Manager App Portal at Continental: A Content, Collaboration, and Convenience App Selection that Works

Even apps for corporate management are respectable now. Manager app portals complement such “run-a-business” apps with apps that make managers’ business life easier. The “right” mix of apps makes the difference. Accommodating managers’ user perspective, we examine which apps disproportionately influence managers’ perception of information systems’ usefulness.

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1. Design Problem

Companies expect mobile Information Systems (IS) to make their workforce more efficient. Thanks to SAP’s (2016) new FIORI tiles even apps for corporate management are available now. However, finance content alone is not sufficient to convince managers to go mobile. One interviewee outlined “I will not use an iPad just to have my financials electronically.” Thus, the “right” mix of both “run-a-business” apps and apps that make managers’ business life easier will make the difference.

Manager app portals are a combination of apps that conform to a model composed according to a standard (cf. Councill/Heinemann, 2002). Following Shneiderman’s (1997) mantra “overview first, zoom and filter, then details-on-demand,” portals should provide both a personalized first orientation – we call it a “first-stop information shop” – and an easy-to-use navigation for detailed information. Such portals promise managers a new freedom in accessing, generating, and disseminating information to, finally, make decisions faster than before (cf. Ostrov/Krenske, 2013).

In addition to an article from Brenner et al. (2014) about IS design for use, Mayer et al. (2012) identify different manager IS use situations in generalizing distinct classes of “similar” user-group preferences. Another specification is described by Reinecke/Bernstein (2013) who developed user interfaces that adapt to culture differences. Based on Shneiderman (1997), Al-Kassab et al. (2014) examine the impact of visualization and analytics on managerial decision making. However, an app portal accommodating managers’ user perspective is barely covered.

Taking managers’ user perspective, the objective of this article is to examine which apps disproportionately influence the perception of IS usefulness – especially when they are mobile. In doing so, we consider managers as either “analysts” (those who primarily work more interactively with IS) or “consumers” (those who primarily consume IS information).

Following a design science research (DSR) approach in IS (cf. Gregor/Hevner, 2013), the remainder of this article is as follows: Applying the Kano model we use findings from a manager focus group with participants from multiple industries to identify apps that make the difference (requirements analysis). Then, we set up two app portals, one for analyst and one for consumer managers (design) and apply our findings to a prototype at Continental (use case). Summarizing both our findings from the Kano model and lessons learned at Continental we expose four guidelines that drive the “right” mix of apps for managers (recommendations). We end with a summary, limitations, and avenues for future research.

2. Requirement Analysis

Based on findings from our literature review with 90 relevant publications (cf. Mayer et al., 2017), we
examined single requirement characterizations, list approaches, frameworks, and structural equation models (SEMs). As SEMs are testing the impact of variables and surrogates on IS design, they convey a rigorous understanding of requirements, but no direct design guidelines. Single requirement characterizations and list approaches, in turn, provide guidance, as they outline IS features and hands-on variables. However, they do not evidence strong rigor since they often bear no connection to frameworks and SEMs. To bridge this divide between “truth” provided by SEMs and “relevance” of less rigorous hands-on approaches, we applied the Kano model. It is employed in product development to discover categories of customer needs (cf. Kano et al., 1984). We differentiate five categories of apps as follows (cf. Matzler/Hinterhuber, 1998):

1. **Attractive apps ("A")** disproportionately influence managers’ IS satisfaction and act as the strongest differentiators in design. Although managers do not expect IS to include these apps, they are generally very excited about IS that offer these features.

2. **One-dimensional apps ("O")** result in satisfaction when present and in dissatisfaction when absent. Their presence increases IS perception “the more, the better”. As these apps improve, satisfaction among managers increases in a linear relation.

3. **Must-be apps ("M")** are taken for granted. If they are absent, managers will be strongly dissatisfied. However, no matter how well they perform, these basic apps do not have the power to shift managers’ user satisfaction beyond a neutral state.

4. **Our model groups apps that managers do not care about into the indifferent ("I") category.**

5. **For apps in the reverse category ("R") a high degree of achievement results in dissatisfaction.** For example, the presence of too many functions in a manager app portal can be perceived as reverse quality, especially by users who like an easy-to-use IS handling.

**Kano Data:** From our literature review we took 30 potential apps ranging from business emails and financial reporting to semi-business apps such as business journal readers (cf. Mayer et al., 2017). Specifying the Kano model, we listed each app in a questionnaire along with its functional/dysfunctional question pair used to test and rate them. We structured the apps threefold: (1) **Content apps** supporting managers’ management task and two types of complementary apps covering (2) their collaboration, and (3) **convenience** especially when they are mobile (Fig. 1).

Rating these apps, we had structured interviews with managers of a focus group from seven companies organized within the Competence Center “Unternehmenssteuerungssysteme” at Darmstadt University of Technology. Regarding their working style, the participants consisted of sixteen analyst and nine consumer managers. Data were obtained from September to December 2015.

**Results:** Identifying which apps disproportionately influence managers’ perception of IS usefulness, we analyzed the results in three steps. (1) We determined how many respondents considered an app “attractive” (A), “one-dimensional” (O), a “must-be” (M), “indifferent” (I) or “reverse” (R). All must-be apps were directly selected to be integrated in our portal design. (2) We calculated the customer satisfaction coefficient for the remaining ones. It expresses the extent of satisfaction (EoS) \( (A + O) / (A + O + M + I) \) – in other words, how strongly the presence of an app will satisfy a manager on a normalized scale from 0.00 (no impact) to 1.00 (strong impact). (3) We proceeded with apps with an EoS score of at least 0.33 which means that a third of the interviewed managers consider them either attractive or one-dimensional. Fig. 1 summarizes the results (Mayer et al., 2017).

**3. Design**

Incorporating all must-be and most satisfying apps, we developed two manager app portal designs: One for analyst and one for consumer managers (Fig. 2). **News Ticker:** In each portal design, the header of the app clusters contains a news ticker. This includes news from public life (manager collaboration, Fig. 1, EoS scores: 0.69; 0.63), news from business life (corporate management, 0.63; 0.63), and drill-downs are evaluated as somewhat satisfying (0.67), and drill-downs are evaluated as somewhat satisfying (0.38; 0.44). Creating own reports is only satisfying for analyst managers (0.33). We incorporate such reports twice as wide for both types of managers and creating own reports for analyst managers on top.

**Collaboration:** Analyst and consumer managers name business emails and a business calendar as must-be apps. The same is true for video calling (0.60; 0.56). For analyst managers, annotations are

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**Key Messages**

- Manager App Portals have to cover both functional and non-functional requirements: Finance content alone is not sufficient to convince managers to go mobile.
- App portals promise managers a new freedom in accessing, generating, and disseminating information to, finally, make decisions faster than before.
- The right mix of apps drives managers’ perception of IS usefulness. However, do not forget the device selection.
Fig. 1: Most satisfying software components for manager app portals (Mayer et al., 2017)

For consumer managers, they are more satisfied with email, calendar, and office suite.

Another “must-be,” for consumer managers they are attractive (0.56). A one-click collaboration (sending items by dragging and dropping onto a colleague’s icon) is analyst managers’ most attractive app (0.88). It includes notifications on changes (0.81) and shared office documents (0.63). Complemented by other users’ availability (0.50) and screen sharing (0.44), it replaces sending emails back and forth or waiting for assistants to pick up their notes. This is not on the agenda of consumer managers. Covering on-topic annotations directly on their reports instead of making a screenshot, preparing an email, and, finally, attaching the screenshot to the email, they stick with business emails and like them most “at the push of a button” (0.67).

The same is true for integrating an office suite (must-be; 0.22) and private emails (0.38; 0.00). These apps are relevant for analyst managers, not for consumer ones. Summarizing these findings, the seven apps within the analyst manager collaboration cluster are placed adjacent to one another, whereas the four apps for consumers are twice as wide and placed vertically (Fig. 2).

Convenience: Analyst and consumer managers highlight flight and train apps as a “must-be.” Convenience apps such as a taxi app or restaurant fin-
der complement managers’ kind of a self-service travel management (0.38; 0.33). Business journal readers (0.94, 0.89) received the most exceptional score in the examination and newspaper readers (0.63; 0.56) are very attractive for both types of managers as well. Analyst managers evaluate a web browser as a must-be app, consumer managers, in turn, as somewhat attractive (0.33). A search engine received a score of somewhat attractive (0.38; 0.33) and complements our conceptual design of a manager app portal.

4. Use Case

Company and Project Scope
Continental is one of the world’s leading automotive suppliers. Within their two divisions “automotive” and “rubber,” it had revenues of 39.2 billion EUR and 207,899 employees at 200 production sites (cf. Continental, 2016). Complementing an IS project from 2012, the Financial Reporting (FIRE, Fig. 3, middle app column, second icon) which delivers reports to group CxO (Level 1) and Level 2 group directors and heads of divisions, the project had the scope of getting Continental’s managers online. The head of FIRE asked as follows: Comple-
ment the financial reporting with apps, which our managers do not expect, and, in doing so, improve managers’ perception of IS usefulness with more self-service capabilities.

Starting the project in January 2016, the project team of two internal business intelligence (BI) knowledge workers and two external academic consultants (authors of this article), profiled four managers. We concluded that two managers are analyst, while the other two are consumer-style.

Prototype
Specifying our conceptual design (Fig. 2) with the results from analyst managers, Fig. 3 shows our prototype of a manager app portal at Continental. Besides the FIRE reporting, the manager app portal incorporates other financial reports and associated analyses (app cluster “corporate management”). These reports are complemented with several apps for manager collaboration (left app cluster) and for managers’ convenience (right app cluster).

News Ticker: Each app cluster has a news ticker, implemented by live tiles. Taking collaboration as an example, the news ticker consists of a collection of breaking news from several feeds. The access is by web application programming interfaces (APIs) or rich site summary (RSS) feeds and caches up to 100 single news. For the user, clicking on the tile opens a slide-in window (Fig. 4, blue frame, left) with the requested information (Fig. 4, blue frame, right). In the content cluster the live tile contains financial information. Within the convenience cluster weather information of predefined locations are exposed since Continental managers’ typically travel between important production and sales facilities.

Content: Fig. 5 shows the live tile design of the FIRE reporting key performance indicators (KPIs). Besides this, the head of FIRE added the monthly group reporting “Green Book”, as well as the customer profitability analysis “CUPID – customer profitability indication.” All reports were complemented by new filters, drill downs, and the capability to create own reports. Freely drawn selections for a better navigation and adaptive split screens or slide in windows for comments should replace print outs.

Collaboration: Business emails, business calendar as well as a full-fledged office suite are incorporated. In this way, most important information are directly visible to managers with a one-click collaboration. In doing so, the head of FIRE fulfilled the aim of the consumer managers to harvest the Continental knowledge better and the request of the analyst managers to better share documents. Skype allows video calling and screen sharing (another attractive software component from our research). Accommodating a side note of one analyst manager “Three devices is at least one too many. This is especially true when I have my private smartphone with me as well,” private emails were incorporated in manager collaboration as well.

Convenience: Besides the weather app, the head of FIRE incorporated Lufthansa and Deutsche Bahn as travel apps delivering schedules and booking with one click. A taxi app complements these travel apps. Additionally, trip advisor as a popular restaurant finder was integrated. An app for the au-
Device selection: Although notebooks are the device of choice at Continental, the importance of their managers’ mobile use situations called for a smaller device, so that a powerful tablet was essential for the implementation. This was in line with what one manager asks for: “The smartphone has just the capability to be the ‘satellite’ for my new information management, not bigger than 5 inches and it will not be the single device for my corporate management task.” Fig. 6 outlines the interplay of smartphones as a first hub of information for alerting and push notifications and powerful tablets. Responding to a push email on a manager’s smartphone, he or she can choose the app portal on the tablet or call his or her assistant with a smartphone for further details. As such, tablets (a) serve as an advanced PDF reader more efficiently than smartphones do and (b) as an electronic typewriter for complex emailing, especially when office documents are attached, as well as (c) managers’ preferred device for simple ad-hoc analysis “on the fly.”

Technical implementation
The manager app portal runs on Windows 10 and a Microsoft Surface Pro 4. It was developed as a Windows 10 app in JavaScript with deployment via PowerShell and an APPX file. The apps in the manager portal are modern apps accessed by their unified resource identifier (URI). Web links are integrated according to the content they link to. The first option is a full screen browser for detailed in-
The app portal itself is a harmonized layer that is positioned on top of Windows.

The interplay of a powerful tablet with a smartphone as a “satellite” for alerting and push notifications is shown in Fig. 6. A secure store on the tablet matches credentials of Windows user with SAP user. Theobald “ERPConnect” is used to access SAP BW data from Windows (see next slide). BW security is applied and only data that the user has rights for is accessed.

For live tiles, only the relevant KPIs are fed back to the user’s app portal. As soon as the user clicks on a live tile showing SAP BW data, the standard web application opens. BW data are accessed via a Theobald connector (Fig. 7). One of the concerns voiced by the Continental managers was how their security and authorization concept remains in place when using a manager app portal. Thus, the solution is a “secure store” on the tablet, where Windows and SAP credentials are matched. The SAP BW is then accessed with the user’s rights and only data is returned that the user is allowed to see. Clicking on the FIRE live tile opens the BW NetWeaver portal in a browser if the user has VPN access enabled.

The app portal itself is a harmonized layer that is positioned on top of Windows. The modern app design (Fig. 8, bottom) has advantages: Firstly, the corporate identity can be maintained for all icons, not only the background image. Secondly, if one user likes a different app such as a general flight portal instead of the Lufthansa app, only the link beneath the manager app portal layer needs to be shown.

The Live tile information is as follows:

1. Secure store on the tablet matches credentials of Windows user with SAP user
2. Theobald “ERPConnect” is used to access SAP BW data from Windows (see next slide)
3. BW security is applied and only data that the user has rights for is accessed
4. For live tiles, only the relevant KPIs are fed back to the user’s app portal

Fig. 7: SAP BW is accessed with a Theobald connector

Fig. 6: Interplay of a powerful tablet with a smartphone as a “satellite” for alerting and push notifications
Large number of original apps from the Windows app store available
Live tiles such as “weather” are working without any customizing
Apps are interchangeable if a user wants to replace one item with another
- Robustness against updates
- Background process for live tiles against SAP BW have a time out
- No role concept available
- In general, large administration overhead

+ Corporate identity for all tiles can easily be adapted
+ More easily portable to smartphones
+ Robust against updates
- Development effort (especially for live tiles)
- Users can hardly change apps and need technical understanding to do so (via a .json file)

Fig. 8: Customized Windows start screen vs. modern app design

be changed. The main differentiators against using the Windows start screen (Fig. 8, top) were robustness against updates, a harmonized look and feel and the prospect of a facilitated future distribution among a larger user group.

Evaluation
The managers confirmed our selection of content, collaboration, and convenience apps. Even the more tech-averse consumer managers exposed the relevance of new apps besides FIRE. However, they outlined that such a portal must always be “ready to go” and “easy to use”.

“I want the full picture. Besides FIRE, I’m looking forward for news tickers. However, I don’t like to handle different data formats and sources.” (consumer manager)

“I can no longer cope with my day-to-day work without any IS support – but, keep it simple.” (consumer manager)

Highlighting the importance of groupwork both analyst managers supported our proposal of one-click collaboration and private emails. Collaboration was mentioned by consumer managers with a focus of making annotations directly on the screen and sending them with a “push of the button” to colleagues or their assistants.

“Groupwork implies direct data manipulation during our discussion, document sharing, and even new ways to collaborate.” (analyst manager)

All managers argued that the borders between business and private life vanish. Thus, they ask for what seemed to be squaring the circle. An IS redesign must master managers’ more and more hyper connected information retrieval in terms of “less is more”.

“I don’t want to be bombarded with notifications every minute. Draw my attention to critical events in real-time and do it more personalized.” (analyst manager)

“Harvest the knowledge of our people by collaboration instead of inflating expectations of newest IT hypses. I use both my smartphone and my tablet when I’m on the road.” (consumer manager)

“In the evening on a business trip, I expect to be able to check my private emails as well.” (consumer manager)

Finally, the convenience apps were considered as interesting by most of the managers.

“I screen car magazines for interesting articles on our products; it is my job to be up-to-date, but I also read them for fun.” (analyst manager)

Whereas one consumer manager was less enthusiastic about restaurant finders and point-of-interest maps, he pointed out the usefulness of logistic apps:

“Restaurant finders? I’d rather ask the concierge. But last week when I was stuck at a train station, I tried calling my assistant who was already gone. A train app would have saved me a lot of waiting.” (consumer manager)

Recommendations
Summarizing both our findings applying the Kano model and lessons learned from Continental we present four guidelines that drive the “right” mix of apps and the associated device selection for managers.

1. Content: Make core reports more interactive with drill downs and filters for manager self-service. Our research and prototype at Continental validated that the foremost objective of IS for managers is supporting them with financial reports. For analyst managers, filters, drill-downs, and creating own reports make them more interactive. For in-

Even the more tech-averse consumer managers exposed the relevance of complementing apps besides Financial Reporting.
Implications for practice

- Content: Make core reports more interactive with drill downs and filters for manager self-service.
- Collaboration: Offer collaboration bars and push notifications on changes to shared office documents for analyst managers. Get consumer managers “online” with news tickers and “at the push of a button” emails.
- Convenience: Take “fun and enjoyment” into account when accommodating managers’ business life.
- Device selection: Consider that tablets create their own manager use case as their “first-stop information shop.”

An intuitive navigation concept is key – it has much more impact than another graph type representing the same data.

1. Content: Make core reports more interactive with drill downs and filters for manager self-service.

2. Collaboration: Offer collaboration bars and push notifications on changes to shared office documents for analyst managers. Get consumer managers “online” with news tickers and “at the push of a button” emails. Besides the must-be components for manager collaboration, such as business emails, business calendars, and video calling (Fig. 3), analyst managers ask for collaboration bars as well as push notifications on changes to shared documents. Such a one-click notification should replace their sending emails back and forth. To simplify their communication routines, in turn, consumer managers just ask for direct emails “at the push of a button”.

3. Convenience: Take “fun and enjoyment” into account when accommodating managers’ business life. This guideline is not about fancy graphics and colorful charts, but reasonable information at a few clicks to make managers’ business life more convenient. Besides a “best-of” selection of travel, weather, and around-me apps, business journal and newspaper readers are most satisfying for both types of managers. They will help them to pass waiting times and to no longer depend on calling their assistants – if the information is available with just a few clicks.

4. Device selection: Consider that tablets create their own manager use case as their “first-stop information shop.” The device influences managers’ IS perception strongly. Thus, their expectations should be aligned with capabilities in the company (including security guidelines and hotline support). The consumer managers considered smartphones as their preferred device. However, the lessons learned from Continental exposed that managers do not feel comfortable with smartphones larger than 5 inches. We expect that notebooks and tablets for managers will merge to a class of 2-in-1 hardware such as Lenovo Yoga or Microsoft Surface called “convertibles”.

Summary, limitations, and avenues for future research

Applying the Kano model with findings from a manager focus group and lessons learned from a prototype at Continental, we examined which apps disproportionately influence managers’ perception of IS usefulness. For research purposes, our approach helps researchers to understand managers’ user perspective. For practice purposes, our research accommodates the changing IS requirements of managers and is a blueprint for investigating their boundaries of IS use.

A next design cycle should cover strategies towards a more powerful and flexible app store and infrastructure. Regarding the app (and device) selection, it should not be too difficult to define a company-specific profile, but how to generalize patterns for making such a selection, while bearing in mind managers’ different use situations should be particularly interesting as well.

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Zusammenfassung


Keywords

# Design Science Research (DSR) in IS # Human Factor in IS Design (Human-Computer Interaction Research) # Information Systems (IS) Analysis # Kano Model # Manager User-Group Preferences: Analyst and Consumer Managers

Stichwörter

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