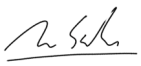
Note to reviewers: I would very much like feedback on all the patterns in the paper. However, we all have day jobs and other papers to review ;-). If you don't have time to review the whole paper, I'd be grateful if you could focus your time first on providing comments on the overall pattern language (problem/solution pairs, relationships, missing elements) and secondly on STEEPLECHASE, Q&A and PROS AND CONS.

In addition, any additional references you may think relevant would be very useful.

Thanks in advance for you time.



Changes from 0.5 to 0.6

1. References added.
2. Resolution of forces in TEST DRIVE.
3. Additional guidance in Q&A.
4. Paths through the pattern language section added at the end.
5. Minor corrections.
6. Additional examples added from reference [3].
7. Context changed for SEPARATE BARS.
8. Note to reviewers moved to the front with additional request for references.
9. Discussion on core team added to introduction.

Technical Solution Selection Patterns (v0.6)

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Abstract. The supplier selection process is a key part of a commercial off the shelf software (COTS) based development project. Supplier selection involves a broad community including business representatives, technical teams, functional experts, and contract negotiations.

Introduction

This paper represents part of a larger effort to capture a set of patterns to fill the knowledge gap that confronts the inexperienced and aspiring Team Leader and Project Manager. As such the target audience for the pattern and proto-pattern work is IT Software professionals that have had between 2 and 5 years industrial experience. Line Managers and Programme Managers are not the target audience for these patterns.

The paper presents a number of patterns that are exclusively targeted at helping a technical lead (the Lead) shape and execute a supplier selection process. This paper does not address commercial negotiation, financial due diligence or assurance activities.

The following patterns are introduced in this document:

- SUBJECT MATTER EXPERT: Nothing beats hands on experience with a solution. Finding a subject matter expert can allow the selection process to short list rapidly and focus on the weakness of each solution.
- STEEPLECHASE: There is not enough time to evaluate all products in detail. Instead the process must include ever finer filters, removing products at each step. The nature of the filter is key, too much effort required by the supplier and they may pull out, too little effort and inappropriate solutions will pass.
- SUBJECT AREAS: The project will need to organise itself around key areas of concern. These areas will be used to organise assessment activities and the presentation of the results.
- Q&A: The project needs to have the supplier commit details of their solution to paper. A standard Q&A in the form of an RFP allows the evaluation team to pose a set of questions that surface solution details and inform further selection stages.
- WEIGHTS AND MEASURES: There can be many requirements defined as input into the assessment. PROS AND CONS can paint as broad picture but there is often a need for a

more quantitative approach. This pattern describes how to weave a quantitative approach to supplier selection into the process.

- SEPARATE BARS: It is important to ensure the key subject areas are evaluated independently. If this does not occur then high scores in some areas will swamp low scoring subject areas in others. This pattern describes an approach that avoids ending up with one score for the entire assessment.
- AUTOMATED ADMIN: Developing a Q&A approach combined with WEIGHTS & MEASURES requires a lot of administrative effort. This pattern describes an approach to automate the Q&A/WEIGHTS & MEASURES interface.
- TEST DRIVE: The project needs to evaluate the products but a straight Q&A based approach does not give the 'hands on' feel of a demonstration. This pattern describes an approach to demonstrations that allows a degree of quantitative and qualitative measurement based on scenarios.
- INTERNAL EXAM: The project needs to understand how well engineered the solution is. However, the project often cannot look at the source code and TEST DRIVE is focused on the external face of the solution. This pattern describes an approach to assessing the quality of a solution with an associated database.
- WHITES OF THE EYES: In an assessment the focus is often solely on the solution. However, the organisation's personnel are key to the success of any large COTS-based development.
- REFERENCE SITE: In an assessment it is important to contact reference sites to find out how the supplier has performed post selection.
- PROS AND CONS: The project needs to articulate its findings. Quantitative statements are often used in assessments, but they do not capture 'gut feelings' and impressions. This pattern describes when and how to use pros and cons to articulate aspects of a supplier assessment.
- PIES: Once the WEIGHTS & MEASURES and the PROS AND CONS have been applied the results need to be distilled to key messages for the sponsoring management teams. This pattern describes an approach that captures the qualitative nature of the assessment in a clear manner.

This paper assumes that a team of people is performing the selection. This team would normally be composed of technical and functional experts along with representatives from your business such as expert users. It is helpful to identify a core team within that group, who will be involved in all stages of the process, except perhaps commercial negotiations. The rest of the team should be involved as is felt appropriate, normally taking part in initial scenario based demonstrations and reviews of responses and the ongoing assessment. This distinction between core and non-core ensures that time consuming detailed assessment evaluations can be kept efficient by keeping the numbers involved down.

Pattern Relationships

Figure 1 shows the key relationships between the patterns. The patterns are classified as either Assessment or Scoring & Representation patterns. The former relate to patterns for learning about candidates solution, the latter to scoring each candidate and presenting the results. SUBJECT MATTER EXPERT is shown to the side as it accelerates the entire assessment process. SUBJECT AREAS is also shown outside as it effects the entire process. The connecting lines indicate influences or related patterns.

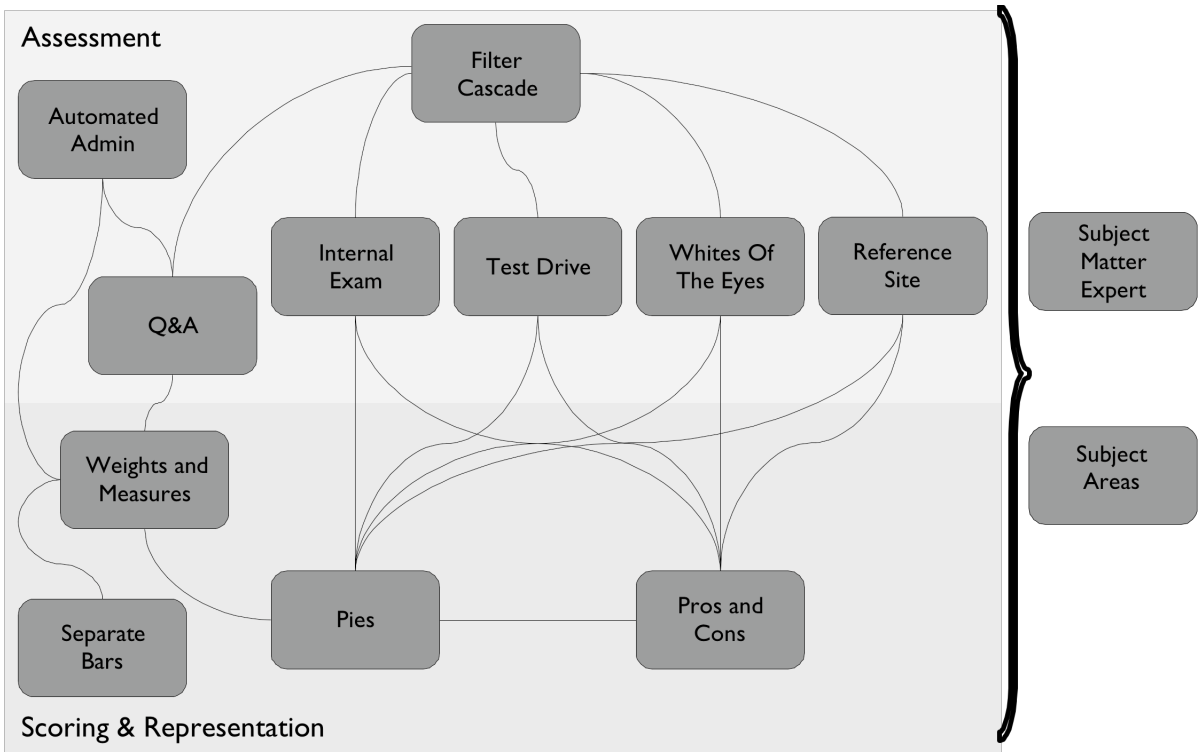

Figure 1: Pattern Relationships

SUBJECT MATTER EXPERT

Context *The project is at the start of a supplier selection process. There is limited practical hands on experience of tools in the problem domain.*

Problem **A supplier needs to be selected as soon as possible. Due diligence needs to take place, but examining a long list of potential candidates is time consuming.**

Supplier selection is key to a COTS-based project. A poor selection could result in a failure to deliver. This means that a thorough and unbiased evaluation is key to project success. However, it is not good enough to be diligent and fair, you have to be seen to be doing these things. Worse, you may have to prove you were unbiased and thorough if a stakeholder queries the results. A supplier selection activity therefore has to be exhaustive (which requires many suppliers are evaluated), have a degree of objectivity, a lack of bias and a clear paper trail. All this takes time and time is never on the side of an IT project. The project will want the supplier selection completed as quickly as possible, but if you travel to quickly the supplier selection won't be rigorous or traceable.

Therefore

Reduce the research and learning curve associated with understanding the available products by engaging a subject matter expert.

The subject mater expert (SME) should be experienced in many of the packages that address the problem domain. Find these people internally in the organisation or hire an independent external consultant. Use the SME to reduce the long list of supplier products to a more management size, say 5-10. Let the SME drive some of the questions and scenarios (see other patterns in this language), as they will know where the weaknesses are. This approach can shave months from a procurement process.

Incorrect Application Failing to ensure the consultant is independent can result in a skewed result, or worse, accusations from candidates that the process has been

biased.

Relying solely on a SME who, unless recruited internally, will not fully understand the business, can mean that certain key areas may be ignored in the assessment.

Examples

Trading organisation: A large trading organisation used a SME to provide an initial shortlist of suppliers. The SME was associated with the project for a long period of time, providing key insights and targeted questioning.

Software House: The selection of software tools within a software organisation can proceed rapidly as the organisation will have a large number of SMEs. Canvassing opinions will generate a small short list very rapidly.

Team Education: [3] notes that the RFP process is dependant "…on both the teams education concerning suppliers and the available products…"

STEEPLECHASE

Context *A supplier needs to be selected and a selection process has not been defined.*

Problem **There are too many products to evaluate in detail.**

There are too many products to evaluate in detail but the project needs to evaluate all the products to ensure they pick the right one. The evaluation needs to be exhaustive, objective and fair. This can take a long time. Since a supplier does not know at the start what their probability of success is they will often be reluctant to commit the resources required for a long evaluation process. If suppliers are reluctant to commit to the selection process then the projects options are reduced, and in the worse case, the best option may choose not to take part. Reducing the required effort of involvement by a supplier in the evaluation process may encourage them to apply but this may result in too many applicants, applicants who are not serious and/or a superficial evaluation.

Therefore

Construct the evaluation like a steeplechase, a sequence of hurdles, but raise the bar higher with each stage. Ensure the first stage has an initial low cost of entry but ramp up the degree of diligence as each filter is passed.

A tried and tested sequence of steps is as follows:

1. SME produces **short list** of 5-10 suppliers.
2. **Technical & Functional short listing** focused on showstoppers reduces this to 3. This activity uses Q&A, WEIGHTS AND MEASURES, TEST DRIVE, PROS AND CONS, PIES and SEPARATE BARS to remove any suppliers who have show stopping problems in their solution. The supplier should be asked to respond to a set of questions focused on the key things that are important and also

to demonstrate a number of important scenarios. This is often referred to as the Request For Information (RFI) phase. Some people consider an RFI to be no more than a request for market data rather than evaluation; this paper considers that the result of the RFI is evaluated.

3. **Detailed evaluation** reduces the list to one preferred supplier and one fallback. The same set of patterns as in step 2 is applied, this time though it is very detailed. There are more scenarios and in-depth technical evaluation. This is often referred to as the Request For Proposal (RFP) phase, primarily because this is often the first time the supplier gets to propose costs and a solution architecture.
4. **Assurance activities** are performed with the preferred supplier. These activities are often only needed in high value transactions. They involve on-site visits, company audits and staff profiles. The aim is to ensure that everything told in the previous stages is correct, has been interpreted correctly and the relationship with the supplier over the project and beyond will be efficient, co-operative and cost effective.
5. **Commercial negotiations**. Commercial negotiations are out of the scope of this paper, but it should be noted that at this point it is useful to have both a preferred supplier and an 'also ran'. This improves your position in negotiations.

This point of these steps is to increase degrees of assessment at the same time as reducing the number of products being evaluated at each hurdle. This ensures that effort is only spent where really needed, i.e. on the true contenders and not wasted on all the supplier's proposals.

Note: you may choose a different sequence of steps. For example, if the potential candidates are well understood then you could choose to skip steps 1 and 2. The key is to ensure that the investment of effort on both you and the supplier's side increases as a function of the degree of commitment to a reducing set of candidates.

Incorrect Application

Too much time is spent on the first two stages and suppliers drop out due to the high cost of bidding.

Too many suppliers are allowed through each step, creating a large workload.

Using all these stages when the set of suppliers is very small. If there are only a few suppliers and there is a SME available then skipping step 2 and 4 can save time.

Examples

Nearly all significant procurements go through an RFI/RFP process.

[3] identifies the following key example stages (simplified from text):

- Send out RFP.
- Receive RFP and evaluate.
- Ask questions.
- Select shortlist.
- Hold supplier presentations, site visits, demonstrations and reference checks.
- Select winner.
- Negotiate contract.
- Debrief losers.

SUBJECT AREAS

Context *The project is going to assess a number of candidate products and present its findings.*

Problem **The supplier selection process generates a lot of data. This data needs to be analysed and presented in a structured fashion.**

Presenting each individual data point (e.g. a %fit for each answer to a question in a request for information) will swamp the reader with information. The reader will not be able to see the wood for the trees. Splitting the data up arbitrarily allows the reader to chunk the output, but it will not be clear how each chunk relates to key areas. Reducing the dataset to an overall % fit allows a simple rendering, but the subtleties represented by each data point will be lost and the user cannot drill down from a broad view into the detail.

Therefore

Define a set of subject areas and organise the assessment activities around these areas.

These areas should be agreed across the team and focus on the important areas of concern. Functional subject areas are domain specific, but technical subject areas often include: Security, Integration, Configuration, Availability, Performance, Operability and Standards Compliance. Structure these areas into two tiers. The first tier represents the overall scores on a broad range of key areas such as Architecture or Operability. Expand each item in the first tier into a small number of sub-areas such as Standards Compliance, Database choice, Operating system choice etc. This allows readers to drill down from the top level to more detail. Note that whilst this paper is not covering commercial negotiations, it is worth bearing in mind that subject areas need to be defined to provide the appropriate information around financial viability, licensing models, strategic fit etc.

Incorrect Application Too many subject areas and it will be difficult to distil data into digestible chunks. To few subject areas and it will be hard to understand what each

score really means relative to peoples concerns.

Examples *Architecture Team* An architecture team for a large corporation use the following technical categories: Architecture, Operations and System Provision. These were broken down thus:

- Architecture: Style, Integration, Standards, Database, Framework, Customisation and Extension.
- Operability: Performance, Integrity, Security, Monitoring, Availability, Resilience, Recovery, Auditing, and Logging.
- System Provision: Deployment, set-up, Administration, Training, Support, Maintenance, Roadmap.

Q&A

Context *Candidates need to be short listed or taken from a short list to a preferred supplier.*

Problem **The assessment activity wishes to analyse solution characteristics in a detailed, reproducible and consistent manner.**

There are often a number of stakeholders, many opinion makers and domain experts in your organisation that need or wish to review the solution. Each of them can view the solution in person but often this is not practical due to schedule constraints and the reducing efficacy of meetings when the number of attendees rises. Basically, you need to avoid having to involve everyone 'face to face' with the solution and yet still keep people engaged, able to review (in some sense) the solution and contribute their opinions. You could call each interested party individually to discussion the solutions being proposed, but this can be time consuming and once the phone has been put down, the detail in the conversation maybe forgotten. In addition, the supplier selection processes should provide a paper trail to show due diligence has been practiced and embed a degree of repeatability so the suppliers are treated the same.

Therefore

Produce a sequence of questions that the supplier must answer about their solution.

Produce a set of questions in each area defined in SUBJECT AREAS. Firstly, define a set of statements in each subject area that encapsulate the requirements. When creating the statements be careful to distinguish between *must*, *should* and *may*. For example: "The system *must* support 99.99% availability in current production environments". Use the IETF definitions of *must, should* and *may* for clarity. Append these definitions to communications sent to the client. This ensures all parties are clear which requirements are mandatory.

For each statement, provide one or more closed questions and a small set

of open questions that explore the responses in the closed questions. For example, a closed question might be "Has the system supported 99.99% availability in a production environment?" and the related open question would be "Provide availability data from a production environment over at least a 6 month period".

It can be tempting to produce a very large list of questions. This can put smaller suppliers off responding. A good test as to whether a question should be put in the document is to ask what is expected of the response and what impact the response will have on the assessment. Quite often this activity will demonstrate the question isn't significant and can be removed. Always be sure to consider the Q&A from the supplier's point of view and consider whether it is fair or whether your requests are too onerous.

The supplier's response to the questions can then be circulated to all interested parties and responses noted without having to sit everyone down in front of the solution. Of course, some people (the core team) do need to experience the solution first hand and other patterns address this process.

When reading the responses perform a breadth first pass first, and disqualify those suppliers who have provided documents that show a complete lack of understanding of the requirements, don't demonstrate sufficient knowledge or expertise, or don't meet the requirements for responding to the Q&A (i.e. respond late, don't use the correct response format etc).

Incorrect Application

Providing too many questions and statements at the short listing stage. At this point question should focus on showstoppers and critical issues.

Providing questions that are open to too much interpretation.

Requirements do not reflect what is available in the market place, i.e. they are 'wish lists'. All requirements must be achievable.

Examples

Software House: A software house often receives RFPs that consist of closed questions and a set of open questions.

Supply Chain Re-engineering Project: Issues an RFI for short listing and an RFP for detailed evaluation. Both of these contained open and closed questions, organised into subject areas.

WEIGHTS AND MEASURES

Context *The team are involved in a supplier selection process and have applied* Q&A.

Problem **The project needs to provide an objective assessment of the products fit.**

The project needs to score each solution. However, the scoring needs to:

- Reflect the relative importance of different characteristics.
- Recognise where a criteria is partially fulfilled.
- Allow showstoppers to be identified and communicated.

You need to ensure there is consistency of scoring, but need to recognise that the process is somewhat subjective. You wish to capture the assessment in an easily communicable form, but you need to allow the flexibility to ensure that all impressions are not reduced to binary yes/no results.

Therefore

Associate weights with each requirement and scores for the yes/no/partial answers.

Q&A has grouped questions into subject areas. For each yes/no/partial question allocate a weighting and then score each supplier against the requirements. Whilst allocating scores to requirements is subjective, WEIGHTS AND MEASURES helps to smooth out inconsistencies and provide a degree of objectivity in the decision making.

Use a coarse grained weight (such as 1 to 5) to keep things simple. Define in words what each weighting means, for example:

Weight	Description
1	The requirement is a long term aspiration.

2	The requirement is a ‘nice to have’.
3	The solution should meet the requirement.
4	The solution must meet or partially meet this requirement.
5	The solution must meet the requirement.

Ensure that supplier selection team agree with the weightings provided.

Break the requirements into subject areas (see SUBJECT AREAS). The subject areas allow candidates to be compared in specific areas rather than across the board. Score the suppliers responses to the questions with 0 for Not Met, 1 for Partial and 2 for Fully Met.

Create a spreadsheet with at least four columns:

- Requirement
- Weighting
- Score
- Weighting * Score

The total of the last column (for each subject area) will provide a weighted output. Often the mandatory requirements need amplifying to ensure they are represented correctly in the final summation. In this case use a non-linear weighting such as 1, 2, 3, 5, 8 to bias the scoring more in favour of the mandatory requirements.

Test the sensitivity of the scores to the weightings. Now score the solution according to your criteria. Scoring is normally performed by the relevant part of the selection team. The technical areas would normally be scored by one or more technical members and the functional areas by the expert users and functional experts assigned to the selection team. Multiple score samples allow anomalies to be identified, discussed and certain individual biases will be removed during the averaging or score reconciliation process. Once the results are collated, adjust the weightings. If the results change significantly then locate the source of the sensitivity and determine if the scoring model needs adjusting.

It is tempting to suggest that any candidate that does not meet a mandatory requirement should be removed from the playing field. However, in practice life is never this simple. A failure to meet a mandatory requirement should be raised separately to the score, but expect that any rejection occurs within the context of all the requirement scores.

Once done, you can represent the scores in each subject area using radar charts like those found in Excel.

Incorrect Application

Failure to obtain a common understanding in the team of the meaning of the scores and weightings will result in inconsistent scores.

Having one person perform scoring without validation can result in errors being undiscovered.

Relying solely on scores for a supplier selection will fail to capture key insights and assessment that are difficult to turn into numbers.

Presenting the results as scientific creates an incorrect impression. Whilst the score is numerical, the allocation of scores to requirements is inherently subjective.

Examples

Energy Provider: A major energy provider used this pattern to compare candidates in a number of different subject areas.

Software House: A software house used this mechanism to assist in determining which configuration management system to use.

Points: [3] provides both weighting examples and a points system, where a specific number of points is allocated to each question/requirement.

SEPARATE BARS

Context *You intend to use* WEIGHTS AND MEASURES.

Problem **Applying WEIGHTS AND MEASURES has generated scores in a number of subject areas. Simply adding up the scores does not provide a sense of whether the application is fit for purpose.**

WEIGHTS AND MEASURES provides a set of numbers and weightings. However, simply adding up these numbers fails to capture any 'show stoppers'. At its simplest Weights and Measures could produce a trivial set of weightings such as:

- Functionality: 70%
- Technical: 30%

If the results are weighted and then added then the Technical component could score 0 and the application could still score 70% of the maximum. You could identify some 'go/no-go' questions that have to be answered with a 'yes' for the candidate to proceed. The problem then is that it will be hard to drop a candidate based on a single no/no-go question, particularly if the supplier says they can meet the criteria in the next release.

Therefore

Establish separate quality bars for each subject area and identify a 'drop dead' cut off point for each subject area.

Having identified the SUBJECT AREAS, define the minimum score that the candidate applications have to achieve in each area to pass to the next stage. Once done, match the scores against these quality bars and reject those that come in below the bar. This allows the selection team to specify a mandatory degree of fitness in each area whilst still biasing the overall scores in favour of one or more subject areas.

Incorrect This patterns works best early on in the selection process. If applied later

Application on in the project the team run the risk of over-simplifying the subtle trade-offs that needs to occur when selecting from a short-list of suppliers.

Examples *Bulk Commodity Scheduling:* A project tasked with re-engineering a supply chain had a number of different subject areas to analyse the system in: Function, Business Process Match, Architecture, Operability and System Provision. The results were weighted heavily in the function arena. The technical assessment needed to draw a line below which systems could be considered non-starters. The assessment provided quality bars for each area and only applications that scored above the bars in each area passed through to the next stage.

Back Office System: The selection of a component of a back office system was operating in an environment where technological standards were mandated. The group chose to separate out standards compliance into a separate area and set a quality bar for that of 75%. This allowed the project to drop non-compliant candidates even if they scored highly in the functional match.

AUTOMATED ADMIN

Context *The selection process has applied* WEIGHTS AND MEASURES, Q&A *and* STEEPLECHASE. *The process is at step 3 in the process defined in* STEEPLECHASE

Problem **The project has produced an RFP using Q&A and will score using WEIGHTS AND MEASURES, but this causes rework each time the Q&A is changed.**

During the production of an RFP the questions will be re-worked several times. This rework will require that the scoring model be updated. It is therefore important to minimise the effort involved in adding/removing questions or adjusting weightings and max/min scores. An RFP needs a thorough set of questions, but once the RFP responses are in then time has to be spent examining each answer and generating scores.

Therefore

Automate the administration using an RFP management tool that generates an RFP form that the supplier can fill in and can be scored automatically.

There are a number of RFP products on the market. These products allow questions, weightings and acceptable scores to be entered into a database. The tool will then generate an RFP document that the suppliers can then fill out. Once the responses are sent back the products provide mechanisms for either creating reports or generating scores that can be exported to Excel for report production. If your budget allows purchasing one of these tools can save a lot of time, effort and avoid mistakes.

If your budget is restricted, consider writing your RFP document in a word processor that supports forms (such as Microsoft Word). Turn each answer into a pull down menu (Yes/No/Partial) and name each menu with the question number. Send the document to the suppliers and be sure to provide instructions on the use of the form. Write VBA to extract the values from these menu items into a spreadsheet and run this VBA on each response form the supplier. Whilst more time consuming than purchasing an RFP tool, this can be cheaper in terms of non-personnel

related costs, though it certainly requires more manpower. The major drawback of this approach is that the supplier will a compatible version of the word processor software you used.

Incorrect Application

An RFP tool can make it simple to add lots of questions. Creating too many questions will yield RFPs that are too time consuming for a supplier to answer comprehensively.

Examples

Bulk Commodity Scheduling: A project tasked with re-engineering a supply chain had an exhaustive set of questions and weighting that the suppliers needed to respond to. However, they did not have the experience in RFP supplier tools to allow them to make a rapid selection. They chose to build an RFP using MS Word Forms and wrote VBA in Excel to extract the answers in a spreadsheet for scoring.

Commercial Products: Products such as Infotivities RFP tool and eBreviates web based RPF tool (this list is *not* a recommendation) all provide support for RFP production and scoring.

TEST DRIVE

Context *The selection process has applied* WEIGHTS AND MEASURES, Q&A *and* STEEPLECHASE. *The project wishes to see the solution in action to examine its efficacy 'in the flesh'.*

Problem **Nothing beats seeing the solution in action but it can be hard to identify weaknesses in a supplier driven demonstration.**

Viewing the solution in action provides an excellent way for people to form an impression of the solution. However, unstructured demonstrations will allow the supplier to skip over weaknesses and the demo may fail to address key points or not relate to the domain your business users understand. Even if the demonstration is structured it can be difficult to ensure a consistent scoring and it may become no more than a sales presentation. Without consistency and structure it will be difficult to apply WEIGHTS AND MEASURES effectively.

Therefore

Take the solution for a test drive using scenarios you have defined to reflect your business needs.

Examine the business processes and determine how the solution will be employed within those processes. Use this analysis to define business scenarios the supplier should demonstrate. These scenarios should be end to end, that is, they include items outside of the solution itself. Define one scenario for each business process and key variation. The scenarios should be accompanied by data definitions and limited so the supplier can set-up a demonstration in a small number of person days (say 5 or so – clearly this depends on the size of the solution and the value of the deal). For example:

The operator wishes to schedule a movement of 10,000BBL of JET from Amsterdam to New York Harbour. When the movement arrives the inspector will send the operator a report on the discharged JET. The report will show a 10% loss. The operator will enter this data against the movement and view an automatically generated loss/gain statement. This

statement will contain the original estimate (10,000BBL), the actual (9,000BBL) and the delta (1,000BBL).

In this abbreviated scenario there is defined data at each step. This allows the supplier to target the demonstration at your business and makes it easier to determine 'smoke and mirrors'. In addition the business steps allow the supplier to establish how their solution fits with your business process and suggest workarounds. Always be sure to consider the business scenarios from the supplier's point of view and consider whether it is fair or whether your requests are too onerous. Be sure to explain to the supplier how much time you think they should spend preparing. Execute the scenarios with the supplier or have the supplier execute the scenarios. During or after the TEST DRIVE, have the evaluation team score using pre-prepared WEIGHTS AND MEASURES. Once complete you will have a set of scores that rate a structured demonstration of the solution using fit with your business processes as key criteria. You should have identified most smoke and mirrors and the evaluation team should have a much better understanding of how the solution would be used 'in the flesh'.

Incorrect Application

Creating too many scenarios will lead to the supplier needing to spend too much time preparing for the demonstration and they may choose to drop out. A demonstration that lasts for multiple days will result in supplier and evaluator fatigue.

Examples

Bulk Commodity Scheduling: A project tasked with re-engineering a supply chain defined 20 key scenarios with variations within them. Evaluators scored the solution against each scenario, noting steps that could not be handled within the tool.

Configuration Management: The selection of a configuration management tool defined a set of scenarios that developers would typically act out during a normal day. Each solution was put through its paces using these scenarios. This ensures that the products could be used in everyday activities.

Install and Leave: This variant, mentioned in [3] has the supplier installing the solution (or a demo/prototype thereof) on your site and the evaluation team assessing the solution over a period of days or months in almost 'live' scenarios.

INTERNAL EXAM

Context *The solution chosen in the selection process will be in use for some time. The selection process is at the stage where a number of products have been short listed*

Problem **The TEST DRIVE provides the opportunity to assess the operation of the solution but the project is selecting not just a solution but a solution that can be cost effectively maintained and enhanced over time.**

To ensure the solution can be cost effectively maintained and enhanced you need to assess the internal quality of the solution. However, many will not allow assessors to examine the code base and, even if they did, the code base maybe too large to assess in a timely fashion.

Therefore

Install the application and perform an internal examination by looking at the database schema. A well engineered solution normally has a well engineered schema[1], which is thus a key indicator to solution quality.

In the relational database world a well engineered schema means that, amongst other things, the following should be seen:

- The schema is primarily in third normal form, with targeted denormalisation for performance.
- Columns have appropriate constraints to maintain the quality of the data and protect against logical corruption.
- Appropriate indices are defined.
- Table and column names are descriptive.

After installing the solution, reverse engineer the schema using a tool such as Visio or ERWin. If reverse engineering is not allowed request an entity relationship diagram (ERD) from the supplier. Examine the ERD for the characteristics you would define as indicative of a well engineered solution.

A beneficial side effect of this approach is that the complexity of the schema can support views on the depth of a solution drawn from Q&A and TEST DRIVE.

Note that this approach does not work in heavily meta-data driven architectures where the schema is deliberately obfuscated or in a language you do not understand.

Incorrect Application

This evaluation is an indicator and should not be used on its own to evaluate a solution.

Examples

ERP: A project evaluation of enterprise resource planning (ERP) products used this approach to evaluate both the quality of the implementation and the richness of the domain model.

IEEE: [1] described a number of examples where this approach was used.

WHITES OF THE EYES

Context *You have a preferred supplier, a relatively small company*[1]*, and wish to evaluate both the solution and the quality of the supplier's staff.*

Problem **Q&A, TEST DRIVE and INTERNAL EXAM provide some indication as to the quality of the personnel but at the final assessment stage it needs to be remembered that buying a solution for COTS-based development also involves significant supplier engagement.**

Most COTS-based projects rely heavily on the supplier for enhancements, support, training and maintenance. Demonstrations provide some clue as to the quality of the personnel, but the staff performing the demonstrations may not be indicative of the organisation as a whole.

Therefore

Ask to speak to key teams (e.g. development) about how the solution is enhanced and managed. Ideally, ask to walk the floor.

This approach, normally only available in 'high value' solution selection processes, allows the project to evaluate key personnel that provide the services that support the proposal. Setup meetings to discuss the development process, domain expertise and release cycle. Make it clear to the supplier this is part of the evaluation and that you wish to meet the people who make the company tick. Watch for warning signs such as being marshalled into a room without being able to wander around the office or seeing the same faces in each meeting. Be sure to ask what they do, not what they *would* do. Remember that the customer's staff will always be on their best behaviour, look carefully for slightly different stories or questions being avoided or answered obliquely. Done well this process creates trust between you and the preferred supplier and provides a richer understanding of the potential supplier.

Incorrect Confrontational interviewing will put people on the defensive.

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[1] In relation to the solution value and/or the size of your organisation.

Application Applying this technique to well known and large suppliers will either draw a blank or add limited value.

Examples *Telecom solution supplier*: Major telecom companies would meet with members of staff during the selection process. This allowed the potential customers to evaluate the skills of the suppliers' staff.

ERP: The technical evaluation team 'walked the floor' of the solution suppliers' development shop to assess development practices and general staff kills.

REFERENCE SITE

Context *The selection process has applied* WEIGHTS AND MEASURES, Q&A *and* STEEPLECHASE. *The process is at step 3 in the process defined in* STEEPLECHASE.

Problem **Q&A, WEIGHTS AND MEASURES, WHITES OF THE EYES, TEST DRIVE and INTERNAL EXAM provide some indication as to the quality of the personnel but they don't provide enough information to determine what peoples real experience of the supplier will be.**

You are evaluating the solution and wish to understand more about what it is really like to work with the supplier. The demonstrations provide a view, but it is an artificial environment and the supplier is on their best behaviour. You could add more questions on customer experience to the Q&A, but the supplier will answer these and put a positive spin on any description. You could attend a user forum, if there is one, but this may be months away and there may not be opportunity for frank discussions in a conference environment.

Therefore

Ask the supplier to provide you with reference customers. Contact each reference site and ask for opinions.

Ask the supplier to select customers who are similar to your own organisation. Use Q&A and SUBJECT AREAS to provide structure around the questions you ask. You may choose to align your questions against the subject areas used in previous phases of the evaluation. However, it is more important to focus in on the key issues that are worrying you at the time. Identifying questions will ensure you will ask all the reference sites the same questions. Ideally you should visit the reference sites as face to face communication is always more effective than phone. However, if this is not possible then contact them by phone. Ensure you ask questions about reliability, installation/roll-out, responsiveness to defects and enhancements and general skill levels. Ask if there were any key problems or whether there is anything the reference site would wish to change about their relationship. At the end of the conversation you should have some good insights into what your relationship with the supplier is likely to be

like. Since the supplier has chosen the reference sites these are going to be the happiest customers. This in itself will be telling. If the customers aren't that happy you can be sure there is a sea of other more discontented customers out there.

Use PROS AND CONS along with some key quotes to document the outcome. Following a style similar to the Zagat[2] restaurant review summaries can be a good communication tool in informal organisations.

Incorrect Application A long list of questions will put off the reference sites. Keep it short and sweet.

Examples Nearly all selection processes include reference site activities.

PROS AND CONS

Context *A key gate in the process has been reached and results need to be summarised.*

Problem **WEIGHTS AND MEASURES has been applied, but numbers and graphs do not capture the subjective impressions that are so important during an evaluation.**

It is tempting to solely use the output of WEIGHTS AND MEASURES to provide the evaluation results. However, the process is not completely scientific. Presenting all the results as graphs and numbers will not only mislead readers into the degree of 'science' applied, but you will also lose some of the rich quantitative information gathered. Mapping subjective impressions to a numerical scale can help, but again numbers are giving a false impression of the accuracy and objectivity of the impressions. A narrative description of impressions helps, but this narrative can be hard to portray succinctly.

Therefore

Present qualitative assessments as pros and cons rather than trying to massage them into a numerical form.

Instead of trying to put a measure to such facets as experienced staff or maturity of the solution present as a series of pros and cons. E.g.

Pros	Cons
Organisation has domain expertise in depth.	Organisational culture does not match our organisation.
Solution has been in the marketplace for over a decade.	Solution code base may well be fragile.

It is worth organising your pros and cons into the subject areas identified for WEIGHTS AND MEASURES to ensure a consistency of approach. You may also choose to format each row in the form "Pro *but* Con". E.g.

Pros	Cons
Rendering speed is very high	The rendered image lacks complex texture mapping
	The rendered image generates false vertices when moving quickly through the terrain.

Incorrect Application

Presenting data that could be more reasonably scored quantitatively, such as functional fit, as pros and cons.

Examples

Most evaluations: Most evaluations present subjective data in the forms of pros and cons or narrative.

PIES

Context *The results from the evaluation need distilling down into an executive summary for a report of presentation.*

Problem **The project needs to represent the assessment from WHITES OF THE EYES, Q&A, TEST DRIVE and INTERNAL EXAM in a clear manner.**

The assessment is both qualitative as well as quantitative. An approach such as percentage fit is misleading as it implies more science behind the numbers than really exists. Providing both numbers and pros and cons often yields too much information for a brief presentation or executive summary. Rejecting the narrative text or pros and cons in favour of the headline results in the key SUBJECT AREAS will lose the subjective data and present a misleading view.

Therefore

Use pies that are marked out in quarters. Present each subject area and its fit using a pie shaded to match the degree of fit.

Use a pie for each key subject area. Use the quantitative scores to populate the pie and then modify the pie according to subjective impressions. Ensure the results are not oversimplified by providing the quantitative data and pros and cons as supporting material.

The lack of numbers indicates the qualitative nature of the assessment, but the shading indicates a degree of unbiased quantitative assessment.

Accompany each pie by a short list (1-3) of key issues.

Incorrect Application Presenting more than 5 or 6 pie charts. A vast array of pie charts will only serve to mask the key issues at hand.

Examples *Bulk Commodity Scheduling*: A project tasked with re-engineering a supply chain used for key pie charts to represent the solution fit. The areas chosen were Technical Fit, Functional Fit, Organisational Fit and

Financial Fit.

Scheduling System: A commodity movement scheduling system evaluation had its results presented as a series of pie charts during the presentation to the board.

Three Paths Through the Language

The following three sections provide illustrative *example* applications of the patterns in this document.

Thorough evaluation for a high value contract

Locate a SUBJECT MATTER EXPERT. Draw up a shortlist of products. Use STEEPLECHASE to break the assessment process into an RFI and RFP stage. Intend to go from 10 suppliers in the RFI stage to 3 for the RFP and 1 (+ 1 fallback) for negotiations. Identify the key SUBJECT AREAS to be evaluated. Create a short written Q&A that the vendor will respond to and a corresponding set of WEIGHTS AND MEASURES to score the responses. Allow the vendors the opportunity to briefly demonstrate their solution in overview. Create and provide concise scenarios as set out in TEST DRIVE. Once the scores from the Q&A and TEST DRIVE are in, present the data numerically against SEPARATE BARS and in overview, with key issues in PROS AND CONS and the 30,000ft view as PIES.

Once the 3 vendors are selected for the RFP process, enhance the level of detail in the SUBJECT AREAS and prepare a thorough Q&A and WEIGHTS AND MEASURES. Spend time defining the business scenarios and allow ½ day[2] per supplier for a TEST DRIVE. If you have not done so already, apply AUTOMATED ADMIN and ensure the responses to the Q&A can be automatically scored (as much as possible). Modify scores with a subjective assessment of the responses to the open questions in Q&A and the results of an INTERNAL EXAM. Execute TEST DRIVE, scoring using WEIGHTS AND MEASURES. Present all the numerical data using radar charts against the defined SEPARATE BARS. List out all the PROS AND CONS and summarise USING PIES. Pick out the top two vendors and see the WHITES OF THE EYES whilst following up on REFERENCE SITES. Update the conclusions accordingly. Start commercial assurance activities and then price negotiations with the preferred supplier (out of scope of this paper).

Faster evaluation with more trust in an expert

Locate a SUBJECT MATTER EXPERT. Draw up a shortlist of three products. Use a single evaluation stage. Intend to go from the 3 suppliers in the RFP to 1 (+ 1 fallback) for negotiations. Identify the key SUBJECT AREAS to be evaluated. Prepare a thorough Q&A and WEIGHTS AND MEASURES. Spend time defining the business scenarios and allow ½ day per supplier for a TEST DRIVE. If you have not done so already, apply AUTOMATED ADMIN and

[2] Clearly this maybe longer or shorter, depending on the solution complexity.

ensure the responses to the Q&A can be automatically scored (as much as possible). Modify scores with a subjective assessment of the responses to the open questions in Q&A and the results of an INTERNAL EXAM. Execute TEST DRIVE, scoring using WEIGHTS AND MEASURES. Present all the numerical data using radar charts against the defined SEPARATE BARS. Follow up with the REFERENCE SITES and summarise using PIES and PROS AND CONS. Start commercial assurance activities and then price negotiations with the preferred supplier (out of scope of this paper).

Light touch with low cost solution.

Locate a SUBJECT MATTER EXPERT. Draw up a shortlist of three to five products. Use STEEPLECHASE to define two stages. Firstly identify the key SUBJECT AREAS to be evaluated and assess functionality yourself against a Q&A that emphasis requirements rather than open questions. Assess the scores against the defined SEPARATE BARS and pick the top two. Secondly, obtain demonstration copies of the software and put the top two through a TEST DRIVE. Score the TEST DRIVE using WEIGHTS AND MEASURES. Assess the scores against the defined SEPARATE BARS. List out all the PROS AND CONS. Present with a summary represented by PIES. Start price negotiations with the winner (out of scope of this paper).

Conclusion

This paper has provided some key techniques for running an effective technical evaluation of a solution process. If you are to take a key message away from this paper, it should be that evaluations need to be methodical, mix the subjective and objective, provide a staged approach to the selection process and always balance completeness and precision with the available time. Also, remember that a supplier is not under an obligation to respond to your selection process, and is less likely to do so if your process is unstructured, poorly written or looks likes a 'sounding out' of the market place.

References

[1] Blaha, M. *A Copper Bullet for Software Quality Improvement*. IEEE Computer Feb 2004.

[2] http://www.zagat.com

[3] Porter-Roth, Bud. *Request for Proposal*. Addison-Wesley 2002.