i.e. acceptable value(s)). Also, trends and discrepancies should be identified and should lead to Action Items or Process Improvement projects/actions. KPIs can have numerical, logical (yes/no, above/below threshold) values. There are examples of internal KPIs applied to the PRACE Infrastructure in PRACE 3IP-D6.1.1 [29]. Definitions of the external KPIs can be found in PRACE 3IP-D2.4 [18].

If possible, the KPIs of a process should be broken into the KPIs of its sub-processes in order to provide better granularity when monitoring a process. In this way, the Reader knows which of the sub-processes fails in the case of a failure of the entire process. For example, in a process in which Requests (i.e. Requests for time on PRACE machines) are first Accepted and then could be Delayed (e.g. due to an Approval or Review Process), two sub-processes can operate the following KPIs:

$$\text{Delay/Total Number} = \text{Accepted/Total Number} \times \text{Delay/Accepted}$$

Additional notes to consider:

- Some KPIs could have a value that is expressed as an average/standard deviation or median.
- Apart from the functions and processes, special attention should be paid to Customer/User satisfaction. This is where the analysis should start.
- Trends and Deviations – these should be visible through the KPI Card.

2.6 External factors

Category: Strategy

Question: Do you identify, analyse and understand external indicators, such as global and economic, market and societal trends, which may affect the organisation?

Priority assessed: rated: low

Development level assessed: 0/5

Each organisation, in particular those operating in the public domain, should proactively analyse their external factors and allow them to influence their strategies. The PEST (Political, Economic, Social and Technological) analysis and its varieties (e.g. PESTEL, with the addition of Legal and Environmental factors) is a recognised tool for taking into account the influences of the broader environment an organisation operates in. It should be used to feed into a SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis that in turn should identify Critical Success Factors and Objectives – the PEST factors are either the external Opportunities or Threats in the SWOT chart as below.

This exercise should become a part of the Strategic Review (see section 2.9.1), and represented in the general management process in Figure 5).
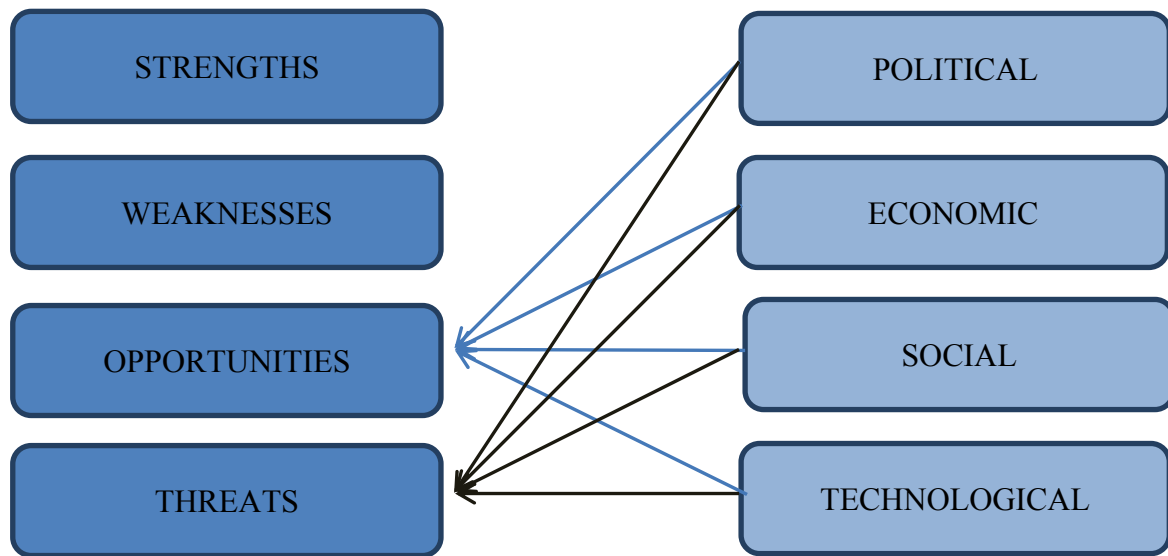
Figure 4 : The elements of the PEST Analysis serve as input into the external factors of the SWOT analysis.

The PEST Analysis also feeds into the Stakeholders Analysis (see section 0, and represented in the general management process in Figure 5).

Examples of PEST elements are:

Political:

- EC directives, regulations and policies (DG Connect, DG Research)
- National level directives, regulations and policies
- EC-level HPC ecosystem policies and strategies

Economic:

- General Economic trends (booms, crises, employment levels)
- Availability of funds

Societal:

- The Societal Challenges

Technological:

- HPC technology and application trends, projects, break-through solutions.

This information should be captured in a table with headings corresponding to the four areas above (P, E, S, T). Within each heading, the elements should be prioritised according to their importance (i.e. the most important /i.e. having the most impact/ elements should be listed first. E.g.:

POLITICAL	ECONOMIC	SOCIETAL	TECHNOLOGICAL
PRIORITY 1	…	….	….
PRIORITY 2, etc.	….	….	….
…	….	….	….

Table 2: Example of a PEST Analysis template

2.7 Management process

Category: Management

Question: Have you explicitly designed a management process?

Priority assessed: top

Development level assessed: 1/5

A Management process is needed to drive the way the organisation is managed. With a clear process in place it is possible to adapt the organisation to a changing environment moving faster towards its mission and assuring the satisfaction of all the stakeholders. For PRACE, the following RADAR process is proposed as Management process:

Results targeted:

- PRACE has to be managed through an explicit process
- The process has to define explicitly the PRACE staff in charge and involved in the processes, as well as the responsibilities
- The process has to define the relationships between the different tasks
- The performance of the process has to be measured precisely

Approaches:

There are different approaches that can be used to tackle the management process; here we identify some possibilities:

- Distributed management. The current executive bodies of the PRACE management have a distributed management organisation, where responsibilities are distributed amongst the different members, and the day to day operation is being managed by an office manager.
- Centralised management. The organisation of PRACE may be changed in the future into a centralised structure with which a PRACE CEO will have all executive responsibilities and some specific strategic responsibilities of the organisation.
- Systematic management. All the processes have a detailed description and are fully monitored and controlled through formal processes (forms, documentation, reports, etc.). This could lead to an overhead in managing the management process, but the association can be run in a controlled manner with a measureable performance.
- Lightweight management. The management process can describe with a relatively low level of detail the management processes. Using this approach, many processes will

not be described formally, leaving flexibility in executing them, and just controlling them with few checkpoints, KPIs, or through informal follow-ups.

Usually, smaller organisations like PRACE do not need a very rigid management approach, since the management overhead does not justify the benefits of the general control of the different processes, and the amount of processes to control is small enough for one person to be aware of the overall progress. Nevertheless, in the case of distributed management, it is generally beneficial to have all the active processes well documented so that when taking strategic decisions at Council or BoD level, everyone can have a clear view of the risks, advances or problems in all the areas. Moreover, a systematic management can lead to better prioritisation and improve the efficiency and effectiveness of the organisation.

It is necessary to find the right balance, and the advice of this working group is to start with a lightweight simple-to-implement approach, that in further iterations of the RADAR process can evolve into a more systematic approach.

<u>Deployment</u>

The following functional diagram represents a possible distribution and classification of the PRACE processes:
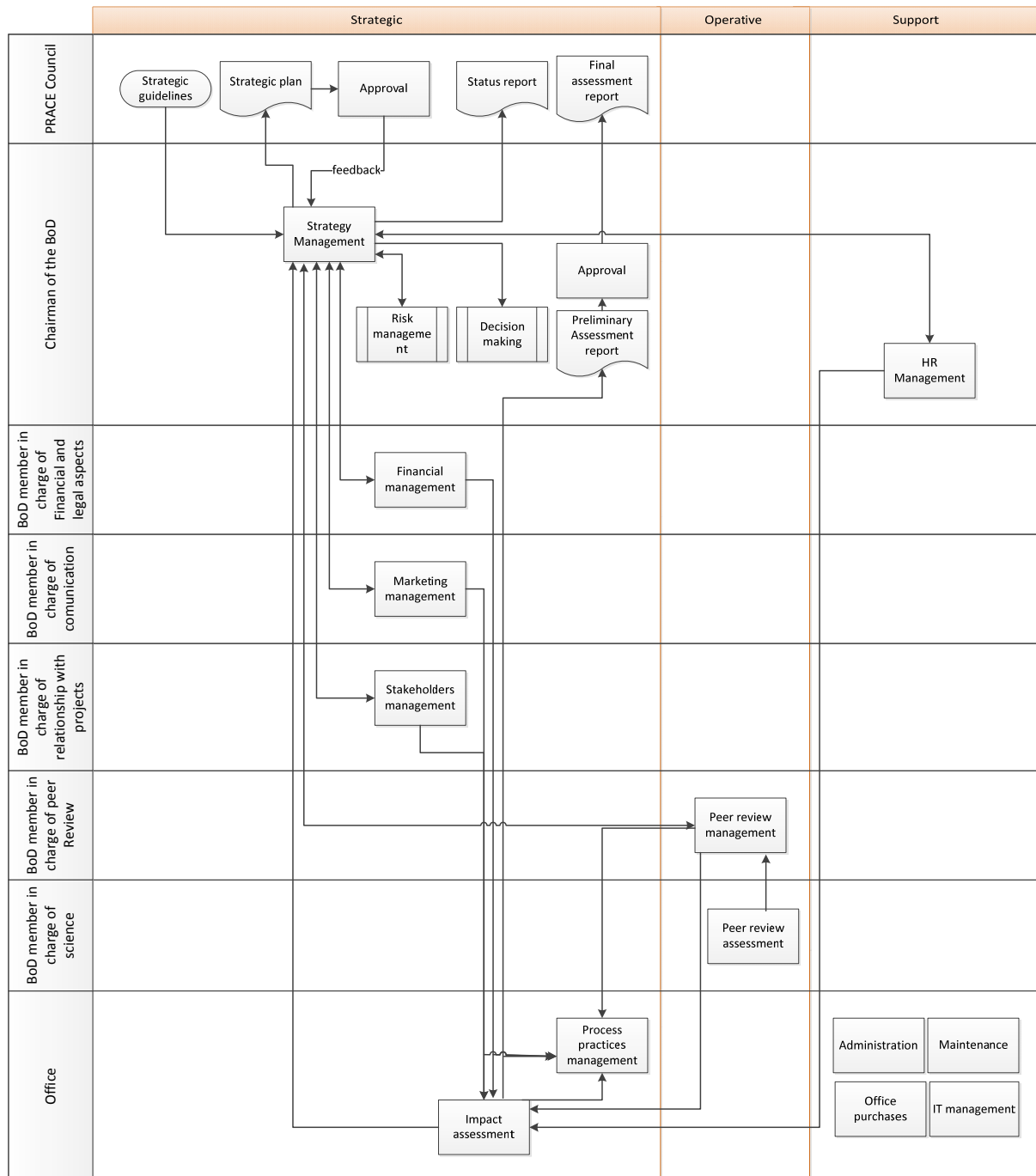
Figure 5 Functional description of a possible Management Process by different roles

The next figure represents the Management process with more level of detail indicating some of the more important sub-processes, inputs and outputs:
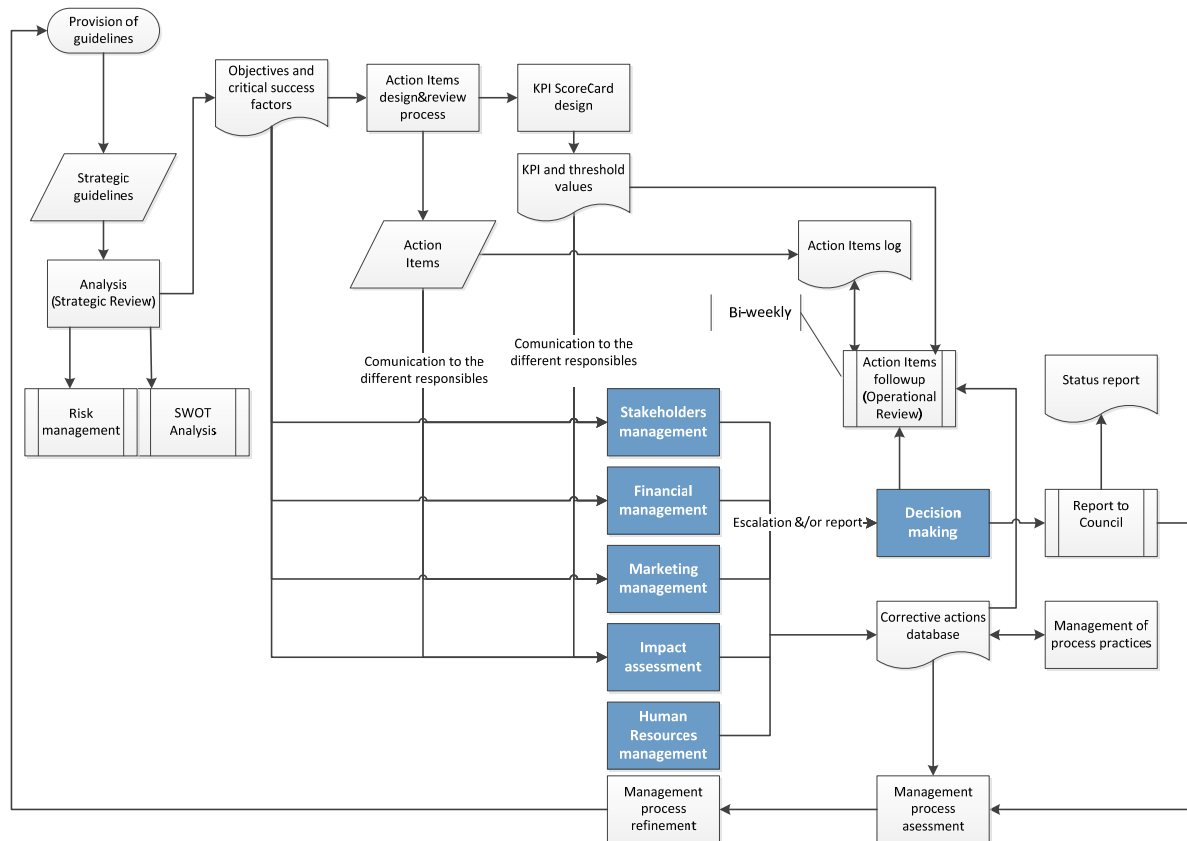
Figure 6 Graphical representation of the general Management Process

The process has been designed using the lightweight approach. It is a cyclic process that starts with the guidelines provided by the Council, and restarts after having delivered the status report.

1. From the guidelines provided by the Council an analysis should be made, this analysis shall include a SWOT analysis and a specific analysis of risks (see element 0 for more details on this)
2. From the outcome of the previous analysis, a set of yearly objectives shall be defined
3. Next, general actions shall be defined to reach the objectives set, and together with them, a review process to assess their evolution
4. The review process in the previous step will likely involve the definition of a set of specific KPI for each action (see section 0 for more information). These are defined as a next step. The objectives, actions, and KPIs shall be communicated to the responsible of the different general strategic areas (Stakeholders management, Financial management, marketing management, and Impact assessment).
5. During the course of the year, it is suggested to log progress of the tasks (in an action items log) and results obtained.
6. It is advised to log the elements described in the section 2.3.4 (Good practices, Bad practices/issues and Corrective actions used addressing issues) in a repository for further consideration in the process improvement process. A person responsible shall be nominated to manage this log, maintain it and encourage its usage.
7. For each of the strategic areas mentioned there will be decisions to make; this process may involve escalating high impact topics for discussion, or just reporting

to higher level bodies. As a part of this process, it is recommended to have periodic a review of the actions (e.g. bi-weekly) using as input the action items log and the repository of process practices log.

8. The data from the strategic reviews can be used as input to report to the Council with the periodicity requested.

9. After one year period, the whole process should be assessed using as input the good/bad practices logged and the information on them in order to identify things to be improved. After the assessment, decisions shall be taken in the individual and general management process to refine the whole cycle. More options for this step are provided in the *Assessment* and *Refinement* phase discussed in the next element.

2.8 Management process assessment

Category: Management

Question: Have you defined and used a balanced set of results to review the progress of the management system and performance?

Priority assessed: high

Development level assessed: 1/5

The general Management process suggested in the previous element indicates the use of a RADAR cycle. The Assessment and Refinement of the process are the last two elements of the cycle and are discussed in this section:

<u>Assessment</u>

As indicated in Figure 6, a Management process assessment shall exist within the loop. The assessment can be based on different measurements, for example:

- The corrective actions process (management of the corrective actions database) can provide information on the quality of a process.
- Perceived quality measurements. Via surveys on perceived quality of the management process and strategy deployment to the members.
- External assessment. Some companies subcontract the assessment to specialised audit companies or strategic consultancies. PRACE could consider these services for assessing the processes used and the results obtained with them.
- Performance measurements. The performance of an annual strategy development cycle can be measured using KPIs. The aspects measured through KPI can include:
  - Adherence to agreed/acceptable values. To assess this the repository of processes practices can be consulted to identify and measure deviations,
  - Strategy development. Assessing the strategic plans and identifying deviations.
  - Right effort allocation. Assessing the effort reported and the feedback on this respect of the people using the management system.
  - Easy of Deployment. Checking with the people involved on the deployment the number of complaints.
  - Measurability. Assessing, for example, the accuracy of KPI used in each management sub-process.
  - Qualitative results predicted vs. results obtained.
- Improvement measurements. In order to have a complete overview, it will be necessary not only to observe the yearly results, but having a contextual view on

results over many years (or cycles). The following example shows a representation that can be useful in this respect:
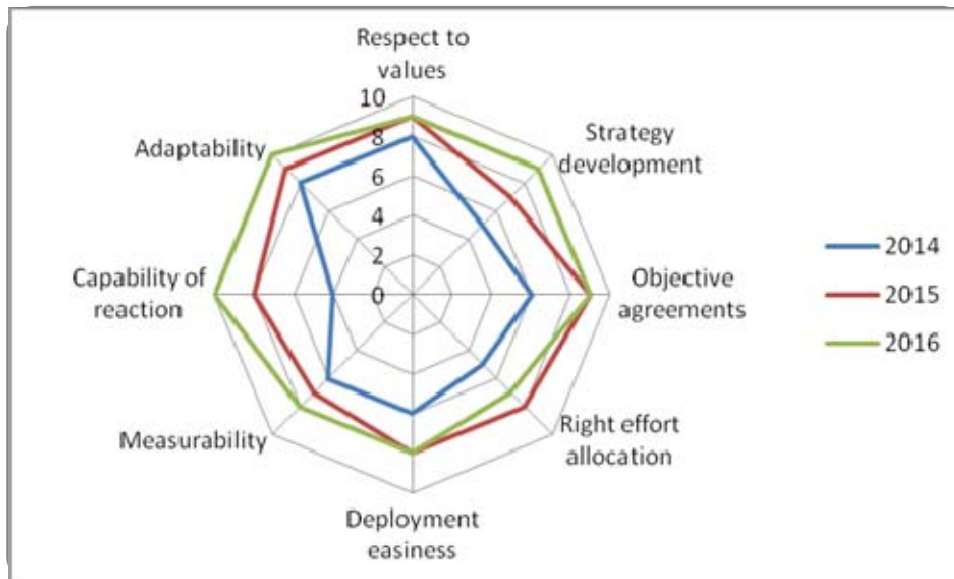

Figure 7 Example of graphical representation that can be useful for measuring improvements

Refinement

In order for PRACE to remain competitive in an ever-changing environment, it is necessary to adjust the management process periodically on the basis of the assessed results and on the identification of areas for improvement. This will allow the improvement of future results assessed.

2.9 Management of priorities

Category: Strategy

Question: Do you have a view of long and short term priorities?

Priority assessed: top

Development level assessed: 1/5

In Figure 5, and Figure 6, a sub-process called "provision of guidelines" is identified as the first stage of the general management process. These guidelines provided by the Council are themselves subject to a prioritisation process. the following analysis provides some suggestions that can help to structure this process.

As stated in the RAMIRI handbook [2], the strategic priorities are defined by a selection process, involving the top and mid-level managers (Council and BoD), and the limitation is given by the understanding that there are always more interesting aspects, choices and activities than the ones which can be fulfilled by the available and acquirable resources. The best approach is to ask these management levels to write a list of all priorities they would like to see implemented by the RI. This will produce a very long list, which will be submitted to a "decimation (or "triage") process" at a meeting (Strategic Review meeting) of the proposers, who should competitively specify which priorities can survive. This process starts by defining how many priorities can be kept at the end (typically about ten), and then by "voting out" priorities, until the target number is reached (this process, if successful, has, as a by-product,

the building of a "corporate team feeling" between the people involved, it is therefore useful to involve the largest manageable number of internal decision makers at the various levels). The results of this process are the selected objectives or critical success factors (represented in Figure 6). In next subsection –Strategic review- we provide more advice on how to structure the discussion.

Once the Objectives have been defined, the selection of which specific tasks to pursue with the (limited) resources available becomes a (somewhat) easier task, giving both the possibility to prioritise tasks, and to be selective when there are new tasks being put forward. Introducing the capability to operate by tasks, and developing a process culture respecting time and cost boundaries is an important aspect, and should be a strategic priority in an RI.

A follow-up to this process is the Operational Review, in which the Objectives and associated Action Items are reviewed. This review takes places on a more organic level than the Strategic Review mentioned above.

The concepts on management of priorities explained in this section, provides further definition on potential content on two processes represented in Figure 6: Analysis (Strategic Review) and the Action items follow-up (Operational review).

2.9.1 *Strategic Review*

The strategic review takes as input the strategic guidelines, the Mission and the Vision. The SWOT analysis process based on this input will result in the identification of the Critical Success Factors (CSF). The CSF to address are those where internal Strengths match external Opportunities (i.e. the environment provides a chance for the internal assets to be utilised) or where the internal Weaknesses are matched by the Threats of the external environment (i.e. where the organisation's 'defence' system fails).

SWOT Analysis	POSITIVE	NEGATIVE
INTERNAL	STRENGTHS ■ □ ►	WEAKNESSESES ● ◄ ▲
	CSF1	CSF2
EXTERNAL	OPPORTUNITIES ♦ ☼	THREATS ▫ ♥

Table 3: Illustration of a SWOT Analysis with the two elements considered for identifying the CSF

The analysis of the identified CSF can lead to a consensus on Objectives. Depending on their time-span, these Objectives are Short-Term or Long-Term. This exercise should result in a list of Objectives and Priorities.

In the next step, the Objectives should be broken down into Action Items and fed into the Operational Review as the next table. All objectives could be reviewed on e.g. a quarterly basis, or whenever new strategic guidelines are received. Table 4 can be used to capture them and facilitate the analysis.

Sometimes, the number of objectives derived from the Strategic Analysis is too high to present workable strategy. If that is the case, PRACE might choose to limit the number of high-priority objectives to e.g. three per domain/function or a given period. This method forces the owners of each function to re-think their priorities and choose those that bring the most return for their area.

2.9.2 *Operational Review*

The implementation of the Action Items related to Objectives should be tracked regularly. PRACE might consider creating a log to facilitate this task (Action Items log in the diagram)[1] and a process to address it. What follows below is an example of a template for this.

ACTION	OBJECTIVE	PRIORITY (High-Medium-Low)	OWNER	DEADLINE	STATUS (OPEN - CLOSED)	PROGRESS STATUS (Green-Amber-Red)	STATUS UPDATE COMMENTS
…	…	…	…	…	…	…	…

Table 4: Proposed template for capturing Objectives and analysing them

Each Action Item should be prioritised taking into account their urgency and importance. Three priority levels should be applied: High (H), Medium (M) and Low (L). Periodical review meetings focused on the analysis of this log should be scheduled. Each review should start with the *H* items. Each action should have an owner, a deadline and a status update. The status of each task should be OPEN or CLOSED. The progress (status) of each item should be defined as GREEN (on track), AMBER (in progress, but delayed), RED (seriously delayed).

The agenda of such an Operational Review Meeting could include other elements of the organisation's operational work:

- KPI Card Review (start with Customer/User stats) (see section 2.5) in order to pre-assess available results that may indicate results of actions taken and create different action items if necessary to address them, or to escalate issues, or decisions to the council.
- Corrective actions DB (see section 2.3.4). To consider taking decisions towards processes that do not work correctly and create action items towards them.

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[1] Action Items are best tracked through an issue tracking system which could be integrated with the email system and other databases. The advantage of these solutions lies in the accessibility of the information and automation of the process through reminders via email, status summaries, reporting, etc. Some examples of issue tracking systems that could be put in place are: Basecamp [33], Jira [34] or 5PM [35]

2.10 Stakeholders management

Category: Stakeholders

Question: Do you use approaches to understand, anticipate and respond to the different needs and expectations of their key stakeholders?

Priority assessed: top

Development level assessed: 0/5

In Figure 5 and Figure 6, one of the strategic processes represented in the general strategic management concept is *Stakeholder management*. While in some organisations *Customer management* element might be sufficient to further develop from the strategic level, PRACE cannot focus only on customers (users), but must include the entire ecosystem on which it depends, that is on all its stakeholders. PRACE as a not-for-profit organisation, for its sustainability does not depend on the business volume, but on the impact it has on the science and business of its users and on its perception at different national and international levels. All different stakeholders play a crucial role in the impact PRACE exerts, and it is necessary to organise the relationship with these as much as possible.

The different stakeholders for PRACE are (partially extracted from [19], [20], for summary of contacts see [20]):

Software developing academic community

The objectives are similar in part to the ones for system manufacturers: demonstration of capability in providing scalable applications for leadership class computing systems in Europe, raising the interest among the software vendors for European HPC activities, stimulating European software development and increasing the software vendor involvement in Europe.

Universities training on HPC

Academic institutions are essential for nurturing the next generations of scientists in order to ensure a continuous growth in the adoption of this technology. For this reason, these institutions are important for PRACE, to enable support and collaboration.

End User Communities

Ultimately, the end users are the decisive stakeholder group for PRACE as the aim of PRACE is to provide a world class HPC service to European scientists and engineers. These End User Communities include other RI, Academic Users, and users in Research Laboratories and industry. The involvement of European industries in high performance computing is also essential. This involvement not only covers the usage of high performance computing but also the development of highly parallel program codes.

Related European Projects

All PRACE member states and partner institutions are involved in other national, regional and European computing-related projects. Some, like the European HPC, Grid computing projects and EUDAT are particularly closely linked with PRACE and in many cases provide services to the same user communities as PRACE and may also partly share the same infrastructure. They have been considered as important stakeholders for successful deployment of PRACE, which need to interoperate with these projects. An effective dialogue with Closely related projects is necessary in order to explore possible joint activities for increased effectiveness and improved quality of services, for example technical and user-level collaboration, sharing of best practices, joint application development, sharing of prototyping results, joint

prototyping of new high-end computing technology (both software and hardware), training and education courses and similar topics. The scale of mutual interests may vary depending on the project.

PRACE may also need to cooperate with other projects in the establishment and application of standards and best practices where overlaps exist, in order to assure smooth interaction and interoperability.

Providers of HPC Services

These include the non-PRACE member EU countries, accession countries and those on the waiting list to open negotiation with the EC. For successful European coverage of the future PRACE services, it is important to create ties to these remaining HPC service providers in non-PRACE countries. The objectives of contacting providers of HPC services is to make PRACE targets known to the countries (outreach activities), discuss how the users of the HPC services in that country can utilise PRACE services, investigate the technical challenges to connect with the PRACE infrastructure, gather political support for the project and possibly sign a Memorandum of Understanding. The end-result will be to provide a critical mass for European supercomputing, to better coordinate HPC activities and to avoid duplication of work in providing leadership resources to European researchers.

Networking Infrastructure Providers

Communication networks, such as light paths between the centres and connections to various sources of data, have a major impact on the efficiency and effectiveness of the pan-European HPC services. Dedicated links are often required to sustain the necessary data transfer speeds. High-speed networking with sufficient bandwidth is a requirement for successful PRACE service. An objective could be to discuss the technical and economical options for connecting PRACE centres themselves and with different user communities to PRACE.

System Manufacturers

System manufacturers are the key stakeholders who will have an essential role in developing the technology to meet the Exaflop/s computing target and beyond.

Software vendors

Software is the key enabler for results. Scalability beyond tens of thousands of processors is required to efficiently utilise the PRACE systems – at least for most of the architectures. Collaboration with software vendors is important for PRACE, both with developers of scientific software and with developers of middleware and other tools that improve the usability of the systems. The objectives are similar in part to the ones for system manufacturers: demonstration of capability in providing scalable applications for the highest end computing systems in Europe, raising the interest among the software vendors for European HPC activities, stimulating European software development and increasing the software vendor involvement in Europe.

Funding Bodies

Funding bodies are naturally one of the most important stakeholder groups. The objectives for discussions with funding bodies include convincing the governments and research councils about the necessity to promote European competitiveness in computational science through establishment of European high end computing centres and related collaboration in pan-European coverage.

Policy Setting Organisations

PRACE needs to align its work to optimally address the various policies and through that process interoperate with other European initiatives. Communication and collaboration with policy setting organisations is thus important for the PRACE success. PRACE targets to sustain an open and constructive discussion with policy setting organisations. PRACE aims to contribute to the standardization efforts and participate actively to the related policy meetings.

PRACE needs a precise plan for Each different stakeholder. In order to have a standardised approach, we suggest the use of a structured approach, for which we provide a general RADAR based methodology to consider when developing specific processes for each type of stakeholder.

Results

With the growing sophistication and complexity of the business environment, it is necessary to develop the collective art of "keeping the ear close to the ground" in the most varied ways possible in order to get permanently the most complete and relevant image of the ecosystem.

There are three clear results to address:

- Understand needs (PRACE's and stakeholder's) and expectations.
- Anticipate needs and expectations.
- Respond to needs and expectations.

Approach

Identifying the stakeholders and have a continuous review of the list and dialogue with the stakeholders is the most advisable approach for PRACE. The way the data is captured and reviewed can differ in many ways. In any case, it is necessary to list and rate problems, risks and opportunities with each stakeholder, always having a clear idea on three questions:

- What does PRACE need to know?
- How will PRACE gain the necessary information?
- What actions will PRACE take in response to gathered information?

It is however important not to measure things that are not relevant to the stakeholders' priorities nor to PRACE's strategy. The general process for PRACE stakeholder management that need to be considered in the approach is a RADAR loop around stakeholder requirements/usefulness. This loop involves the selection of methods for collecting qualitative or quantitative information on stakeholders (surveys, databases, internet, interviews, meetings, intelligence through informal network of contacts, direct personal experiences, etc.)

It is advisable to maintain a balance between techniques so that a good overall picture is obtained. Reliance on just one technique presents the risk of not having a good holistic view. The effectiveness of the information gathering should be monitored and improved as necessary to assure use of best practices in the information gathering related to stakeholders.

Deploy

It is advised to have this process distributed across the organisation, not only in the PRACE office, but also within the different members of PRACE. It is advisable to have fully functional Customer Relation Management System (CRM) software to manage the

knowledge base, and it is advised to incite personnel to collect and record data on stakeholders.

An important step in the deployment of this task is the design of the different analysis processes, and on the basis of that, the design of the elements to be logged on the different stakeholders. Depending on whether the analysis to be made is lighter or heavier, it will be necessary to log more or less data.

The following diagram represents a further refinement of the process stakeholder management in Figure 6. Since PRACE is a small institution, instead of running a different process for each stakeholder we suggest to group inputs into three categories: User analysis, external factors analysis and partnership management. As the diagram shows, we advise having a process defining precise objectives for each of these three categories on the basis of the process input (the general objectives, action items and KPIs), and according to the objectives adapt the design of the CRM tool to accommodate as much as possible the information gathered. The activity log can be a distributed process governed by explicit shared rules.
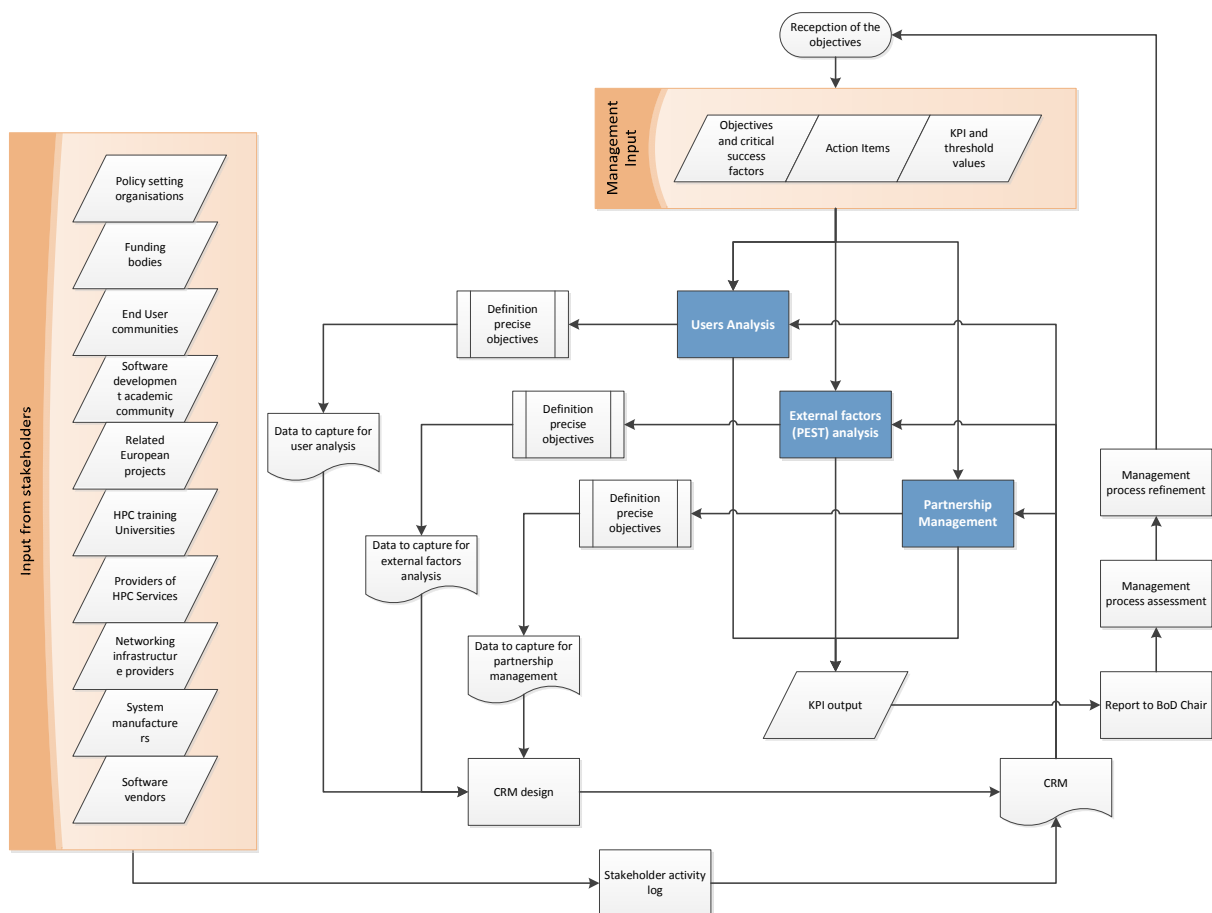

Figure 8 Representation of the proposed Stakeholders management process

The Users Analysis and partnership management sub-process are further elaborated in element 2.13 and 2.11.

<u>**Assess**</u>

The assessment of the activity is not focused on assessing the satisfaction level of users, but on the performance of the process itself. The process should define specific KPI to analyse the success or failure after a certain period. Some possible elements to assess are:

- Number of people updating the CRM.
- Frequency on CRM update per individual.
- Complaints received on the process.
- General KPI reported as outcome of the task. (Has the process led to positive results? What has been the influence of the process?)
- Proportion of types of inputs captured in the CRM.

<u>**Refine**</u>

On the basis of the assessment made, modifications can be made to the process. Taking as example the process suggested in Figure 8, and the assessment items suggested, it could be possible to refine the existing process set by creating a new specific analysis process for a specific group of inputs of stakeholders, or to redefine the staff members that are qualified to log stakeholder activity, or impose more strict rules to do that, or create specific databases or files formats to capture data and process it more easily.

2.11 Partnership Management

Category: Stakeholders

Question: Do you analyse data and information regarding existing and potential partners' core competencies and capabilities to understand how they complement the organization's capabilities?

Priority assessed: medium

Development level assessed: 1/5

The ambitions of PRACE create the need to engage in strategic partnerships in order to satisfactory fulfil them. Sustainable excellence can only be reached with the help of partners sharing their core competences, risk management, and bringing new intangibles. As stated in *Radarise your business for success* [7], Partnership systems are trust-based and characterised by flexible hierarchies, possibly hierarchies where power is guided by values such as cooperation, care taking, and partner equity. Partnership collaboration emphasizes expansion strategy leveraging strengths and mutual benefits.

Using a RADAR loop to manage the process, goals must be defined in the specific area of the partnerships; choosing approaches to collect information necessary to realize the goals; deploying these approaches; assessing the results of the different partnerships; and reviewing each year the steps of the loop.

PRACE needs different types of partnerships for excellence. The partnerships may be of types with expected benefits as illustrated in the Table below:

Partner categories	Examples	Expected benefits
Business partners	Associated advisers Associated brokers Sales networks	New markets, niches, faster turnover growth
Innovation partners	Shared R&D departments, Business Intelligence	Easier access to new technologies, cost cutting
Marketing partners	Co-branding, Co-advertising	Image gain, More efficient advertising
Service partners	Associated Service providers	Service level assurance Better risk sharing
Technologies partners	Standard software partners	Easier use of new technologies, cost cutting
Outsourcing partners	Software development IT production IT user helpdesk	Cost transformation, Service level guaranties
Content and communication partners	Media	Higher value creation
Public-private partnerships	Universities, Public research centres, EC	Risks and investment sharing, funding

Table 5: Types of partners that PRACE can look for

Several fundamental strategic elements need to be in place before any alliance or partnership agreement is signed. These are as follows:

1. Establish clear objectives and expectations for the partnership project. These must be:
   a. Definable: The reasons and goals for the partnership must be clearly delineated and understood by everyone associated with managing and contributing to it.
   b. Actionable: There must be a set of steps or actions that need to be accomplished, and a means of directing, allocating resources and executing the tasks.
   c. Measurable: Metrics need to be established, developed and implemented to assess the results of the partnership.
2. Ensure the alignment of a partnership strategy with PRACE vision and mission and excellence model.
   A relationship will not be efficient for PRACE unless something good comes out of it.
3. Clearly define the expected benefits between partners entering into a relationship.
   Benefits need to be formalised and agreed upon in three fundamental areas which are:
   o Strategy (new user communities, increased credibility, critical size, etc.).
   o Finances (incremental revenue, increased cost efficiencies, return on investment).
   o Intangibles (new competences, co-marketing opportunities, leveraged capabilities).
4. Identify user base growth opportunities where the benefits of a partnership are most apparent.
   Partnerships are most successful when both sides gain equally. But this requires that both sides see and agree on the opportunity and on the way to approach it.
5. Establish criteria for evaluating and scoring potential partners.

Develop metrics to evaluate potential partners before the cooperation begins. Assessment metrics should include measures of overlap between different functions, impact and cost estimations, and cultural traits comparison.

6. Make sure each partner's requirements are clear and aligned with each other's objectives.
7. Secure both executive level commitment and line management ownership
   a. Make sure that both organisations have people who will make a personal commitment to the partnership's success.
   b. Test how both sides work together, communicate and resolve differences.

Next, we provide guidance on the specific development of the different steps of the RADAR loop:

Results

It is necessary to first define strategic objectives with a vision in mind in different areas, for example: establish a relationship with other research infrastructures, outsource the IT before the end of the year, find a business development person in one year or select a new law firm for managing legal issues or establish a relationship with an R&D institution.

it is necessary to set goals for each partnership. There is no sound partnership without results to produce. for example, a goal for an IT partner could be reduce by 20% the current costs; a business development goal could be to sign three contracts with companies for commercial access to PRACE; and a R&D partner goal could be to have a preparatory access project proposal in the Artificial Intelligence area by the end of the year.

The process must include partner research on the one hand, and prioritisation on the other hand. A process for the withdrawal of partnerships needs to be defined for the sake of transparency and to eliminate potential conflicts.

Approaches

A holistic partnership management is based on four processes:

- A partnership strategy process including: partnership strategy review, value chain analysis, competences analysis, and partnership strategy updating. The strategy could involve an initial risk assessment, and the identification of the anticipated benefits. It is necessary to avoid partnerships based on mutual like. If there is lack of direction and structured approach, metrics or actual plans, PRACE may get no results. The absence of a "win-win" partner attitude shall be avoided.
- A partnership selection and acquisition process embracing: partner identification, partner selection, partnership initialisation, and partnership business planning and contracting. In this process, it is important to identify a clear purpose for the partnership, and establish the rules of engagement. These must define the negotiable and the non-negotiable aspects of the partnership at the outset. It is also important to formalise a measurable declaration of each partner's intentions. For large, strategic and contractual partnerships, it is necessary to produce a document that can be referred to in the event of a dispute with the partner. The document should identify a senior partnership sponsor who has ultimate responsibility for the partnership. It is necessary to reduce as far as possible the implicit wishes or evaluations by all partners in a partnership.

- A partnership organisation process containing: organisation, initial design and implementation, and process optimisation. It is necessary to identify who should be involved and who should manage the partner relationship, and manage the time and resources available

- A partnership monitoring process comprising: partnership strategy assessment, monitoring system and reporting. It is necessary to identify the performance management measures and reporting routes. One measure of partnership performance consists in verifying if the objectives of the partnership scorecard are reached or not. Another measure is to ask all non-PRACE involved participants what they value about the relations with the PRACE teams and what could be improved. For this information gathering questionnaires or focus groups or annual partnership meetings can be used if deemed necessary.

The processes are outlined in the diagram below (this diagram represents a specification of the Partnership Management process represented in Figure 6)

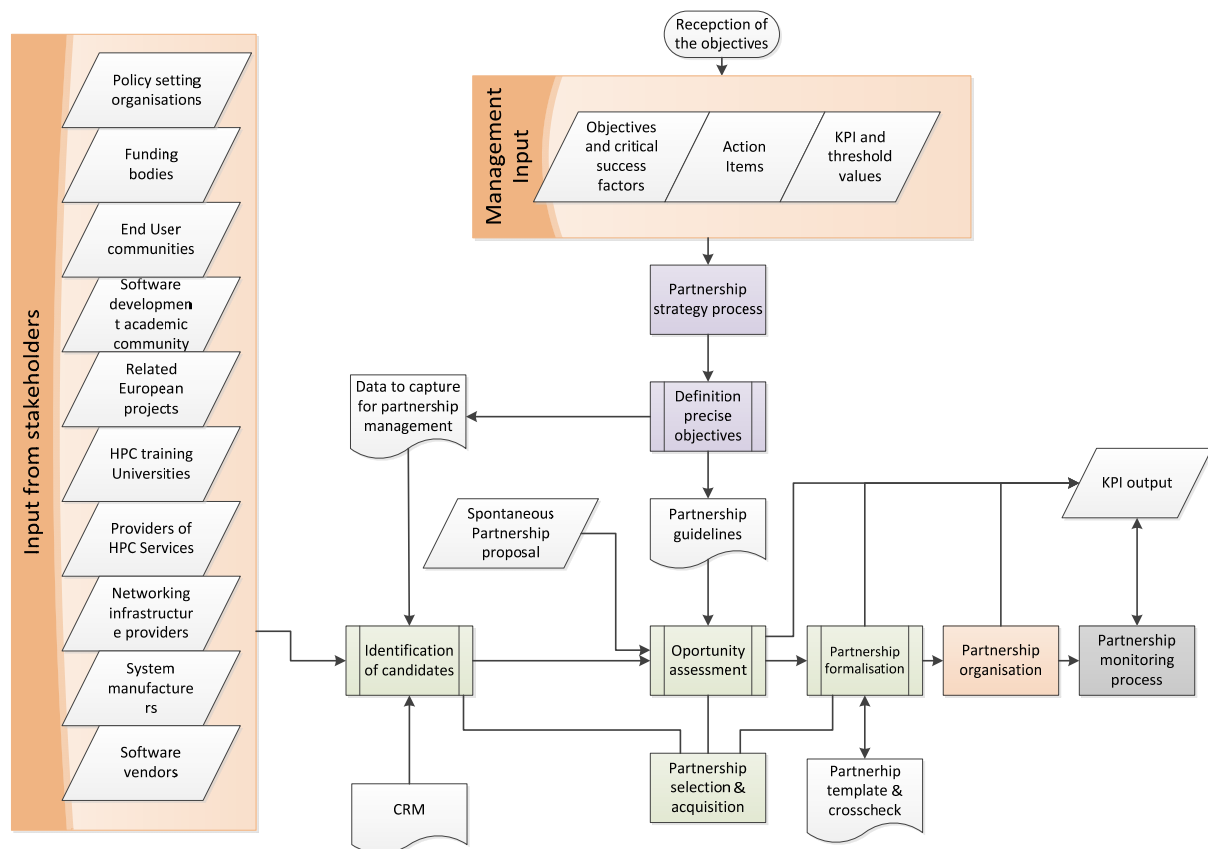**Figure 9 Representation of the proposed Partnership management process**

Deploy

As suggested in *Radarise your business for success* [7], PRACE should consider creating and documenting a quality plan detailing all agreement specifications into actionable tasks and duties for both sides' processes and teams in charge of running the partnership, and to include all involved in finalising this quality plan.

Depending on the volume of partnerships that PRACE is considering to manage and the type of them, it is advisable to consider the deployment of a partner relation manager system (PRM) storing information about partner needs and organisational responses. There is a huge offer in the market for these types of software packages[2]; however, at the current level of development of PRACE it may not be very useful to deploy these specific channel management systems. Information can be stored in an excel spreadsheet or even a wiki page, or the SaaS project management system used. Organisation members should contribute to the partner database updating.

Assess

To assess the process, it is necessary to measure how well partners' needs and expectations are being collected. How many unspoken needs and demands come to light after partnership agreement signature? How much partnership breakdowns are related to bad understanding and integration of partner needs and expectations? A scorecard shared by the partners has to show Win-Win situations. Partnership Balanced Scorecards support both formulation of goals and success measurements. They must concern not only the financial performance, but also make clear the efficiency of the partnership, the innovation contribution.

In general, it is a good practice to champion and publicise successes in improved services to users delivered through partnership arrangements.

Refine

The refinement of the process involves the modification of the processes that were identified as not operative or malfunctioning, as well as trying to amend decisions that were done using an incorrect process, or refine those done using a different set of objectives. This would involve taking decisions like for example, when a partnership no longer meets the objectives, it will be necessary to negotiate the closure or withdrawal of PRACE from that partnership.

2.12 Partnership selection & acquisition

Category: Stakeholders

Question: Do you establish appropriate networks to enable them to identify potential partnership opportunities to enhance their capabilities and ability to generate additional stakeholder value?

Priority assessed: medium

Development level assessed: 1/5

As explained in the previous element, partnership management is a highly strategic process. All its sub-processes are important, but the partnership selection and acquisition has been assessed as one of special interest for PRACE.

As indicated in the Figure 8, partnership selection and acquisition can be decomposed into three different sub-processes, which are described next:

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[2]   Averetek   [http://www.averetek.com/],   Channel360   [http://www.channel360.net/],   Cloud Profiler[http://www.cloudprofiler.com/], PartnerPath [http://www.partner-path.com/services/automate/]

2.12.1 *Identification of candidates*

This process consists in actively establishing contacts with all stakeholders, and exchange views scouting their needs and learning from their capabilities. This can be done directly in face to face meetings or indirectly searching for information on them available on the web and from other sources and then finding a direct contact with them. All activity in this phase needs to be logged in the CRM, and the general indications provided in section Stakeholders Management 0 need to be considered. The current CRM tool should be adapted to cater for external partnerships. There should be a repository of key contacts/sources for each strategic/operational area, together with a strategy to tackle each and review its implementation. Entries logged into the CRM shall be tagged with an adequate terminology that permits to easily keep track of the status and the pre-assessed relevance. Aside of the active leads that can be generated by the active scouting, spontaneous proposals may appear, these contacts need also to be logged into the CRM.

The data to be logged and the criterion used to identify candidates depend on the precise objectives set by PRACE. These objectives are the result of the partnership strategy process (see 2.11). These objectives should be translated into a written template of the necessary data to be captured for each of the studied leads. Although most of the template will be standard, some parts may reflect particular interests that the partnership objectives seek to address.

Any PRACE member staff can potentially participate in this process, but with 25 members, each having its own network of partnerships, it is advisable that one person be made responsible of the task, receiving inputs from other people, seeking their active collaboration and doing active research.

2.12.2 *Opportunity assessment*

PRACE can schedule periodic opportunity assessments of partnerships. The frequency of these assessments should depend on the amount of leads identified and proposals received. Decisions on these sessions should be taken considering also the partnership guidelines that indicate what are the results targeted. Even though the objectives may be precise, it is advisable to take decisions on the basis of broader discussions to ensure a rigorous process. Each Partnership could be assigned a rating (1-10) and related objectives/actions could be generated. Some data in this process may be considered for further assessment on the process itself, for example, number of opportunities evaluated, ratio of accepted vs. refused, etc.

2.12.3 *Partnership formalisation*

PRACE may consider maintaining a database of templates for partnerships, and improve their terms iteratively with the experience gained. It would also be useful to have a checklist of elements to be checked in the process of formalising a partnership, considering protocol, legal aspects, timings, etc.

2.13 User analysis

Category: Stakeholders

Question: Do you know who the different customers groups are, both existing and potential, and anticipate their different needs and expectations?

Priority assessed: top

Development level assessed: 2/5

The chapter 0 Stakeholder management, identifies the end users as the decisive stakeholders as the aim of PRACE is to provide world class HPC related services to targeted user groups. Here we propose a process to monitor the different customer groups and anticipate their needs and expectations.

In Figure 8 representing a refinement of the stakeholder management process, user analysis is defined as one of three activities with the objective to collect and record data on stakeholders. User analysis targets users and user groups, assess their needs and then specify how the different PRACE services satisfy these needs. We will use the RADAR methodology to outline a process for the user analysis.

The services provided by PRACE are a central element in a user analysis. We anticipate that services will be developed and adjusted continuously and new ones developed based on user needs. It is a prerequisite that all services offered be clearly described in a way understandable for the targeted users and users groups and marketed through PRACE outreach channels. In PRACE-3IP WP6 'Operations of the Distributed Research Infrastructure' there is work going on with the aim to establish a PRACE Service Catalogue. PRACE can benefit from this work and can maintain this catalogue in the future.

In addition, it is important to keep track of who is using the different services for example in a CRM system or in an excel spreadsheet.

Results

In the user analysis, the following outcomes should be addressed:

- A grouping of users in target groups based on earlier analysis (*Analysis of HPC Ecosystem* [19]). A description of how PRACE services satisfy these needs and expectations.
- Regrouping of users if necessary based on the users responses.
- Responses to needs and expectations by defining action items for necessary improvements of PRACE services or design of new ones.
- Foresee potential opportunities for better serving users.

Approach

A starting point for the user analysis is a description of all PRACE services and a description of user categories. Based on these descriptions a questionnaire should be created with an aim to reveal how services satisfy needs and expectations. The periodic analysis of the survey answers will make possible the educated adaptation of the PRACE offer. However, as the ecosystem evolves, it will also be necessary to be aware of the evolution of user categories, and keep track of how they grow, shrink, emerge or disappear. To do that PRACE could

partially rely on input provided by the SSC, and on its own metrics of impact related to user space.

Deploy

End users include the research infrastructures defined in the ESFRI Roadmap – most of them representing a specific scientific discipline – and other groups such as existing European Research Infrastructures, scientific communities, individual scientists and industry. The analysis of the evolution of the categories of users, as indicated above, can be done on the basis of the input provided by the SSC in reports such as, for example, the Scientific Case [22]. The User Forum is another valuable source of information. In order to structure the analysis, it is advisable to have a document listing categories of users and register data on each one of them. For this analysis we recommend to use the sources that are being analysed in a different task within this work package [18]. Since the proposal of analysis of these sources will not be delivered by the time the current deliverable becomes public, we add some brief notes on these sources:

- Industry participation in PRACE activities: with this data it would be possible to track the interest of the different types of industrial users or potential users, and to, for example, adapt the business development actions according to that. Data on user distribution by countries would be also potentially interesting or the requirements of user companies in terms of e.g. expertise and other support services, software, numbers of cores, etc.
- Evolution of the participant profile in training events: with this data it would be possible to determine where PRACE training services have maximum impact (whether young or senior researchers). Other elements to track would be the distribution of training participants by country and by scientific field.
- H-index of applicants: with this data it would be possible to know the seniority of researchers that PRACE gives access to. The analysis can be carried out by scientific area.
- Project finance structure in term of additional funding: an important user aspect is to have a good understanding of how they finance their projects. The analysis can be extended to see the evolution in the particular sources of funding, funding rates, funding length, etc. This knowledge may help PRACE defining strategies that maximise the impact.

Besides having a comprehensive knowledge of PRACE users, it is also important to know how the users are using PRACE. This will help not only the User analysis but also the analysis of the PRACE offer (see 2.14). The sources of information for this analysis are diverse. One straightforward option is to use a general questionnaire to be sent to all included in the user database (all contacts in the PRACE CRM). The questionnaire would be sent to individual users within the different user groups. Examples of questions to be answered are:

- Which PRACE services are they using.
- The level of satisfaction with each service being used.
- Suggestions for improvements.
- Level of interest for services not being used so far.
- Reasons for not using these services.
- Volumes of use and expected changes in these volumes.
- Scientific area for the user of the services.

There should also be a possibility to follow up with direct contacts and face to face meetings with representatives from actual target groups if deemed necessary. This could be the case when targeting new user groups or groups where the result of the questionnaire is difficult to interpret, or shows unexpected outcomes. Surveys and their analysis could be based on a standard tool such as Questback, google doc, or surveymonkey.

Key findings could be logged in an excel sheet, or a CRM system categorised for each one of the target groups. The form below shows a structure for how this can be done and examples on logged data.

	Target group 1	Target group 2	Target group n
Service 1	Not in use Potential for use Action item(s)	Not in use Potential for use Action item(s)	Level of satisfaction Improvements suggestions Volumes now and anticipated Action items(s)
Service 2	Level of satisfaction Improvements suggestions Volumes now and anticipated Action item(s)	Level of satisfaction Improvements suggestions Volumes now and anticipated Action item(s)	Not in use Potential for use Action item(s)

Table 6: Example of form to log data on usage of services

Action items may be of several kinds, i.e. suggestion for improvements in a service or a follow up action against a target group concerning one or more services, or the issue of a call for expression of interest, etc. The prioritisation, following up or implementation of the action items is not within the scope of this process but it is important that the status of each item is maintained within the CRM system. This could for example be PE-Pending, PL – Planned, IM – Implemented, RE – Rejected.

An example of key findings for a service is shown below.

Access to Tier-0 cycles from HM-X	Level of satisfaction: 4 (max 6) - File transfer took too long time - The user documentation should be improved especially on…. (some specification) Action item status: 1. File transfer improvement (PL) 2. Documentation improvements (IM)

Potential new users and target groups can be tracked in different ways. One is by following up contacts established on seminar or conference booths. Another is by creating forms which are asked to be filled out by visitors on the PRACE website when they are searching for information about the outcome of PRACE projects.

As a part of this analysis it would be possible to use information from other sources e.g. feedback assembled from PATC training courses and other PRACE training events. For new services it would also be interesting to have a "send your suggestion for new/additional services" form in the PRACE website to capture new ideas. Another information source for

analysis can be processing information from the user support ticketing system revealing weaknesses and suggesting improvements and possibly also ideas for new services. Yet another source can be information gathered from user forums evaluations.

The core of the methodology is to create the survey based on the following matrix: Groups of Customers * PRACE offer.

By collecting the aforementioned information it is possible to assess the PRACE offer at the time of issuing the survey. Having in hand the past survey outcomes, we can build the historical scenario of user needs and derive trends. The next in turn survey will reaffirm the assumptions.

Assess and refine

The assessment of the outcomes of PRACE services targeted in this process can be made directly from the user feedback forms. Some services, such as training, have already gathered this data. There are also indirect indicators that can help on the assessment task. These are part of the work in progress in task 2.4 to be published in [18] (see also material in the subject from PRACE 1IP ([30][31][32]). Here we mention the metrics we consider particularly relevant. All details on them will be provided in the mentioned deliverable:

- Software development for scalability development: this analysis can provide information on the type of projects that users run in the infrastructure, whether they aim at developing scientific knowledge or to develop HPC software for Tier-0 resources. For these projects, a specific survey and a process to follow up on them have been designed in [18]. The outcomes of this survey can be used in this analysis to know whether the work done has raised the productivity in their business or research, if it has helped to create jobs, to increase visibility or changed in some other positive way the way they do business or research.
- Success ratio of proposals: with this data it would be possible to assess the activity of the user base requesting access to PRACE resources, and whether it is increasing flat or decreasing. it would be useful to analyse the renewal of the demand, plotting the data on number of new vs old PI for the projects, and the demand of a specific type of call vs. the others (Open R&D versus regular, for example). It will also be useful to analyse the evolution in the number of core hours requested to Tier-1 machines.
- Industry participation in PRACE activities: the analysis of the trends in the number of hours requested for Open R&D access can be of help in assessing the value of this service. A process has been designed in *Quantitative Impact Assessment for the RI* [18] to follow up yearly on companies who have accessed PRACE services. The answers would give information on whether the trainings or support provided has helped the uses to create new products, raised their productivity, helped to make preparatory access proposals, helped to create jobs in the company, to increase visibility, to increase investment in HPC or changing in any positive manner the way they do business.
- Training Events: different statistics can be useful for analysing the training service, like for example, the ratio of new vs. recurring participants, average persons per training, average time of training per person, participants in the training portal, bouncing rate in the portal, Youtube impact, etc.
- Publications: for the analysis of the PRACE user base, it is important to know the product of the research done with PRACE, beside the industrial feedback, it is important to track the scientific production that depend on PRACE over time to know

how the level of utility of PRACE services to participate in science. This analysis can be made by specific scientific fields.

- Evolution of the technical specifications of the systems: in order to explain certain findings of the user analysis, it may be useful to follow the technical specification of the systems provided to PRACE, and benchmark it with the most powerful machines in the world.

2.14 Management of the PRACE offer

Category: Strategy

Question: Have you developed the portfolio in line with the changing needs of existing and potential customer groups?

Priority assessed: medium

Development level assessed: 1/5

PRACE does not need a portfolio and roadmap of products in the same way that a company does. The equivalent of developing a portfolio in line of the changing needs of existing and potential customer groups for PRACE will be to adapt its service offerings and call targets to the existing and potential user demands also considering the general stakeholder's interests.

At this point in time, the calls are driven by a well-defined process based on scientific criterions adviced by the SSC. The services to be offered are still under discussion, and they will depend on the configuration of the European HPC ecosystem and on what other institutions will offer (CoE, ETP, PPP, etc.). Once the implementation period is better established, PRACE would benefit from having a process set up to review its offer on the basis of the interests and needs of the demand. In this respect, the process for managing the PRACE offer is part of the user analysis defined in the previous element. Further analysis of the PRACE offer (or deployment of the offer) is partly made in the marketing management (see element 2.15).

2.15 Marketing Management

Category: Strategy

Question: Do you develop marketing strategies to promote the products and services to target customers and user groups?

Priority assessed: Top

Development level assessed: 2/5

The marketing strategy is the basis for processes that concentrates PRACE resources on the optimal opportunities for promoting the PRACE brand and services.the marketing strategy will help PRACE develop efficient ways to reach customers (users) and stakeholders and encourage their future loyalty to HPC in general and PRACE in particular. This means vibrant communication media including traditional and emerging options for print disseminations, tools for accessing online contents and PRACE databases as well as promoting consistency, coherence, and alignment across all its services.

To fully realize the marketing goals, PRACE needs to define and deploy all basic and long-term internal marketing analysis activities followed by the formulation, evaluation and selection of market-oriented strategies to achieve maximum impact of its marketing efforts and strategy.

Following the methodology suggested for defining processes based on the RADAR loop the marketing strategy management can be divided into the following phases:

Results

In this phase, PRACE determines what it wants to achieve as part of the European research eco-system by setting its marketing goals. Goals/Results can be set on the basis of the (general) annual objectives for PRACE set by the Council, or the strategy defined for Stakeholders Management or Partnership Management. (see section 0 and 2.11 respectively) or a combination thereof.

Setting realistic goals is a major element of good marketing strategy. One clear major goal of PRACE marketing strategy is to gain users throughout Europe and also to properly communicate the impact of PRACE is currently making, ensuring funding agents and European society are well aware of its functions and importance. Given the unique nature of PRACE new users will largely have a history of using local organisation, and national/regional resources and possibly other resources and services in a European computing and data eco-system and continue to have a symbiotic relationship with those providers rather than being gained through direct competition.

PRACE's name and reputation should be developed and built within the science and research communities around Europe and, more specifically, in the target groups. This includes PRACE brand and unique identity. Both the brand and identity lay the foundation for the way users perceive PRACE as their Pan-European provider of HPC services.

Another important goal in the strategy could be providing quality and consistent user support service having in mind the organizational and functional structure of PRACE. In other words, PRACE has to consolidate and maintain its good reputation as excellent Research Infrastructure providing excellent support service.

Approaches

Once Results are decided PRACE can consider adopting a classic marketing mix for its marketing strategy (the 4P [24]). While Price and Place are not variables for PRACE to consider, Product and Promotion are elements that PRACE should consider in its marketing strategy:

- **Product:** it is an item that satisfies what a consumer desires/demands. PRACE can think of its services as products in this sense, and PRACE may want to consider priorities amongst them, the image it wants to transmit for each of them, their targeted audience, the analysis of the competitors they would co-exist with, etc. Designing a strategy from a product perspective requires using mechanisms such as a SWOT analysis, and once analysed, the outcomes may affect specific elements e.g. the re-design of a corporate image or message, to general high level strategic elements e.g. the creation of new objectives for partnership management.
- **Promotion:** it refers to all the methods of communication that a marketer may use to provide information to different parties about the product. It comprises elements such as: advertising, public relations, conferences, industrial events, etc. This elements encompasses a necessary study of the market (related to stakeholders management and user analysis – 0 and 2.13 respectively), as well as the design of messages (according to the product design), identification of optimal promotion events or channels. All PRACE projects have deployed their own Dissemination Plans that guides in by

developing products, targeting users, developing a brand and choosing distribution channels. They can be consider as the first signs of PRACE tactics for communicating its strategy, including public relations, advertising, social media and promotions.

<u>Deploy</u>

Marketing strategies are usually developed as multi-year plans, with a tactical plan detailing specific actions to be accomplished in the near term. Marketing strategies serve as the fundamental underpinning of marketing plan designed to fill market needs and reach marketing objectives.

A plan of action details steps that need to take place in order to execute the marketing plan. This includes the production of marketing materials and costs of each component in the plan. PRACE needs to ssure that necessary staff and budget are allocated to the different components. Time scales must also be included to make sure the marketing plan is effective. Time scales are especially important when there are opportunities that are time sensitive, such as seasonal events (e.g. PRACE Industrial Seminars, PRACE Schools, and Supercomputing Exhibitions and Conferences, PRACEdays).

The analysis of the product from a marketing point of view, and the identification of the existing and potential users and their needs is a key element in a marketing strategy. This sub-process is related to stakeholders' management (see 0) and its related tools. The CRM in particular shall be a key source of information for managing contacts, and creating categories and target groups through appropriate tagging. This analysis also requires the study of data monitored by PRACE. This data may reveal defects that may be addressed via an appropriate marketing strategy or achievements that need to be sustained. This data in some cases represents an excellent basis in setting the marketing goals and activities as well as in shaping the marketing campaigns. In that context, the elements from the PRACE-3IP project D2.4 [18] (to be delivered; full details on them will be provided in the deliverable) can provide such information for the analysis:

- Software enabling development metrics: evolution on number of software enabling projects, resources allocated to such projects vs. non software enabling projects, feedback on surveys sent to users after two years on the impact PRACE services had on their development, etc. This data may reflect the impact and relative importance of software enabling projects, and the data can be considered in a particular marketing campaign in case PRACE consider this as a strategic priority.
- Industry participation in PRACE activities: characteristics of industrial participation (SME, Corporate, repeating, new companies, repeating companies, total volume, etc.), distribution of the interest by sector or country, HPC requirements in the interested companies, hours requested for OR&D Regular Access, results of the survey answered two years after project completion, etc.
  This data will reveal the engagement of companies, the interest in specific sectors, and the impact resulting due to the use of PRACE. All this information is key to properly address marketing campaigns to industry and to design events that will maximise the participation and overall quality.
- Training events: same as in the previous paragraph but for the particular case of trainings events (industrial plus non industrial). This includes the usage of data of previous participants, such as average age, average trainings per person, interest by scientific field, etc. This data will provide the necessary information for better promoting and adapting the trainings in PRACE countries by maximizing their reach.

- PRACE raising awareness events and media coverage: social media reach and web site analytics. This basic measure will help to identify elements of interest and, for example, identify proposals for new and better services.
- Success ratio of proposals: monitoring the success ratio of the specific PRACE calls can be a key indicator for the need of designing specific campaigns to maximise the competitiveness amongst proposals coming from different scientific or engineering domains, for example.
- H-index of applicants: by analysing the profile of the H-index it is possible to get an idea of the PRACE user types from different areas. This key knowledge is of high value for designing marketing campaigns better targeted to the most successful profiles, or to try to boost the participation of the profiles with less engagement via specific campaigns.
- Publications of any type: elaborating success case stories with the statistics on the scientific output of the usage of PRACE services can be a good material for advertising PRACE amongst agnostic researchers.
- Evolution of the technical specifications of the PRACE coordinated systems: such data needs to be regularly updated and be used in marketing campaigns together with the total amount of computing time provided by the systems.
- Evolution of environmental imprint: data as the Mflop per second per Watt (MFlop/s/W) should be increasingly emphasised in the marketing material to raise the awareness about the energy efficiency of supercomputing being a first-order constraint on par with speed and the efforts and successes in improving it.
- Project finance structure in term of additional funding or private/public: Knowing how the users fund their projects is important to market PRACE. Marketing actions can leverage this information in deciding which events, information sessions, workshops or concentration meetings PRACE should be present for maximising the impact of the marketing actions. Also, the results of the surveys indicating the success degree of using PRACE for increasing funding can be used as marketing material.

Performing various tasks and activities such as advertising, public relations, internet networking, participation in exhibitions or other events and use of print and electronic media can help in raising awareness within target groups about PRACE services. These activities, should be focused on PRACE's strengths and the needs of the target groups.

As an example, within all PRACE projects, a broad spectrum of communication channels have been exploited in order to effectively reach the target audiences for dissemination and to maximise the visibility and impact. The PRACE website has a central role. Press releases, news bulletins, success stories, articles, brochures, posters, and videos have been produced during the lifetime of the PRACE projects. In the future, marketing benefits of new activities like HPC programming contests, or challenges to different teams on, for example scalability of certain software in a given scientific domain should be considered.

Beside defining target groups, and marketing campaigns, a strong prerequisite for a good marketing deployment plan is work on the organisation's message which should be clear and inviting. In the context of PRACE, the overall profile should stand apart from the rest (e.g. other HPC centres) by communicating consistent but at the same time differentiating marketing messages. This conveys the PRACE unique Pan-European stature. each marketing message should clearly convey the benefits the organisation's services offers its users, PRACE needs to emphasise uniqueness, quality and the range of services.

Assessment

It should be undertaken within an overall strategic framework of PRACE that accords it to the basic quality of the data and the fundamentals of dissemination. The assessment needs to identify significant enhancements in the marketing strategy that are achievable in the short term (e.g. adding new activities and/or refinement of goals and messages), while laying the groundwork for long-term improvements. Some of the variables from *PRACE 3IP-D2.4* [18] reviewed in the deployment phase can provide also valuable information for assessing the success of particular marketing campaigns or general marketing process.

Refine

Based on the assessment made, the whole marketing management process can be refined and modified to cope with the particular situation PRACE may be facing.

2.16 Financial Management

Category: Management

Question: Have you designed financial planning, control, reporting and review processes to optimise the use of resources?

Priority assessed: low

Development level assessed: 2/5

PRACE should develop a transparent and clear process for establishing a yearly and a long term (at least three year) budget with the yearly budget being of an operational nature and the long term budget reflecting the strategic objectives of PRACE as set forth by the Council.

The long term budgets are of particularly high importance given the fairly long budgetary processes of important PRACE stakeholders. Processes needs to be established that assures that Council and Stakeholder concerns and strategic objectives are considered in preparing long term budgets, and that approved budgets are communicated effectively to relevant Stakeholders.

A clear process should be established to translate the objectives as established by the Council into budgetary requirements. This process should involve the BoD, the Director, relevant Stakeholders and as needed outside expertise.

Budgets (annual and long term) should be updated annually and approved by the last Council meeting in any given year. Budget preparation for Council decision should start in earnest once the annual financial report has been approved by the Council. The PRACE Director should (or the BoD Chair) appoint and communicate to the Council and relevant Stakeholders who is responsible within PRACE for preparation of budgets and annual financial reports.

The Annual Financial report shall be available within 30 days of the close of the fiscal year and approved by the first Council meeting following the completion of the Annual Financial report.

PRACE should establish budget categories that enable tracking of expenditures and effectiveness of key functions of PRACE, such as for instance outreach, education and training, marketing, the work of the Scientific Steering and Access Committees, the PRACE office and the different essential elements of the key functions. A process should be established for reviewing and revising budget categories as needed to allow for proper monitoring of the effectiveness of operations. The effectiveness should be compared with other similar organizations annually. Budget categories should be approved by the BoD in

consultation with the Council and developed and/or proposed by PRACE financial staff in consultation with the BoD. The tracking and evaluation of effectiveness should also include the effectiveness of outsourced operations (e.g. IT services, accounting, banking and legal services).

Budget reconciliation should be completed within 10 days of the close of each month and presented to the Director promptly. Quarterly reconciliation's should be communicated to the BoD and the Council.

PRACE should also establish processes to assure compliance with applicable laws and carry out compliance reviews regularly, at least annually, and internal audits that address both compliance and effectiveness of the organisation. The reports should be presented without delay to the BoD and the Council if requested.

PRACE should have clear and well documented policies for expenditure approvals, procurements, fee collections, reimbursements and payment processes and monitor the adherence to the policies and procedures and take corrective action where warranted and revise policies and procedures as necessary. The policies and procedures should be approved by the BoD and as needed by the Council with adherence reported to the BoD quarterly.

PRACE should also have policies and procedures for the management of financial assets and controlling/limiting liabilities. These policies and procedures should be reviewed at least annually and revised as needed.

PRACE should also establish a process for monitoring funding opportunities for realising its vision and mission and potential partners for responding to identified funding opportunities. Responses to such opportunities and their outcomes should also be monitored and reviewed by the BoD at least annually.

2.17 Human Resources management

Category: Management (1,2,3), Human Resources (4)

Questions:

1. Have you clearly defined the skills, competencies and people performance levels required to achieve the Mission Vision and strategic goals?
2. Have you ensured that people have the necessary resources, competencies and empowerment to maximize the customer experience?
3. Do you inspire people and create a culture of involvement, ownership, empowerment, improvement and accountability through their actions, behaviours and experience?
4. Do you use a structured approach for generating and prioritising creative ideas? Do you test and refine the most promising ideas, allocating resources to realise them within appropriate timescales?

Priority assessed: **Development level assessed by BoD:**
1. Top   1. 2/5
2. Medium   2. 2/5
3. Low   3. 1/5
4. Low   4. 0/5

The questions have been grouped into a single category since they mainly refer to the Human Resources aspects of PRACE, and two out of the four questions are rated as low priority. The PRACE organisation has nowadays very reduced man power, nevertheless, we provide some general guidelines and recommendation to be considered by the PRACE management in order to develop the right culture of office staff as well as in the distributed network of collaborators amongst the members.

2.17.1 *Skill management*

As stated in *Radarise your business for success* [7], Skills constitute the foundation of organisational knowledge. Therefore, defining a skill accurately is critical. It is necessary to determine what a skill means to PRACE. A skill can be described as knowledge, ability, talent, competency, experience, responsibility, and proficiency, among others. It is necessary to use precise wording when deciding what it takes to perform a certain role.

In an organisation, a skill has to meet the following criteria to be relevant and manageable. It must be:

- Definable: a skill must be described and formalised for people to understand. If it cannot be described clearly and precisely, it will not be possible to accurately demonstrate it in work environment.
- Trainable: training, coaching and other development solutions must be available in order for people to improve and to enrich their skills.
- Substantial: there must be some significance and robustness to the skill. It should not be something, which can be learned too easily. It needs personal investments to be acquired.
- Demonstrable: people must be able to prove their skill on the job and demonstrate the various levels of proficiency. If a skill and/or its results cannot be observed in a working environment, it should not be considered.
- Measurable: a skill must be measured quantitatively, or at least classified in some order of ranking, so proficiency can be assigned and assessed.
- Verifiable: a skill must be corroborated and gauged in a consistent and impartial way throughout the company.
- Acceptable: it is very important to find the right yardsticks for defining and measuring skills for acceptance by all co-workers and ensuring equity.
- Discussible: there must be sufficient substance to permit a constructive dialogue between employees and managers about skill development and improvement.

There are many types of skills, for instance: behavioural skills such as initiative, cultural skills such as customer focus, developmental skills such as project management, functional skills such as accounting, managerial skills such as empowerment, and procedural skills such as purchasing, technical skills such as using specific software, etc. Skills identification is established in the creation of skills content and proficiency standards for generic job title, and followed by skills assessment by the individual and manager. Skills acquisition is based on the establishment of training and development plans and the enrichment of these skills, which must be developed. Skills application is rated in terms of accomplishment and in a context of performance.

Each job has to have its description. Such a job profile may comprise three different aspects:

- A task description
  - o Mission of the job
  - o Major tasks of the job

- o Complementary tasks of the job
- A competence grid
  - o Hard competences
  - o Soft competences
- A list of internal and external knowledge bases the job needs to access
  - o Knowledge bases to be updated by the job
  - o Internal data and document bases to be consulted by the job
  - o External data and document bases to be consulted by the job (for instance Internet sites)

After collecting skills information, it would be necessary to work out what to do with it. Here we propose an assessment framework based on the RADAR methodology [7].

Each generic job requires two different levels of skills:

- General ability skills often called soft skills are more socially oriented skills. We suggest assessing them with a five-point scale, where level 1 is the lowest and level 5 the highest.
- Specific technical skills often called hard skills are skills that refer to job-specific knowledge. We suggest to assess them with a five-point scale, where the levels mean:

  1. Beginner for performing a task.
  2. Can perform the task with significant support.
  3. Can perform the task independently.
  4. Advanced in performing the task.
  5. Expert in the task.

It would be necessary to assess each person against these required levels of skills and identify weaknesses in skills and competences. Then link training to individual skills needs to reabsorb the gap between required and available skills. With such an approach it would be possible to be aware at all times of the knowledge coverage needed by all the processes along with the actual knowledge available. The gaps between the two have to be reduced by hiring, training, moving or promoting. This way it would be possible to know what PRACE knows more than a year ago. The evaluation can be made through an appraisal process (see next subsection).

It is generally advised to reward and recognise those who contribute, often voluntarily, through mentoring, coaching, project participation, and other forms of knowledge transfer.

It is also advisable to assess the process periodically (yearly) through questionnaires about employee satisfaction. There are many available in the consulting market, and any can be adapted to the PRACE characteristics. In the assessment, it is also convenient to measure the time and money invested in training, coaching, promoting, etc. and asses the return of investment based on performance of their tasks and personal satisfaction.

2.17.2 *Appraisal process*

Although the question refers to "maximise customer experience", for PRACE, it can be translated into a different objective that should be set by the PRACE Council and may not be related to user experience but to stakeholder satisfaction, and to increase of impact.

The most advisable mechanism for assessing whether the different PRACE actors have the necessary resources, competencies and empowerment to accomplish their goals is to measure the actor performance and ask for their feedback. Here, we provide general guidelines for a possible appraisal process.

Performance appraisal is advisable in order to develop, encourage and recognise performance and work-place behaviours, and to proactively identify and apply appropriate corrective measures to address any concerns impacting the employee's ability to meet the established performance expectations.

- It is suggested that performance policy evaluation should be performed annually. Performance appraisal should cover mainly responsibilities of each job towards mission/vision of PRACE.
- Improvement of open communication between supervisors and their staff.
- Documenting the professional growth and development needs and achievements of employees (improvement of skills, see previous section subsection 2.17.1).
- Collecting data to support analysis and decisions in staffing, compensation and training.

For appraisal process there should be some documents such as;

- Employee performance appraisal policy document (covering appraisal policies and purposes).
- Performance review process guideline for supervisors (including due dates, supervisor's role, review meeting planning instructions, and guideline about review forms).
- Appraisal performance review forms (it should be more than one form such as classified (supervisors' appraisal performance form) and non-classified (employees' appraisal performance form).
- Self-evaluation form for employees.
- New employee evaluation form.

Supervisor and employees should meet and thoroughly discuss the review. Upon completion of performance review meeting, signed copies of the review should be distributed as indicated in the document.

Employees wishing to add comments to their review may do so in the provided section. The following descriptions should be provided to assist the supervisor in using the designed rating scale:

1. Unsatisfactory: Generally fails to meet expectations.
2. Needs improvement: Performance does not always meet standards or expectations.
3. Fully successful: Performance fully meets requirements and expectations.
4. Commendable: Performance fully meets and often exceeds requirements and expectations.
5. Exemplary: Performance far exceeds all jobs standards and expectations.

Self-evaluation form for employees should cover the following expectations:

- His/her major achievements in the last period.
- Job-related goals would he/she likes to accomplish in the next 12 months.
- Elements that prevented her from doing a better job (empowerment, resources, knowledge, time, competencies, training).
- Specific areas would he/she likes to improve his/her job performance.
- Steps that liked to take to improve his/her preparation for future opportunities.

- Evaluation himself/herself on the following factors: outstanding, very competent, satisfactory, needs improvement on teamwork, innovation/creativity, interpersonal skills, time management skills.

According to performance evaluation and self-evaluation forms, performance improvement plan should be done. Performance improvement plan should address certain fundamental points:

- Summary statement that performance is not meeting the requirements or the expectations of the supervisor.
- It should identify what resources, materials, training, and etc. will be made available to help the employee meet the performance expectations.
- Performance improvement could be many forms such as
    - Training, assigned books to read, or classes to attend.
    - Mentoring by supervisor or other staff.
    - Job shadowing an another employee who has good command of the skills or behaviours in question.
    - Periodic meetings with the supervisor or staff who will train/assist the employee.
- Performance improvement plan should have a schedule. It must be identified the period of time after which some level of improvement is expected. This time period should be 30-120 days.

2.17.3 *Inspiration*

Developing a culture in PRACE that inspire people (not only employees, but all stakeholders) is an ambitious and difficult goal that can be achieved spontaneously or with some strategic assistance. Inspiring people can create a culture of involvement, ownership, empowerment, improvement and accountability. The most important element to create such inspiration is to design process and attitudes at the managerial level that take into account the named principles and periodically assess whether this is being achieved or not and refine the plans to enforce this in a continuous loop.

Some elements can assist in this goal:

- Defining an internal communication plan. This would ensure fluent communication, exchange of ideas, fostering and involvement spirit.
- Defining a motivation plan for employees and some stakeholders. Through the design of a calendar or upon specific triggers, it is advisable to, design a plan for incentives or social activities to tighten the links between the PRACE related people.
- Encouraging people to be ambassadors of the organisation's image and reputation. First being an example of loyalty and faith towards PRACE, and second acknowledging when this behaviour is followed and not letting people undermine PRACE image and reputation internally or externally to PRACE.
- Motivate people to become involved in improvement and innovation and recognising their efforts and achievements.
- Defining fundamental duties of any type of PRACE workers and ensure proper promotion and reinforcement of them. For example:
    - Follow written instructions and procedures.
    - Record anything that isn't right, especially user or other stakeholders complaints.
    - Suggest improvement and innovation ideas (see next sub section 2.17.4).

> o   Keep knowledge bases up to date CRM.
> o   Take an active part in achieving objectives.

2.17.4 *Creativity*

Organisations, and above all big organisations, are learning that is possible to leverage the brain power that the company has got in its employees and stakeholders. Through the structured consultation to many people it is possible to get brilliant ideas and approaches that the management team, despite its experience and competence may not create. Platforms such as Isoco-OpenInnovation [27] or easycrit [28] are becoming more largely used in order to capture ideas, opinions and feedback, do small scale market test, innovate, etc.

Consulting employees, in itself it is an element culturally advisable (according to the EFQM model of excellence) as stated in the previous section 2.17.3. At some point in time, PRACE may require creative solutions in order to be able to reach certain goals that are not achievable by following the usual practices, for example: increasing the demand of HPC services 100% in one year, or having a 100% increase of signups in the HPC related masters provided in the Member's countries. In these cases, innovative ideas can help to define strategies. In spite of its reduced number of employees, PRACE has a significant number of collaborators in its members, all potentially contributors when creativity is needed. In this sense, a tool to manage this type of inputs can be very useful to PRACE in case innovation of some aspect is set as an objective. As an alternative to a SaaS tool, creativity workshops can be organized.

3   Proposed next steps

This document has been conceived as a reference guide for further work in developing a more process oriented organisation. The different elements are often related and it is advisable to seek to comprehend the relationships in implementing the mechanisms described (Figure 3 shows the relationship amongst elements). All the elements are suggested following an excellence model that is based on best practices and experience. We propose a progressive deployment using a simplified path as described below:

1. Further develop the Vision and Values as suggested in 2.1 and 0.
2. Capture existing processes as suggested in Policies and procedures 2.3.
3. Design PRACE's Management process taking the provided one as a reference 2.7.
4. Develop the KPI Scorecard framework 2.5.
5. Regulate the usage of a CRM (as suggested in 0).
6. Design a suitable process for performing Strategic reviews and Operational reviews. (2.9) and regulate the usage of an action items log file as management tool.
7. Deploy the rest of elements explained in the document as deemed convenient.