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The full benefit of a firm's IT plan will not be realized if senior executives have different perceptions of the effectiveness and value of IT investments. However, differences in perceptions are rarely the focus of any governance process. We used a method based on Repertory (Rep) Grid analysis to surface critical perception differences in a U.K. firm's senior management team, comparing these to the CIO's perceptions. From the lessons learned in this case, we provide recommendations for using Rep Grids and the associated heat maps.[1,2]

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Identifying the Differences among a Senior Management Team on the Perceived Value of IT Investments

Getting the most from IT often has more to do with human factors than with technology and plans.[3] How executives see and interpret IT is a critical part of this. Executive perception can be very powerful and, if left unmanaged, can lead to "staggeringly effective" IT groups being alienated by top management and all but eliminating the opportunity for IT-enabled business value.[4]

Healthy debate among senior management team members that explores different interpretations and alternative options is good. But the debate must be managed to avoid animosity and negative emotion developing between team members, which can undermine the effectiveness of the team.[5] As the management saying goes: Attack the point, not the person. At the end of a debate, however, the management team needs to reach a consensus. For example,

1 Michelle Kaarst-Brown is the accepting senior editor for this article..

2 The authors thank Michelle Kaarst-Brown for her guidance throughout the review process. We also extend our thanks to the senior executives of InformIT (a pseudonym) for participating in our study.

3 Pan, G. "Information Systems Project Abandonment: A Stakeholder Analysis," *International Journal of Information Management* (25:2), April 2005, pp. 173-184.

4 Hirschheim, R., Porra, J. and Parks, M. S. "The Evolution of the Corporate IT Function and the Role of the CIO at Texaco: How do Perceptions of IT's Performance get Formed?" *The Database for Advances in Information Systems* (34:4), November 2003, pp. 8-27.

5 Eisenhardt, K. M., Kahwajy, J. L. and Bourgeois, L. J. "Conflict and Strategic Choice: How Top Management Teams Disagree," *California Management Review* (39:2), Winter 1997, pp. 42-62.

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when a senior line manager champions an IT project, there may be similarly supported competing projects that get deferred or are unfunded, and this needs to be agreed upon. In practice, many challenges will be faced during the journey of turning a high-level decision into a successfully implemented IT solution. Consensus on whether an IT project will meet the business's goals (i.e., shared understanding as to a project's value) will help secure the "active cooperation" required for the project's delivery.[6] To reach a position of shared understanding, the senior management team needs to engage in a social process of managed negotiation, discussion and argument.[7]

There could be cultural reasons for differences among the members of a senior management team in the perceived value of IT initiatives. For instance, some executives may see IT as a necessary evil in which they are reluctant to invest, while others may perceive IT as a threat and will thus be unwilling to actively support IT initiatives.[8] For example, many organizations were forced to reallocate IT resources during the COVID-19 pandemic, but executives would not necessarily have supported these investments prior to the pandemic either. Alternatively, there may be skepticism among senior executives as to the value of any IT investment because of their perception that IT projects often fail.[9] Although the value rationale for IT, in general, may seem clear to executives, they frequently do not recognize this value within the context of their own firms[10] despite often being the key decision makers. Whatever the reason, IT is not always perceived as being effective, meeting the business's needs and providing business value.

Past studies have shown that shared understanding among decision makers for projects agreed upon in an IT plan is critical to securing the commitment required for their successful delivery[11] and a key factor in realizing business value from IT investments.[12] Senior executives may go into a meeting with different opinions and views on an IT investment portfolio, but if they leave the meeting without resolving the differences, the investments will not get the full support of the senior management team and their implementation will likely be suboptimal. Much of the guidance to CIOs on interacting with the senior management team focuses on the process and conditions required for aligning IT strategy. However, there is little practical guidance for objectively identifying the nature and scale of differences in the senior management team's understanding or perceptions of the value of various IT projects or the prioritized portfolio.[13,14]

To address this issue, we carried out a case study at a U.K. regional franchise operator, InformIT.[15] Together with InformIT's executive team, we explored the question: *How can a CIO identify and address the differences in how the senior management team really understands current and proposed IT investments/projects[16] to find the common ground that helps secure the value of those IT investments?*

The CIO of InformIT recognized the opportunity to explore a technique for identifying

6 Amason, A. C. "Distinguishing the Effects of Functional and Dysfunctional Conflict on Strategic Decision Making: Resolving a Paradox for Top Management Teams," *Academy of Management Journal* (39:1), February 1996, pp. 123-148.

7 See: 1) Walsh, J. P. "Managerial and Organizational Cognition: Notes from a Trip Down Memory Lane," *Organization Science* (6:3), June 1995, pp. 280-321; and 2) Tegarden, D. P., Tegarden, L. F. and Sheetz, S. D. "Cognitive Factions in a Top Management Team: Surfacing and Analyzing Cognitive Diversity Using Causal Maps," *Group Decision and Negotiation* (18:6), November 2007, pp. 537-566.

8 Kaarst-Brown, M. L. "Understanding an Organization's View of the CIO: The Role of Assumptions About IT," *MIS Quarterly Executive* (4:2), June 2005, pp. 287-301.

9 Krotov, V. "Bridging the CIO-CEO Gap: It Takes Two to Tango," *Business Horizons* (58:3), February 2015, pp. 275-283.

10 Johnson, A. M. and Lederer, A. L. "CEO/CIO Mutual Understanding, Strategic Alignment, and the Contribution of IS to the Organization," *Information & Management* (47:3), April 2010, pp. 138-140.

11 Reich, B. H. and Benbasat, I. "Factors that Influence the Social Dimension of Alignment Between Business and Information Technology Objectives," *MIS Quarterly* (24:1), March 2000, pp. 81-113.

12 Preston, D. S. and Karahanna, E. "Antecedents of IS Strategic Alignment: A Nomological Network," *Information Systems Research* (20:2), June 2009, pp. 159-179.

13 Breu K. and Peppard, J. "Useful Knowledge for Information Systems Practice: The Contribution of the Participatory Paradigm," *Journal of Information Technology* (18:3), September 2003, pp. 177-193.

14 Fernando, S., Lycett, M. and De Cesare, S. "Understanding the Relationship between Business and IT Groups: A Personal Construct Theory Approach," *International Journal of Networking and Virtual Organisations* (3:4), January 2006, pp. 438-449.

15 A pseudonym.

16 In our view, where there is an investment in IT to support, develop or help create a new business model, members of the senior management team are likely to form a perception as to the effectiveness and hence business value provided by the IT investment. This happens regardless of whether the project sponsor is the CIO or a senior executive.

potential differences in how the senior management team perceived the effectiveness, and ability to add value, of completed, proposed and in progress IT initiatives. Our aim in exploring the research question was to improve the overall recognition of the perceived business value from IT investments through a process designed to help develop the level of shared understanding of the effectiveness of critical projects in the IT portfolio. In this article, we:

- Describe the technique used to identify and synthesize the different perceptions of value across various IT investments among senior management team members.
- Share the value of the technique's output for the CIO and senior management team at InformIT in understanding the different perceptions of the ability for an IT investment/project to meet business needs
- Provide recommendations and observations for other CIOs interested in improving the perceived effectiveness, and hence perceived value, of their strategic IT portfolio.

Although the emphasis in this article is on the technique and tools developed to assist the senior management team at InformIT, we believe they are applicable to most executive environments.

Overview of the Case Study

InformIT is a regional franchise operator based in the U.K. At the time of the study (2019), it engaged with over 1,000 people operating across multiple franchisee sites generating revenues in excess of $100 million. The business strategy, aimed at growing the brand and revenue, placed an emphasis on customer experience and product value. Innovative digital technology was considered a key enabler for achieving this aim and this is reflected in the nature and scale of the IT portfolio.

InformIT paid close attention to aligning business and IT strategies and plans. However, like many firms, social alignment[17] was not tracked with the same rigor. When approached by the authors, the CIO recognized the potential problems arising from poor social alignment with executives not seeing eye to eye, commenting "You might have people reaching consensus in the room, when underlying they're actually going—I don't really agree with that." The CIO also recognized how our study could "get to the bottom of that" through providing clarity around the source and extent of disagreements. By gaining a better understanding of the disagreements, the CIO saw an opportunity to better position IT in the firm through improved recognition by senior executives of the value that IT adds.

Excluding the CIO, there were nine members of InformIT's senior management team (the operating board), comprising the regional operator's senior executives, as well as two influential franchisees who sat on key commercial and technology operating boards. All nine were also very supportive of the study. Their motivation was the value they would gain from helping the CIO understand *their* perspective of IT projects and how to get the best return on IT investments. The possibility of differences between the operator and franchisees' perceptions of IT-enabled business value makes InformIT a particularly interesting environment for developing an understanding of the differences. The InformIT case provides a good learning opportunity to assess whether it is possible to capture and clearly communicate the differences between executives' perceptions of the value of IT initiatives, and whether the CIO is able to take practical action based on the outcomes.

We selected nine IT investment projects from InformIT's portfolio to examine. Later, we provide examples of how different members of the senior management team perceived the value of this sample of IT investments, using them to illustrate a technique for highlighting the nature and intensity of differences that need to be addressed if the members of the team are to develop a shared understanding and be actively committed to realizing the projects' benefits and value.

17 Social alignment in this context can be thought of as members of the senior management team having a shared understanding (consensus) of an IT project's effectiveness and committing to its delivery. For more information, see Reich. B. H. and Benbasat, I., op. cit., March 2000.

Table 1: Steps Guiding our Research for Developing the Rep Grids and the intended outcomes

Step	Action	Intended Outcome
1.	Clarified how each senior management team member perceives the firm's mission and IT's role in achieving it.	Develop a sense for how senior management team members generally see IT and gain a better understanding of how each member perceives IT projects. Collection of data required to create the "standard grid."
2.	Used the Rep Grid technique to uncover tacit and explicit perceptions of IT projects/ investments that have shaped their views.	
3.	Synthesized individual data into "personal grids" comprising, for each participant, the chosen projects and discriminating factors/criteria.	
4.	Aggregated criteria from personal grids to create a standard grid that incorporates diverse criteria and targeted projects (past, in progress and proposed).	The creation of a grid that facilitates comparisons between participants and enables an understanding at the team level to be built.
5.	Repeated gathering of rankings from all participants using the standard grid.	
6.	Used the CIO (or other designated senior manager) as the baseline to compare similarities and differences in perceptions across criteria and projects.	
7.	Created heat maps to visually show where views align or vary by project or portfolio.	A practical way to develop a shared understanding across the senior management team and improve the perceived business value from IT projects.
8.	Helped the CIO develop an action plan to engage senior management team members individually and collectively in reaching consensus.	

Rep Grids Are a Practical Technique for Identifying Team Member Differences

The CIO of InformIT was open to exploring our use of the repertory grid (Rep Grid) technique to explicitly reveal how each member of the senior management team saw and interpreted project value so that team members could have clarity in their own views and those of other team members.[18] The Rep Grid technique reveals the explicit and tacit thoughts and views of a person on an event or topic through a set of personalized criteria. These criteria depend on how the person experiences the topic or event (e.g., a project) and may evolve over time.

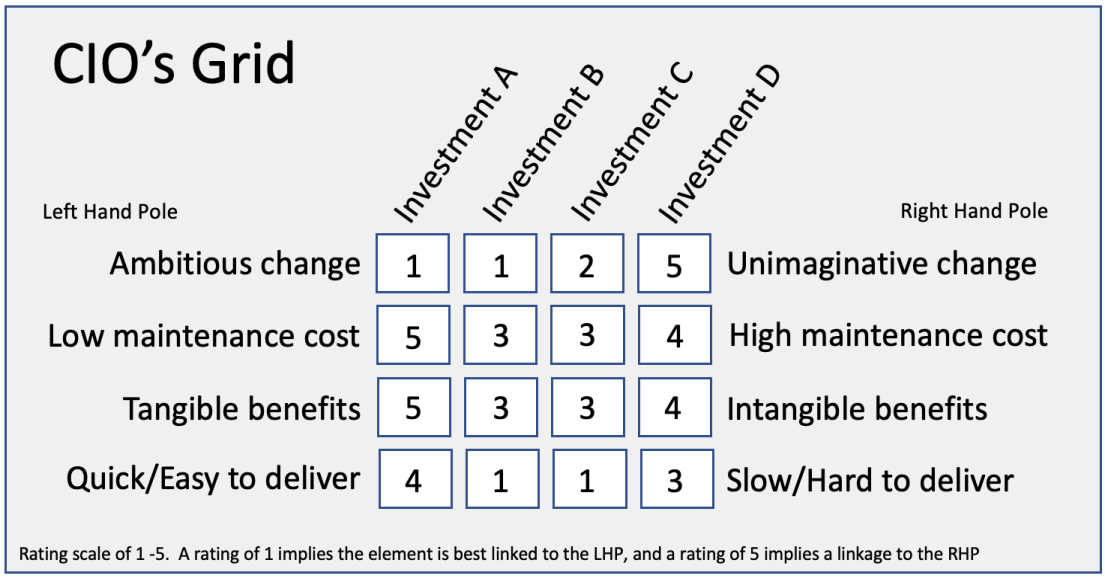
Approaches based on Rep Grids have been widely applied in business and IT studies and are considered to be a good way to explore senior management's IS understanding and improve organizational action.[19] Rep Grids can be used both quantitatively (to develop rules designed to be generally applied) and qualitatively (to capture the interpretation of an event from the perspective of the people being studied). At InformIT, we took a qualitative approach: We used Rep Grids to uncover the tacit and explicit thoughts and views of executives on IT project value and express them in terms of a collection of discriminating factors or criteria. The steps that guided our research approach at Inform IT are shown in Table 1.

Understanding how each member of a senior management team makes sense of an IT investment's effectiveness in adding business value provides the basis for exploring differences

18 Eisenhardt, K. M., Kahwajy, J. L. and Bourgeois, L. J., op. cit., Winter 1997.

19 Examples are cited in Samonas, S., Dhillon, G. and Almusharraf, A. "Stakeholder Perceptions of Information Security Policy: Analyzing Personal Constructs," *International Journal of Information Management* (50), February 2020, pp. 144-154.

Figure 1: Example of a CIO's Rep Grid



in thinking at the team level.[20] At InformIT, we used Rep Grids to explore the nature and scale of the differences in understanding between team members that may reduce the degree of team consensus and commitment to an IT project's delivery.

Example of a Rep Grid

A detailed discussion of Rep Grids and their application in management studies is provided by Easterby-Smith.[21] As the name suggests, a Rep Grid takes the form of a grid, where the focus of interest (e.g., IT projects) determines the columns and the discriminating criteria (e.g., what a person uses to differentiate a project's effectiveness in adding business value) form the rows. These criteria are usually expressed as constructs with opposing poles (bipolar constructs), with each cell value in the grid providing a measure of how well the respondent believes this discriminating criterion applies to that project. Figure 1 provides an example of a possible Rep Grid for an individual (e.g., a CIO) that draws from a few of the criteria identified at InformIT.

Five-point and seven-point rating scales are commonly used with Rep Grids because they represent the extent to which a person might meaningfully discriminate between the opposing options. The Rep Grid in Figure 1 uses a five-point rating scale, where 1 implies the individual's perception is best linked to the left-hand pole, and 5 implies the perception is best linked to the right-hand pole. Thus, the CIO perceives Investment A as a project that brings about ambitious change, but is costly to maintain, has no tangible benefits and is fairly hard to deliver.

Personal and Standard Grids

In our discussions at InformIT, we captured how each senior management team member perceived the firm's mission and IT's role in achieving it. These conversations guided later categorization of the "standard grid" criteria into meaningful themes.

After these initial discussions, we developed personal Rep Grids for each individual, using projects and discriminating criteria obtained directly from each team member. Typically, this resulted in a Rep Grid similar to Figure 1 but with 6 projects (columns) and between 8 and 10 criteria (rows).

20 Tan, F. B and Hunter, M. G. "The Repertory Grid Technique: A Method for the Study of Cognition in Information Systems," *MIS Quarterly* (26:1), March 2002, pp. 39-57.

21 Easterby-Smith, M., Thorpe, R. and Holman, D. "Using Repertory Grids in Management," *Journal of European Industrial Training* (20:3), April 1996, pp. 3-30. For examples of Rep Grids in IS, see Samonas, S. Dhillon, G. and Almusharraf, A., op. cit., February 2020.

Unfortunately, personal grids cannot easily be compared because each contains projects and discriminating criteria that may be unique to each individual, which means it is problematic to understand differences in views across a team. To retain the contextual content, we developed a *standard grid* from the team members' *personal grids*. This grid comprised a subset of all the projects considered by the senior management team members, and an aggregated set of criteria that accurately reflected the nature, range and wording of all the criteria from the team members' personal grids.[22] This is a recognized approach for creating a standard grid.[23] The standard grid enabled the CIO to explore how the senior management team collectively characterized each IT investment's perceived value while preserving the essence of the original personal grids.

The importance of the standard grid at InformIT cannot be overemphasized. When the CIO was shown the standard grid organized by the earlier data gathered about the role of IT, he immediately saw it as a useful addition to the internal governance process for future IT investment planning. The senior management team began referring to it as a "governance grid," while the CIO saw it as providing "a great starting point for when we look at projects … [that] provides a really good balanced approach. Fundamentally, when you distill it down, those are the areas that people are thinking about." The CIO immediately used this grid at a strategy workshop with the senior management team where it was used as a "template in strategy to say inherently how we all think about [projects that] come up as important … [and how we can] measure those initiatives against this governance grid."

All senior management team members were required to assign their ratings to the full list of criteria and IT projects included in the standard grid, an exercise that is much less time-consuming and requires less effort than creating the initial personal grids.

Figure 2 depicts the process for: deriving the standard grid criteria from the personal grids of two senior management team members (Executive 1 and Executive 2) and the CIO; capturing their views of a project using the standard grid; and, finally, presenting the differences in these views.[24] The differences in views are presented by laterally shifting each rating scale of each participant's standard grid response to line up vertically with the ratings of a chosen participant (in Figure 2, the CIO). By using the CIO as a reference point, we are not suggesting that the CIO's view is "correct" or that senior management team members necessarily need to align with it. But, in practice, it helps to have an anchor point and the CIO is a reasonable choice. We say more about this later in the article.

Using Heat Maps to Highlight Differences and Similarities in Perceptions

After discussions with the CIO at InformIT, the similarities and differences in perceived effectiveness to deliver value across the IT projects of interest to the members of the senior management team were not presented as depicted in the right-hand grid of Figure 2. Instead, we presented them as a series of heat maps, a format that was familiar to the team, and which presented the data in a now recognizable and meaningful way.[25,26] The nature and extent of the differences between senior management team members were derived by comparing the individual members' ratings on the standard grid to those of the CIO, and this formed the basis of an action plan for addressing key differences. This action plan enabled the CIO to develop a tailored dialogue for each team member.[27] These conversations can be driven either by the CIO or a project champion from outside the IT organization. In the InformIT case, the CIO, as the

22 For this case study, the standard grid contained an additional criterion "Overall more effective—Overall less effective," which was supplied by the researchers. This criterion is used in an analysis outlined later in the article.

23 Construction of the standard grid was done with the help of an independent expert using an aggregation process known as "bootstrapping" for grouping similar criteria. For more information, see Jankowicz, A. D. *The Easy Guide to Repertory Grids*, John Wiley & Sons, 2004, p. 148.

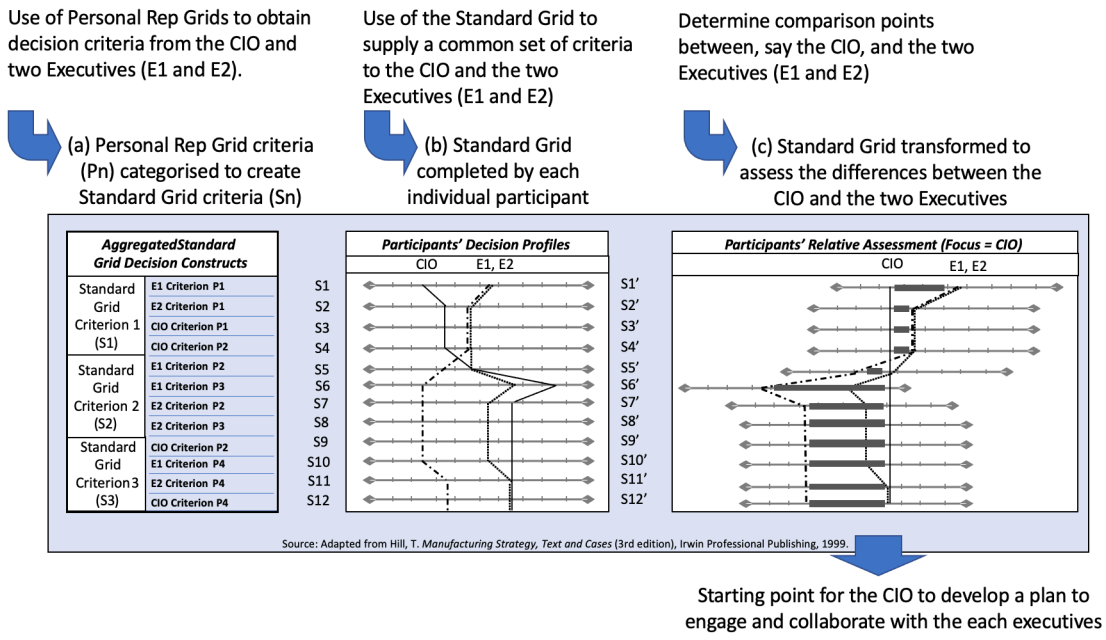
24 When we are referring to criteria from the standard grid, as opposed to a personal grid, we prefix the criteria with the letter "S."

25 Appendix A explains how a heat map is developed.

26 Consistent with other studies, a more statistical analysis appeared to have less meaning for the management team as the recognizable connection to the base grid data was lost. See, for example, Easterby-Smith, M., Thorpe, R. and Holman, D., op. cit., April 1996.

27 An example of using a heat map at InformIT is described in a later section.

Figure 2: Depiction of the Research Process



senior executive with overall responsibility for IT, chose to drive the process.

Two Types of Heat Maps

We developed two types of comparison heat maps for InformIT: 1) a *project heat map* that showed the difference between perceptions of all senior management team members and the CIO for a particular IT project; and 2) a *portfolio heat map* that showed the difference between perceptions of a specific senior management team member and the CIO across all the examined IT projects. In organizations where business executives champion IT projects, it would be helpful to use an IT champion as the reference point, perhaps in addition to the CIO.

Figure 3 shows an example of a portfolio heat map for a CIO-CEO comparison across a portfolio of four investments/projects using criteria identified in conversations with the CIO and CEO. This heat map uses the CIO as the reference point and displays the nature and scale of the CEO's perception of effectiveness to add value to four IT investments. The rows and columns of the heat map are arranged to cluster similar scores together rather than in alphabetical order. Some CIOs, will likely consider a heat map as a form of risk matrix that highlights the sources of risk to achieving consensus.

With the five-point rating scale we used for the study, the differences in perception between the CIO and CEO run from +4 to -4. Scores of +4 or -4 indicate opposite views while a score of zero indicates that the CEO and CIO's perceptions were in agreement. A positive score (green) indicates that the CEO's perception of the investment for that criterion is more positive than the CIO's, and a negative score (red) indicates the opposite.

In this example, there are polar opposite views for investment D, which the CEO perceives as offering "ambitious change," whereas the CIO does not. For Investment A the opposite is true, and for Investment C the CIO perceives it as being "quick to deliver," whereas the CEO perceives it to be "hard to deliver." The heat map reveals that the CEO perceives Investments B and C far more negatively (and Investment D more positively) than the CIO. Given this information from the heat map, the nature of the dialogue and supporting information that might be shared between the CIO and CEO becomes clearer.

Figure 3: Example of a Portfolio Heat Map Showing Differences in the CIO and CEO's Perceptions of Effectiveness for Four Investments

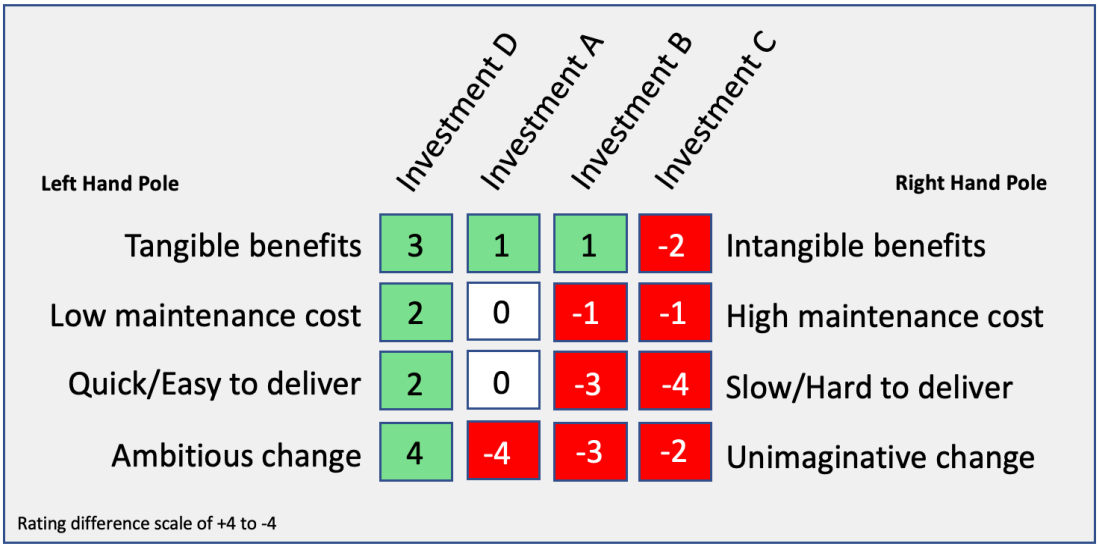


Figure 4: Project Heat Map Showing the Differences in How Different Senior Executives and the CIO Perceived the Effectiveness of the Cybersecurity Project[28]

CIO Rating	Cybersecurity	SMT Member 1	SMT Member 3	SMT Member 4	SMT Member 2	SMT Member 5	SMT Member 6	SMT Member 8	SMT Member 7	SMT Member 9	
5	S24 High/broad operational reliance placed on system	4	3	4	2	4	3	2	3	4	Low/narrow operational reliance on system
5	S5 Solution driven by what we want to do	4	4	4	3	4	0	3	1	0	Solution driven by what we need to do
3	S7 Technology solution seen as best option	2	2	2	2	2	1	2	0	1	Technology solution not valued/unattractive
4	S2 Creates broad consumer perception benefits an reason to switch	2	1	3	1	2	2	1	0	0	Doesn't create perception benefits and/or reason to switch
3	S17 Low degree of change - easier to adopt	2	2	0	1	0	0	2	0	1	High degree of change - resistance to adopt
3	S28 Technical clarity of the solution achieved early in development cycle	1	2	1	1	0	0	0	1	1	Lack of clarity resulting in overly complex and/or more costly solution
3	S22 Provides agility without creating technical debt	2	0	0	1	1	1	0	0	0	Responsive to demands but with disproportionate ongoing cost
3	S27 Fit-for-purpose solution and easy to maintain/operate	1	2	0	0	0	0	1	0	1	Faces challenges and hard to maintain/operate
4	S11 Quick and easy to deliver/deploy	2	3	2	1	-1	2	2	2	3	Slow and hard to deliver/deploy
3	S16 Willingness to adopt system/high take up - relevance	2	2	2	1	1	1	2	1	-1	Reluctant to take on new system/low usage
3	S15 Stakeholders well briefed, managed and engaged	2	1	1	1	0	0	-1	1	0	Stakeholders expectations not set, poorly managed and/or unengaged
2	S19 Clear rationale and expectation for investment	1	1	1	1	1	0	0	0	-1	More confused/confusion over investment aim
3	S10 Delivery met expectation of consumer and/or customer	2	2	2	1	1	1	1	0	-2	Delivery oversold and/or failed to meet expectation
4	S26 Ambitious, inspirational and forward thinking	3	-1	1	2	1	1	-1	0	0	Solution does the bare minimum
3	S20 Innovative and market leading solution that inspires people	2	1	1	2	0	1	0	-1	-1	Solution lacks ambition and makes no leap forward
4	S8 Clear how benefits/RoI are to be calculated	1	3	3	3	-1	2	1	-1	-1	Not clear on measurement and/or benefits less tangible
4	S1 More market/strategic goal driven (e.g., growth or sales)	-1	1	3	1	3	-1	-1	2	0	Less strategic/more internal operation and/or control driven
2	S29 Overall MOREeffective	1	1	1	0	-1	0	-1	-1	0	Overall LESSeffective
2	S23 Confidence in delivery of a highly reliable, trustworthy system and configurable to needs	0	0	-1	0	-1	0	0	-1	0	Low confidence in operational needs being met
2	S6 Benefit likely to be maintained over the long term	1	-1	1	0	1	1	0	-2	-1	Benefit likely to be short term; costly over long term
2	S14 Confidence/trust that delivery (inc ongoing) will meet priority needs	1	1	0	-1	-1	-1	1	-1	0	Lack of confidence that curent or future needs will be meet
2	S18 Has a broad or clear stakeholder ownership	1	1	-1	0	0	0	-1	0	-2	Has a narrow/localised appeal and/or unclear stakholder ownership
2	S21 Provides a platform and/or catalyst for future development	1	1	0	0	0	0	-1	-1	-2	Standalone system and/or offers limited future flexibility/catch up
2	S13 Good collaboration with delivery team during development	1	1	1	0	-1	-2	0	-1	-2	Poor collaboration with delivery team during development
3	S3 Makes product more compelling and/or provides credible long term-solution	2	-1	-1	-1	0	-1	-1	0	-1	Solution lacks long-term credibility in the market place
1	S4 Improves risk management/operational capability	-4	-2	0	0	0	0	0	0	0	Has little impact on risk management/operational capability
2	S9 Value derived directly from benefit to franchisee	-1	1	-1	-1	-1	-1	-1	0	-2	Value derived indirectly and/or benefit - regional franchise operator focus only
2	S25 Transforms (aspects of) the business model/management capability	1	-3	-2	0	0	0	-3	-2	-1	Maintains station or does same things better
1	S12 Drives a key business/strategic parameter, e.g., revenue/cost/margin	-3	0	-2	-2	-2	0	-4	-4	-3	Indirect/low impact on key business goal

Interpreting the Heat Map Examples

From conversations with senior management team members, InformIT's CIO had some idea about their IT investment concerns. However, as illustrated by the firm's cybersecurity project (Figure 4), these conversations did not reveal some of the more tacit concerns nor capture the depth of view or the scale of the concerns accurately. The extent to which the business executives failed to perceive the business value of the cybersecurity project was a surprise to the CIO. The project heat map revealed several points of agreement, most noticeably the project's ability to improve risk management. However, business executives had been less explicit in voicing their concern that the project offered limited benefit to the firm as a whole or the franchisees. This was a hidden tension that the CIO realized needed to be addressed.

The standard grid and comparisons generated a total of 18 heat maps: one for each of the nine projects in the portfolio showing the views across the senior management team relative to those of the CIO (project heat maps), and one for each comparison view across all projects between the CIO and the nine senior management team members (portfolio heat maps).

Figures 4 shows the cybersecurity project heat map, which focused mainly on ensuring compliance with the European Union's General Data Protection Regulation (GDPR) for customer data. This heat map highlights the differences in understanding across InformIT's senior management team for the cybersecurity project. As stated earlier, the discriminating criteria in the standard grid are an aggregation of criteria that can be used to judge not only past IT investments, but also to anticipate the effectiveness of future investments. At the time of our study, the GDPR-related cybersecurity project was being proposed and the heat map had the potential to reveal differences in opinion before the project even started. This was a good time in the project lifecycle for the CIO and senior management team to address the differences highlighted by the heat map.

Heat maps are specific to a particular team and firm, so any insight they provide cannot be assumed to apply widely to other firms. But they can be very helpful to the referenced CIO. For example, Figure 4 suggests that, while all senior management team members may recognize the legal obligation for cybersecurity, their overall attitude appears to be more positively inclined and they "want" to do the project (Criterion S5). Their perception is that it is a core operating system (Criterion S24), represents a small change, is relatively easy to adopt/embed (Criterion S17], has relevance (Criterion S16) and positively impacts brand perception (Criterion S2)—views that the CIO does not share to the same extent.

Separately, we compared the team members' ratings for each criterion on the standard grid against the criterion we supplied ("Overall more effective—Overall less effective") and calculated which of the criteria they rated most similar to it. By summarizing the findings for all team members, the CIO was able to gain a high-level view regarding which criteria were driving the team's thinking.[29]

At InformIT, the criteria the senior management team most closely associated with the perception of overall project effectiveness and its ability to add value were those relating to whether the project builds a platform for the future (Criterion S21), and the need for clear and broad ownership (Criterion S18). This was closely followed by initiatives where the team was confident that the project's delivery would meet priority needs (Criterion S14), that the project was ambitious and forward-thinking (criterion S26), and that clarity on how to deliver the solution was gained early in the development lifecycle (criterion S28).

A standard grid can also highlight conflicting criteria or strategic paradoxes. A closer inspection of the InformIT criteria in Figure 4 suggests that Criteria S17 and S25 reveal strategic tensions. Though these two criteria appear to

28 Each discriminating criterion is numbered S1 to S29. Using a five-point rating scale, the cell level differences range from +4 to -4 (positive differences shown in green; negative in red), with the extremes representing an opposite positive or negative perception respectively, compared with the CIO. For example, if the cell value assigned by the CIO for project 1, Criterion 1 was given a rating of 5, the maximum positive difference arises (+4) when the senior management team member assigned a rating of 1 for that same cell, as in the cell for S24/SMT Member 5.

29 This is known as a "Honey analysis." It offers a way to gain a broad view as to how the senior management team is thinking about a particular topic. In the case of InformIT, we were interested in whether the projects were effective and able to deliver business value. For more information, see Honey, P. "The Repertory Grid in Action: How to Use It to Conduct an Attitude Survey," *Industrial and Commercial Training* (11:11), November 1979, pp. 452-459.

Figure 5: A Portfolio Heat Map Showing Differences in the CIO and CEO's Perceptions of Effectiveness for Critical IT Projects

CIO - CEO Comparison	New Web/Mobile App (In progress)	Order/Delivery Tracking (Delivered)	Cyber Security (Proposed)	New Web/Mobile Platform	Automated Supply Ordering (Proposed)	MIS and Reporting (Delivered)	ERP (Delivered)	Customer Order Management (In	Windows and Office Upgrade	
S17 Low degree of change - Easier to adopt	3	3	0	3	0	-2	0	1	0	S17'
S11 Quick and easy to deliver/deploy	2	3	-1	3	0	0	1	1	-3	S11'
S15 Stakeholders well briefed, managed and engaged	1	2	0	0	1	1	1	0	-1	S15'
S10 Delivery met expectation of consumer and/or customer	1	0	1	0	1	-2	1	1	0	S10'
S13 Good collaboration with delivery team during development	1	0	-1	0	1	0	1	1	-1	S13'
S16 Willingness to adopt system/high take up - relevance	1	0	1	1	-1	0	1	-1	0	S16'
S22 Provides agility without creating technical debt	1	2	1	0	0	1	0	-2	-1	S22'
S25 Transforms (aspects of) the business model/management capability	1	1	0	0	3	1	-2	-1	-1	S25'
S20 Innovative and market leading solution that inspires people	1	0	0	1	0	1	0	-1	-1	S20'
S26 Ambitious, inspirational and forward thinking	1	1	1	0	0	0	0	-1	-1	S26'
S19 Clear rationale and expectation for investment	1	0	1	0	-1	1	0	-2	0	S19'
S9 Value derived directly from benefit to franchisee	0	1	-1	-1	0	0	-1	0	1	S9'
S8 Clear how benefits/RoI are to be calculated	2	0	-1	1	-1	-1	-2	0	1	S8'
S28 Technical clarity of the solution achieved early in development cycle	1	2	0	0	-1	1	-1	0	-3	S28'
S4 Improves risk management/operational capability	0	0	0	0	1	0	0	-1	-2	S4'
S12 Drives a key business/ trategic parameter, e.g., revenue/cost/margin	0	1	-2	1	1	0	-2	0	-1	S12'
S14 Confidence/trust that delivery (including ongoing) will meet priority needs	1	1	-1	0	-1	0	1	-2	-1	S14'
S18 Has a broad or clear stakeholder ownership	1	1	0	0	0	1	0	-2	-3	S18'
S21 Provides a platform and/or catalyst for future development	1	1	0	0	0	-1	-3	0	-1	S21'
S27 Fit for purpose solution and easy to maintain/operate	1	0	0	1	0	0	0	-2	-3	S27'
S7 Technology solution seen as best option	0	1	2	0	-2	-1	-1	-3	-1	S7'
S24 High/broad operational reliance placed on system	1	0	4	0	0	-1	-3	-1	-3	S24'
S23 Confidence in delivery of a highly reliable, trustworthy system and configurable to needs	1	1	-1	0	2	0	-2	-2	-3	S23'
S1 More market/strategic goal driven (e.g., growth or sales)	-2	-1	3	-2	0	0	1	-2	1	S1'
S29 Overall MORE effective	0	0	-1	-1	-1	0	-1	-2	-1	S29'
S2 Creates broad consumer perception benefits & reason to switch	0	-1	2	0	-2	-1	-2	-1	-2	S2'
S6 Benefit likely to be maintained over the long term	-1	0	1	-2	-1	-3	0	-2	0	S6'
S3 Makes product more compelling and/or provides credible long term solution	-1	0	0	0	-2	-2	-2	-3	0	S3'
S5 Solution driven by what we want to do	-1	-3	4	-1	-2	-2	0	-2	-3	S5'

have low compatibility, both are perceived as required for a project to meet the business's needs. Criterion S17 views an effective project as one that has a "low degree of change, and is easy to adopt," whereas Criterion S25 views an effective project as one that "transforms (aspects of) the business model/management capability." Taken together, these criteria suggest that the senior management team wants an IT investment to have a low degree of change and yet be transformational. In practice, such a combination of attributes is unlikely to be exhibited by a single IT investment.

We also observed two further strategic tensions: 1) the firm's need to balance the growth demands of the franchise operator with the equally important demand for operational control sought by franchisees, and 2) the need to balance the shorter-term shareholder drivers of the regional franchise operator with the longer-term owner ambitions of a franchisee. A full discussion of the strategic tensions at InformIT is outside the scope of this article, which is focused on the efficacy of the technique and tools.

Figure 5 shows an example of an InformIT portfolio heat map comparing the CIO and CEO's perceptions. To make the heat map easier to read, the contrasting right-hand pole in this figure is written as "Sx'."

In Figure 5, the first four projects across the top of the grid can be classified as front-office, customer-facing systems, and the other five as back-office, operating systems. While it's not clear from this heat map alone, the CIO tends to perceive back-office systems as less effective, and this view is even more pronounced for the CEO. However, in some of the back-office systems, for example the Windows upgrade, there are key

differences that can be actively explored. The CIO perceives this project as being the right system for the job (S27), having clear business ownership (S18), and having confidence in its delivery (S28, S23, S11). But the CEO does not see things this way. The CIO can use insights provided by a heat map such as this to develop a series of action plans that will guide the discussions required with each senior management team member to develop a shared, common understanding.

Rep Grids and Heat Maps Facilitate Action Plans for What Really Matters

For most CIOs, the acid test for a technique or tool for assessing senior executives' perceptions of IT is whether they consider the effort of using it as justified and the output as convincing enough to act on it. As the leader of the technology function and the most likely technology change agent at InformIT, the CIO's view was arguably the most important to capture as an anchor point for comparisons with the views of other members of the executive team. The CIO highlighted the value of the data from the Rep Grids and the heat maps as being the help they provided in developing actionable plans: "I think one of the benefits of measuring everyone against my thinking helps me contextualize what their thinking is going to be. Because I have a starting point now … I know where to focus my energies. I know where *not* to spend my time."

InformIT's CIO used the Rep Grid results to develop an action plan that emphasized three goals: 1) getting executives on the same page regarding the IT project portfolio, 2) enabling tailored conversations about the value of IT at the firm, and 3) avoiding emotional conflict.

1. Getting Executives on the Same Page

A shared understanding among senior executives of the effectiveness provided by IT projects in the portfolio is a key enabler of IT-enabled business value. The CIO reaffirmed this view, citing the powerful impact of an action plan in finding the common ground between senior management team members.

> *"The main value [of the study] was to gain a deeper understanding of how people view investments. … It really took away a lot of the clutter and got to the underlying thoughts that really mattered to them, and that's powerful. [It] helps me define an action plan to get that specific thinking across the business on an equal footing."*

The CIO knew where to focus because the heat maps showed where "the gaps [in shared understanding] are," and was thus able to accelerate the process of getting each senior management team member "to the same place" more quickly.

2. Having Tailored Conversations about the Value of IT

Though senior executives often accept the value of IT in general, they do not always recognize or agree on the value of IT in their own firm. InformIT's CIO stated that "successful IT departments … [are those] that are seen as value creators for the business." A better understanding of InformIT's senior management team's view of the criteria used to judge a critical project's ability to add value provided the basis for a tailored and meaningful conversation to build this recognition. The CIO commented:

> *"What [the results] really teased out is that the way that you are communicating the value of technology across the different stakeholder groups is important. Communicating in the right way to each person so that they can see where that value is. If you can't communicate that value, then that's not really going to win the day. Beyond that, it's about making sure that you take into account their views when you are assessing the value of something."*

The CIO's action plan, which was based on the Rep Grid analysis, helped to focus this conversation. The plan provided direction for the CIO's engagements with the senior executives and enabled the CIO to have individual conversations about the value of IT in a way "that's relevant to people." The CIO was discussing specific aspects of value in terms of the criteria that team members themselves had helped to create. Because of their involvement in creating the criteria, the CIO believed the data and resulting conversations had credibility because the heat

maps are "sort of bringing it back to the truth all the time." In other words, the heat maps provide an unfiltered view of senior executives' perceptions, rather than the CIO's view of their opinions. These conversations accelerated the move toward a consensus among the senior management team.

3. Avoiding Emotional Conflict

The use of Rep Grids and heat maps highlighted to InformIT's CIO the value of placing a greater emphasis on the more personal or emotional aspects of consensus: "When people make decisions, they're not just influenced by information. There's always this emotional connection to everything we do." Senior management team members can recognize the source of data presented in heat maps, which helps to avoid emotional conflict because the data has an element of objectivity and highlights points of difference. Heat maps therefore encourage team members to work collaboratively on resolving differences rather than adversarially.

Using Rep Grids and heat maps marks an important distinction from the usual IT planning process. At InformIT, the CIO examined the heat maps and responses to the initial interviews to identify likely sources of tension in how each participant perceives specific IT investments. According to the CIO, the results "really show where that emotion was and is in terms of some of the ways that [team members] rated some of the projects. So, I think it provides clarity." This clarity provided the CIO with insights on how best to position the follow-up conversations and drive the commitment to an IT initiative.

In summary, the CIO benefited from the results of the Rep Grid and heat map approach in three ways. First, the results allowed the nature of the differences in how senior management team members perceive IT value to be objectively identified. Second, the approach facilitated credible and tailored conversations to address the differences. Third, the conversations helped the CIO to move closer to a position of perceptual consensus[30] and thus manage the potential for damaging emotional conflict because the heat maps were objective and based on direct input from senior executives. Moreover, all of this was done efficiently because the CIO knew where to focus his attention.[31]

Recommendations For CIOs and IT Champions

Although the Rep Grids and the results reported above are specific to InformIT, the approach is applicable to a wide range of corporate settings. Using Rep Grids with an organization's senior management team, together with the comparisons highlighted in the associated heat maps, can help the CIO to reduce project tensions and increase consensus. Having considered the timing, resources required, and intended benefit of the Rep Grid approach, we provide seven recommendations for CIOs and key IT champions who wish to use this approach.

1. Use an Objective Facilitator

We recommend that the CIO use an external facilitator familiar with the tools and the particular industry, who is independent of the organization and its senior management team for the following reasons: First, this allows the CIO or IT champion to fully participate in the same manner as their senior executive colleagues and be seen as part of the team whose views are being examined. Having an external and independent facilitator provides a helpful detachment and arguably helps elicit an "open and honest" response from participants. The Rep Grid technique is conversational in nature and capable of revealing deeply held beliefs. It is also cognitively demanding and, in practice, many people may start to think openly and out loud. This gives the approach advantages over surveys completed by individuals on their own.

Second, although the Rep Grid technique appears straightforward, in practice it can be an art. Someone with experience in the technique will ensure that procedural validity is maintained and that the organization gains as much as possible from the exercise. Third, managing and conducting a Rep Grid exercise and the analysis takes time that a CIO or other IT champion may feel is best allocated to other tasks.

30 Especially for strategic paradoxes, this might include the acknowledgment of unreconcilable differences of opinion and constructive accommodation of them.

31 Informal contact with the CIO following the study confirmed that the plan was being used and has been helpful beyond our formal involvement.

2. Capture Projects from across the IT Portfolio

One of the findings from our study was how customer-facing IT investments were perceived as being more effective at adding business value than those focused on operational efficiency. It is important when conducting a Grid Rep exercise to ensure that the projects chosen cover the breadth of front and back office IT projects. These can include IT projects that are in progress, as well those recently delivered or planned within the portfolio.[32] Examples from InformIT included a new web/mobile application (in progress), an order tracking system (delivered) and an automated supply ordering system (planned).

3. Use Familiar Formats and Language

We recommend using simple and familiar formats for presenting data outputs. Past studies have suggested that for teams that are familiar with their environment, complex statistical analysis is unlikely to be helpful.[33] Moreover, facilitators who lack the background or appropriate training could find it challenging to present outputs in a meaningful way.[34] By using familiar language in our interviews and data collection, we developed an approach that the CIO felt comfortable using with the senior management team. Both the CIO and senior business executives found the heat maps informative and easy to understand:

> *"[The heat maps] actually provided a pictorial view of, more or less, what they're thinking. That's how they lean. Whether it's positive, negative or other. [The maps] gave me a better sense of what the data was trying to say without having to put all of the statistical analysis around it."*

4. Identify and Discuss Conflicting Criteria and Strategic Paradoxes

As suggested earlier, strategic paradoxes are a possible source of frustration in attempting to align the goals and perceptions of the business value of IT investments. CIOs should closely examine the criteria forming the rows of a heat map for the presence of strategic paradoxes. Such paradoxes are extremely challenging for management teams because they mean that senior managers are seeking to make consistent decisions in the face of conflicting aims. Recognizing such contradictions is often the key to their successful management.[35] By identifying the nature of such conflict, CIOs can have open conversations with their colleagues and explore management choices.

5. Repeat the Rep Grid Exercise to Capture Changing Perspectives Over Time

The Rep Grid technique is time-consuming, requiring at least two hours from each senior management team member for the data collection meetings. Getting buy-in for the first time the technique is used may be easy because it reveals new information. However, repeating the process too often may lose top-management support and result in smaller incremental changes. Arguably, there are four good times to conduct repeat exercises:

1. When a new CIO is appointed
2. When the CIO senses or is being given direct feedback that IT could be more effective at meeting the business's needs
3. When there is a significant change in the composition of the senior management team
4. When there is a significant shift in market conditions and/or strategic direction.

Repeating the exercise will enable the CIO to reassess how the senior management team perceives IT value under the changed conditions.

In the absence of these types of changes, there may be a case for revisiting the data periodically, which is linked, perhaps, to the strategic operating and planning cycle. Consider the

32 Appendix B describes a way to help senior management team members visualize the breadth and nature of the the selected IT projects.

33 See: 1) Eden C. and Spender, J. C. *Managerial and Organizational Cognition: Theory, Methods and Research*, Sage Publications Ltd, 1998; and 2) Easterby-Smith, M. Thorpe, R. and Holman, D., op. cit., April 1996.

34 Chughtai H, and Myers, M. D. "Entering the Field in Qualitative Field Research: A Rite of Passage into a Complex Practice World," *Information Systems Journal* (27:6), September 2017, pp. 795-817.

35 For an informative article on this topic, see Smith, W. K. "Dynamic Decision Making: A Model of Senior Leaders Managing Strategic Paradoxes," *Academy of Management Journal* (57:6), December 2014, pp. 1592-1623.

benefits of capturing the impact of experiences unknown to the CIO that, over time, may have changed a senior executive's way of perceiving IT value. Periodic Rep Grid exercises could also capture shifts in the CIO's view. InformIT's CIO recognized the requirement to periodically repeat the exercise: "People do grow up and mature, even as new people come into the business. This is very much a moment-in time-exercise."

6. Negotiate on the Positives and the Negatives

We would suggest that it is easier for a CIO to arrive at an agreed position on the more positively perceived factors than the more negatively perceived factors. To address the more negative perceptions, the CIO may choose to build a discussion around actionable themes. For example, based on the InformIT cybersecurity project heat map shown in Figure 4, the following statements emphasized the need for further discussion:

- By improving cybersecurity, the firm is tacitly addressing a key business driver (S12).
- Security improvements do have a measurable value, even if indirect (S9).
- Protection of consumer data and protection against the threat of increasingly sophisticated cyberattacks represent a transformation of the business model (S25) and does not simply amount to doing the same things better.
- Improved security will reduce the overall risk profile of the firm (S4).

To help move the needed discussion forward, firms should consider subscribing to external information sources to help them understand:

- How other companies have framed the debate around business benefits such as reduction in risk to the brand and reduced operating costs
- The best implementation approach to secure value for money and ensure future proofing
- The vendor market and whether vendors' offerings are sufficiently flexible to meet the firm's needs.

Portfolio heat maps are a particularly helpful source of information when preparing for tailored discussions with individual senior management team members.

7. Focus on People Not Roles

CIOs can have a stereotypical view of a senior executive's role and it is tempting to use this view to make (possibly wrong) assumptions about an executive's perception of an IT investment. CIOs should not assume how senior management team members will likely think about an IT investment based on their roles. Through the use of heat maps, the CIO can develop an informed position rather than relying on an assumed role stereotype.

During our study, there were changes in the composition of InformIT's management team, with one such change being an appointment to replace the outgoing chief operating officer (COO). A comparison heat map highlighted significant differences in the previous and new COO's perception of business value provided by certain IT projects. The CIO cited their different professional backgrounds as being a major contributory reason for this diversity of views, but it did serve as a lesson to guard against role stereotyping. In the words of the CIO:

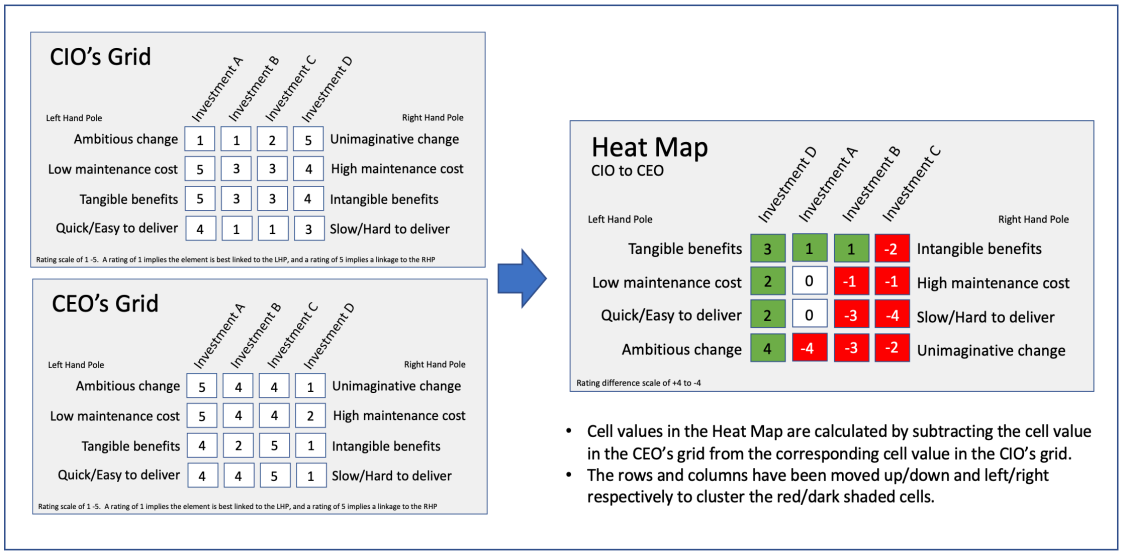
> *"Well, that goes to show that a role title does not mean that person necessarily thinks the way that you would expect [someone in] that role to think. And I think that showed in that transition. ... It is very clear. So, you can't make assumptions about [associating perceptions with] a role."*

The Rep Grid approach and technique described in this article will be particularly useful for incoming CIOs or people new to the CIO role because it will accelerate their understanding of the senior management team members' perceptions of the value of IT investments and the building of relational capital.

Concluding Comments

In our work at InformIT, we explored the question of how a CIO or other IT champion can identify and address the differences in how senior management team members perceive current and proposed IT investments or projects and how these differences can be resolved to gain a common understanding of the ability to

Figure 6: Example of How a Heat Map Is Generated



add IT-enabled business value. In this article, we describe the Rep Grid and heat map approach, which is a practical solution to identifying and resolving perceived differences. Moving toward a position of shared understanding can be achieved through discussion, where building a value-based set of shared criteria allows the senior management team to better articulate and negotiate differences. Not only can this approach help address specific IT project issues currently being faced, but it can also help shape future strategy. Although the Rep Grid approach requires time and effort, it pinpoints the nature and scale of the key perceptual differences in a manner that is agreed upon and accepted, and accelerates the achievement of a common consensus in the senior management team about the effectiveness of IT investments for delivering value.

Appendix 1: How Heat Maps Are Developed

Figure 6 shows an example of four IT investments that have been rated by rated by both the CIO and CEO against the senior management team's standard grid. The figure above shows the individual CIO and CEO grids, which used a five-point rating scale, and the resulting heat map. The top-left grid shows how the CIO perceives the effectiveness of each of the investments and the grid below shows the CEO's perception. The heat map on the right shows the difference between the CIO and CEO (by simply subtracting the CEO's rating from the CIO's rating for a given cell). The differences range from +4 (green) to -4 (red). Differences of +4 or -4 represent opposite perceptions by the CIO and CEO. The rows and columns of the heat map grid have been reordered to cluster green cells at the top left and red cells at the bottom right.

Appendix 2: Visualizing the IT Portfolio Coverage

To capture the senior management team's perceptions of the value of IT investments, it is important to consider projects from across the spectrum of the firm's portfolio of IT projects. For example, even if a senior executive's focus is primarily, say, on customer-facing systems, it is very possible that an operating system used by the executive's staff will also influence the overall perception.

As part of Step 1 (see Table 1), each participant was asked to consider a broad range of projects that had influenced their perceptions, both favorably and unfavorably. As it can be difficult for some senior management team members to easily assess whether they have considered a sufficiently broad range of projects, we provided them with a blank version of the matrix shown in

Figure 7: Visual Representation of IT Portfolio Coverage in the Interviews

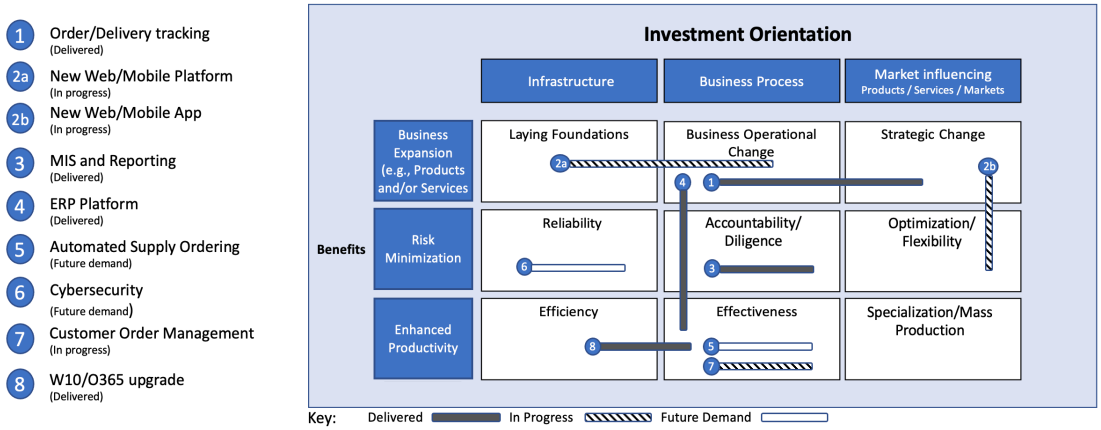


Figure 7. This matrix was adapted from the work of Glen Peters.[36] As part of the Step 2 personal grid interviews, the projects selected by the participants were further discussed with the researcher and plotted onto the matrix. When completing the standard grid, the projects being considered were also visualized on the matrix, as shown in Figure 7.

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36 Peters, G. "Evaluating Your Computer Investment Strategy," Journal of Information Technology (3:3), September 1988, pp. 178-188.