Crafting Salient Web Scenarios Using Priorities

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Abstract. Scenarios are effective conceptual tools for requirements elicitation, analysis, and evaluation. However, choosing salient scenarios is one of the major problems of scenario-based web design. On one hand, due to the partiality of scenarios, it is often difficult to envision up-front all the scenarios necessary to cover every interaction capability to be designed for the site. On the other hand, drastically limiting *ex ante* the number of scenarios may mislead the design because of the risk of missing the coverage of crucial website requirements. This paper introduces a simple technique that enables reasoning about salient scenarios on the basis of the importance of the user profiles, the main stakeholders and their goals. Users and site main stakeholders assign priorities to user profiles and user goals; scenarios are then elaborated on the basis of the profiles and goals with the highest priorities. Advantages and limits of the approach are discussed by means of examples excerpted from a case study.

1. Introduction

Although the use of scenarios is frequently recounted as success factor of an accurate and comprehensive web requirements analysis, little methodological support is offered as to how web analysts should elaborate and select the *crucial* scenarios rather than wasting time and effort on vain narrative speculations. How to define salient scenarios for a website at requirements time? How many scenarios would be enough? How can web project teams be enabled to take reasoned and informed decisions about which scenarios should be considered salient, and which ones are less-important or irrelevant? These questions are not yet systematically answered to support the work of web project teams.

Scenarios for website design are usually considered as partial descriptions of usages or potential usages of the site. On one hand, due to the partiality of scenarios, it is often difficult to envision up-front all the scenarios necessary to cover every interaction capability to be designed for the site. On the other hand, drastically limiting *ex ante* the number of scenarios without any grounded reasoning may mislead the design because of the risk of missing the coverage of crucial website features.

This paper presents an initial proposal that tries to cope with some of the issues underlying the problem of defining salient scenarios for website requirements analysis. The technique is based on the prioritization of user profiles, user goals, main

stakeholders, and their goals. The results of the prioritization process are properly combined to generate critical scenarios, which take into account the most important goals the website should meet.

The paper is organized as follows: Section 2 discusses some of the relevant work related to web scenario analysis; Section 3 defines the key concepts on which the technique is based and a synoptic of the general process. Section 4 and section 5 detail the picture by discussing an example-based presentation of the technique for defining salient client and user scenarios. Finally, the conclusions outline the main benefits and limitations of the approach (section 6).

2. Related Work

Scenarios are powerful drivers for requirements elicitation, analysis, and evaluation of interactive artifacts [2]. In the web domain, scenario-based techniques are claimed to be extensively used by designers for the definition of the user requirements [1][6][4]. A recent empirical study [7] shows that web requirements elicitation is complicated by the fact that customers often do not know their needs and goals with respect to the website, are unable to identify specific target audiences, and are unaware of what the technology is capable to provide to them. In this context, scenarios are helpful conceptual tools that can mitigate some of these difficulties, since they provoke customers to reflect on concrete circumstances of use of the website, may drive the elicitation of what the customer wants the user to do on the site, and anticipate vividly envisioned site features in action.

Besides these benefits, it has been acknowledged that one the potential limits of scenario-based techniques relies on the fact that scenarios are *partial* descriptions of the whole spectrum of the actualized interaction capabilities of an application [8]. Generative approaches [9][10] to scenario analysis might partially mitigate the problem, by (automatically) producing variants and extreme scenarios from the ones elicited. However, the feasibility and benefits of these approaches for website and hypermedia development have not been yet investigated. Moreover, compensating the partiality of scenarios by increasing the numbers of scenario generated risks to result in resource overhead whose return on investment is not clear.

Some reflective practitioners identify in the concept of *persona* [4] a stereotype of a potential user who is defined on the basis of the results of empirical research. Then, a user narrative is elaborated which considers this stereotype as the actor of a scenario. Persona-based scenarios are then used to provoke designers to reflect on website features. Features at different levels of granularity (from very general categories of content to specific functionality) are then prioritized according to their importance to the user and to the business.

Feature-level prioritization is also common in widely known approaches to prioritization such as QFD [13]. Here, features of a new (or existing) product are ranked according to their relevance for the target users, whose needs and preferences have been previously assessed through proper market research. Prioritization at the feature-level assumes that strategic decisions about the definition of the target users and the identification of the needs of all the relevant stakeholders have already been

taken. In fact, as already explored by goal-oriented approaches to requirements analysis [14], priorities may be effectively used for mastering the complexity of the world of the stakeholders (users included) at the intentional level [12][16], i.e. considering their high-level goals and long-term targets of achievement.

3. Setting the Elements for Web Scenario Analysis

The limited coverage offered by scenario-based analysis may be reasonably compensated by the scenario *relevance*, so to make the project effort quickly converge to the definition of the critical conditions for the success of the website: the satisfaction of user requirements (i.e. needs, goals and expectations of the website visitors) and the fulfillment of the goals of the main stakeholders (i.e. objectives of the site promoters and financers). In fact, critical scenarios should capture the information that may serve as suitable indication for defining the website requirements necessary to satisfy these successful conditions. In a budget-conscious climate where web project teams are pushed to deliver websites in an extremely-shortened time-to-market with limited resources for the requirements analysis, concentrating the analysis effort on salient scenarios may turn out to be vital for the success of the project.

First of all, in order to present the technique for creating salient scenarios, it is useful to clarify some definitions for the purpose of our study.

A scenario is considered as a narrative that is elaborated on the basis of two main components: a user profile (P) and a user goal (G). More precisely, we can define the structural elements of an elementary scenario as a tuple {P,G}. A user profile is the description of a type of potential user, whereas a goal is a target of achievement for a user profile when accessing the site. Goals may concern different levels of abstraction and may be decomposed in subgoals and tasks.

A salient scenario is a scenario that is crucial to capture and provokes reflections about the definition of key requirements for the satisfaction of user and main stakeholder goals.

3.1. User Scenarios and Client Scenarios

In order to take into account the fulfillment of both user's and main stakeholders' goals, we introduce the distinction between *user scenarios* and *client scenarios*, which is based upon the consideration of two different viewpoints on the success factors of the website[1].

A *user scenario* describes what a user profile might want to do on the website. A *client scenario* instead describes what a main stakeholder wants a user profile to do on the website. Therefore, whereas a user scenario elaborates a narrative focusing on

[1] Viewpoints analysis enables to get a more comprehensive picture of the requirements [11], thus eliciting aspects of the applications and of its stakeholders that may be overlooked when doing analysis from one perspective only (e.g. end users).

a goal of the user, a client scenario is the projection of a main stakeholder's business or communicative objective on a user goal. This tension between user scenarios and client scenarios is particularly relevant for website design. In fact, these two types of scenarios account for the fact that websites are complex communication means that are designed not only to support users' tasks but also for leading, persuading, and attracting the user towards an expected behavior that is beneficial for the site stakeholders (e.g. "buying a product" for an e-commerce website, "decide to visit the museum" for a museum website, "being impressed by the quality of education" for a university website). Client scenarios therefore do not represent goals naturally motivating the user in his/her interaction, but rather goals (and the correspondent expected effects) that the main stakeholders wish to stimulate in the user during the interaction with the website.

Both types of scenarios should be considered, so to devise the strategies more suitable to satisfy user needs *and* main stakeholder objectives.

The purpose of the technique presented in this paper is to provide web analysts, designers, and main stakeholders with some helpful hints to define and select the *salient* user and client scenarios for the website. It is assumed that, once salient scenarios have been identified, the elaboration of these scenarios will serve as the basis for the definition of detailed website requirements, which may be fed to the design team.

3.2. A Process Overview

In order to define salient scenarios for website requirements analysis, four main phases may be followed: elicitation, prioritization, elaboration, validation. Elicitation aims at making user profiles, goals, and their relevance surface by main stakeholders and end-users. Prioritization deals with the systematic definition of the priority values to be assigned to the material gathered during elicitation.

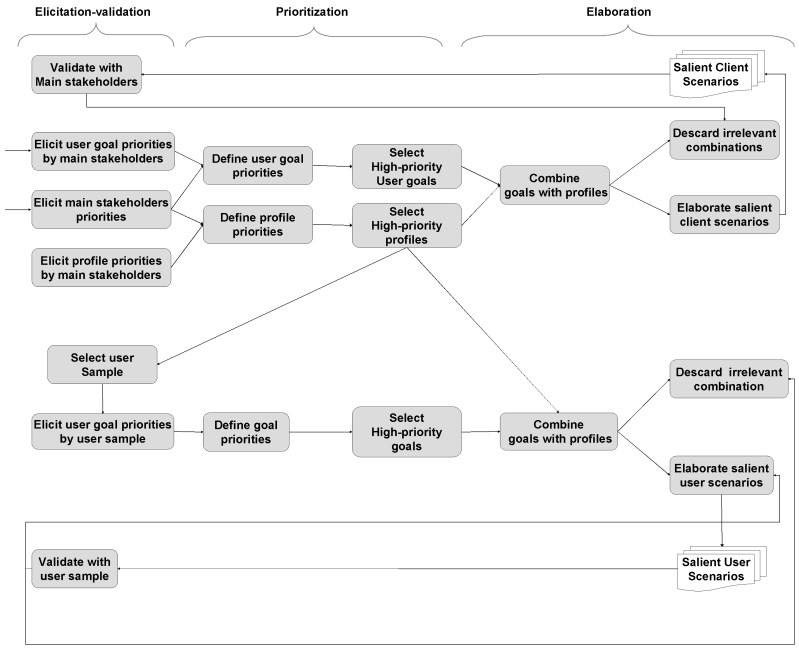

Figure 1. Process overview for defining salient user and client scenarios.

Elaboration focuses on the envisioning of scenarios on the basis of the input from the prioritization phase. Finally, validation allows assessing the results and iterating the process for refinement. Figure 1 shows a general overview of the approach, which is discussed in details in the rest of the paper.

The main results of the activities are salient client scenarios – concerning what the main stakeholders would like the user to do on the website – and the salient user scenarios – focusing on what the users would like to do on the website.

4. Salient Client Scenarios: What We Want Users Do on the Site.

4.1 Elicitation Phase

The elicitation sessions with the main site stakeholders (through interviews, questionnaires, or focus groups) enable to surface the target audience the website is addressed to. Users are modelled in terms of user profiles. A user profile may take the form of a brief description (e.g. in terms of profession, age, knowledge or other demographics) of a user stereotype that represents one target of the communication [12].

For example, in a university website, the main stakeholders identified were: the dean, a professor (domain expert and design expert), the president, the responsible of

one research institute, and the director of an executive master program. Not every main stakeholder has the same importance (in terms of political influence, decision power, or expertise) in the overall economy of the project. Therefore, a priority value may be assigned to each main stakeholder.

The result of the elicitation sessions with these main stakeholders is the identification of a set of user profiles (represented in Table 1): New student, Enrolled student, Internal Researcher, an external Company or another University, and the Administrative Personnel. Main stakeholders assign a priority value to each user profile; this value represents the relative importance of a user profile among the profile set in the *weltanschaung* of a given main stakeholder. For example, the dean of a young university may consider a new student a more important target to satisfy rather than an enrolled student. In contrast, the responsible of an executive master wishes to use the site mainly to attract and communicate with local companies and large organizations, rather than students or researchers.

In the example presented, assigned priority values are normalized on 1-10 points scale.

	priority (S_1)	*priority* (S_2)	*priority* (S_3)	*priority* (S_m)	**Profile Priority**
	Stakeholder S_1	Stakeholder S_2	Stakeholder S_3	Stakeholder S_n	
Profile P_1	*priority* (P_1S_1)	*priority* (P_1S_2)	*priority* (P_1S_3)	*priority* (P_1S_m)	$\sum_{i=1}^{m} priority(P_1S_i) * priority(S_i)$
Profile P_2	*priority* (P_2 S_1)	*priority* (P_2 S_2)	*priority* (P_2 S_3)	*priority* (P_2 S_m)	$\sum_{i=1}^{m} priority(P_2S_i) * priority(S_i)$
Profile P_n	*priority* (P_n S_1)	*priority* (P_n S_2)	*priority* (P_n S_3)	*priority* (P_n S_m)	$\sum_{i=1}^{m} priority(P_nS_i) * priority(S_i)$

	3	*2*	*4*	*0.7*	*0.3*	**Profile Priority**
	Dean	Professor	President	Resp. Master	Resp. Institute	
New student	3.5	3	4	4	2	**35.9**
Enrolled student	1	1.5	2.5	1.5	4	**18.2**
Internal Researcher	0.5	2	1.5	0	2.5	**12.2**
Company/Univ.	3	2.5	1.5	5	1.5	**23.9**
Administrative Personell	2	1	0.5	0	0	**10**

Table 1. The profile table with an example. Highest-priority profiles are highlighted.

Combining the main stakeholder priorities with the priorities of the user profiles, it is possible to define the overall priorities of the user profiles (see Table 1). The overall priority of a profile may be given by the sum of the profile priorities assigned by each main stakeholder *weighted* according to the importance of each main stakeholder.

The main stakeholders are also asked to define what *they would like the users do on the website* (see Table 2). The expected user behaviour is modelled in terms of user goals, as they are envisioned and wished by the main stakeholders. Main stakeholders assign a priority value to each user goal, which represents the relative importance of a goal in the goal set from the main stakeholder perspective. Note that different stakeholders may assign different priorities to each user goal.

For example, a professor may want to persuade the user about the uniqueness of the research themes being pursued, rather than to provide promotional material about the university. On the other hand, the responsible of a master may be interested in having the user being positively affected by a high-quality image of the university through the site rather than in convincing the users about the richness of the cultural context.

Therefore, in the case of several main stakeholders with different opinions about the users to address and the goals of the site, it may be useful for the project team to reuse each main stakeholder's priority to estimate the overall priority of each user goal. This activity may be performed either with the project team (among the analysts and designers), or in agreement with the principal stakeholder, i.e. the ultimate decision maker of the project.

	priority (S_1)	*priority* (S_2)	*priority* (S_3)	*priority* (S_m)	**Goal Priority**
	Stakeholder S_1	Stakeholder S_2	Stakeholder S_3	Stakeholder S_n	
User Goal G_1	*priority* (G_1S_1)	*priority* (G_1S_2)	*priority* (G_1S_3)	*priority* (G_1S_m)	$\sum_{i=1}^{m} priority(G_1S_i) * priority(S_i)$
User Goal G_2	*priority* (G_2 S_1)	*priority* (G_2 S_2)	*priority* (G_2 S_3)	*priority* (G_2 S_m)	$\sum_{i=1}^{m} priority(G_2S_i) * priority(S_i)$
User Goal G_n	*priority* (G_n S_1)	*priority* (G_n S_2)	*priority* (G_n S_3)	*priority* (G_n S_m)	$\sum_{i=1}^{m} priority(G_nS_i) * priority(S_i)$

	3	*2*	*4*	*0.7*	*0.3*	**Goal Priority**
	Dean	Professor	President	Resp. Master	Resp. Institute	
Being interested in the uniqueness of the research	3	3.5	2.5	1.5	2.5	**27.8**
Being fascinated by the cultural context	1	3	3.5	1	1.5	**24.15**
Download and request promotional material	2	1	1.5	3	1.5	**16.55**
Being intrigued by an innovative and professional image	0.5	2.5	1.5	3	3.5	**15.65**
Acknowledge the high academic quality of the faculty	3.5	0.5	1	1.5	1	**16.8**

Table 2. The user goal table (from main stakeholders' perspective) with an example. Highest-priority goals are highlighted.

4.2 Prioritization Phase

So far, we may easily obtain a ranked list of user profiles according to their priority and a ranked list of user goals according to their priority.

High-priority user goals are associated to high-priority user profiles, thus defining the essence of a client scenario. The resulting artefact of any of these combinations is

a potential client scenario because user profiles are associated with the goals that the main stakeholders want them to perform on the site.

The threshold between "high" and "low" priority values is obviously strongly dependent on the number of profiles and goals elicited, as well as on the resources available for the project (particularly for the requirements analysis).

4.3 Elaboration Phase

Given a user profile (P) and a user goal (G), the tuple {P, G} represents the basis from which narrative or more structured scenarios may be elaborated. Scenarios may comprise the description of a user profile in a given context, detailing the circumstances of use, possible motivations and the goal identified. Obviously not every tuple {P, G} is a realistic combination that may give birth to a scenario. It may happen that a given user profile does not fit with a user goal, and that may bring to discard this combination.

	High-Priority User Goal_1	High-Priority User Goal_n
High-priority Profile_1	**Salient Scenario_1,1**	**Salient Scenario_n,1**
High-Priority Profile_m	**Salient Scenario_1,m**	**Salient Scenario_n,m**

	Being interested in the uniqueness of the research	Being fascinated by the cultural context
New student	**Salient Scenario_a**	**Salient Scenario_c**
Company/University	**Salient Scenario_b**	**Salient Scenario_d**

Table 3. The basic dimensions for elaborating salient client scenarios.

Table 3 presents the basic components of a salient scenario, which is made by a high-priority user profile and high-priority user goal. For each combination profile/goal one or more scenarios may be envisioned.

In this case salient Scenario_a {*New Student, Being interested in the uniqueness of the research*} is discarded. During discussion with the main stakeholder it is clear that a potential new student is not primarily interested in the research activities carried out at the university, and neither at the uniqueness of the research. Such a student is usually (though exceptions may exist) primarily focused on what might directly impact his own curriculum and student life.

A possible elaboration for Salient Scenario_c {*New Student, Being fascinated by the cultural context*} is the following:

An italian student is attending the 4th year of high-school and he has to decide in a short period of time (usually 3-4 months) what university he is going to attend after the graduation. To help him out in his choice, a friend of his told him to take a look to the website of the university_x, where he may find interesting information and corresponding to his expectations. He connects to the university_x website from home and looks through the general presentation of the university. Exploring the guided tours and the testimonials of other students, he gathers that the geographical position of the university facilitates a multi-cultural context, where student from different countries and cultures found their own way and carrier, organize activities and events for different communities and are very active to make the university experience

enjoyable. Browsing the faculty overview, he also sees that professors come from all over the world and bring their own expertise and perspective to create an innovative and unique university.

Salient Scenario_c may provoke designers, analysts and main stakeholders to reflect about the requirements concerning the content to be designed for the users (e.g. faculty overview, description of the cultural environment in which the university is located, testimonials and interviews of other students).

Narratives may be defined elaborating on the user goal of the scenario and detail the circumstances of use, the detailed motivation, the tasks and the expected outcome of a user interaction. Similarly to the example of Scenario_c, also Scenario_b and Scenario_d may be envisioned.

4.4 Validation Phase

Since the elaboration phase introduces a potentially high degree of subjectivity and qualitative reasoning in elaborating the salient scenarios, the resulting salient scenarios need to be validated with the main stakeholders.

After a first set of results, the process can be started over again iteratively until the project team holds to have gathered enough requirements material for starting devising input for the requirements analysis and conceptual design.

Validating the scenarios may mean to do further meetings with the main stakeholders (whenever possible) or with their representatives. In these validation sessions, main stakeholders should be able to revise the results of the scenario elaboration, while analysts should show the reasons behind the definition of the scenarios (the assigned priorities).

5. Salient User Scenarios: What Users Might Want to Do on the Site

5.1 Elicitation Phase

On the basis of the high-priority user profiles, a sample of potential final end users may be recruited corresponding to the key characteristics described in the profiles. Through focus groups, brainstorming sessions and interview with them, it is possible to identify what they would like to do on the website in terms of goals (or tasks).

This user-centered research activity is important to complement the main stakeholder-perspective captured by the client scenarios. A variety of user research techniques may be drawn from traditional market research or from interactive product design. Examples of these techniques are task analysis [15], direct observation, surveys [6] and ethnography [5].

The material gathered during elicitation may concern different levels of abstraction as to user needs: from ill-defined user expectations [17], to specific goals, fine-grained tasks, or wished website features.

5.2 Prioritization Phase

Each user within a sample selected for a profile assigns priority value to each goal. Priorities may be elicited by discussing with the potential users the importance of a goal for them to be achieved. In fact, not every goal has the same relevance or urgency for each user. Some users may be interested in goals that other users consider less relevant, because of their personal interests, culture, profession, preferences, or general attitude. Priorities should converge to represent the average interest of the sample corresponding to a given profile.

	Goals	Priorities
User sample_1 (new student)	Understand objectives and relevance of the courses.	3
	Get an idea of the faculty	1
	Understand job opportunities	2.5
	See opportunities for grants	1.5
	See the fee and cost of living	2
User sample_2 (company)	Have an idea of the research quality, and the results produced	4.5
	Find suitable student profiles for internships	2.5
	Look for partners for joint projects	1
	Keep up to date on seminars and events open to the public	2

Table 4. User goals elicited by samples of users. Highest-priority goals are highlighted.

5.3 Elaboration Phase

Each combination of a high-priority goal with a high-priority profile is also a tuple (P,G) that represents a potential generator of salient user scenarios. Also here, narratives, more structured user scenarios or task sequences may be envisioned and further refined on the basis of the tuple (P,G).

Note that unlike client scenarios, user scenarios are here elaborated on the basis of goals elicited directly from potential website users, thus describing a potentially representative excerpt of what the users would like to accomplish by using the website.

Whenever analysts decide that a tuple (P,G) has a goal and a profile that do not match (e.g. because they do not make sense), this tuple may be discarded.

On the basis of the results of Table 4, a possible elaboration of the salient user scenario {*new student*, *understand objectives and relevance of the courses*} is the following:

A student who is deciding whether or not to enroll in the university_x is intrigued by the name and the general characteristics of the faculty but it is not at all clear to him

what kind of courses are taught. Exploring the course descriptions, he would like to understand better the relevance of the content taught and the practical knowledge he may gain from attending such courses. To this end, he wants to find an easy-to-understand presentation of the courses that may explain in details the content of the course but, at the same time, that does not require an advanced expertise to capture the meaning of it. Having gathered the importance and coherence of the courses offered, he can now get an overall but precise idea of the classes he might want to attend. Therefore, he would prefer to have different levels of depth in the presentation of a course: a clear title, a brief overview of the objectives, and a detailed description of the program and activities.

5.4 Validation Phase

It is important to validate with a sample of potential users (the same recruited for elicitation or new ones) the scenarios that have been elaborated, because scenario elaboration has likely introduced biases or misinterpretation of the actual intentions of the stakeholders. Validation consists in showing to users the results of the scenario definition and having the opportunity to discuss them again.

These results may be refined, re-tuned, even removed or changed on the basis of the new discussions and focus groups with the users. Similarly, discarded scenarios may also be presented to the users, so to capture the case in which a user unexpectedly finds a correspondence between his/her own goals and a given narrative.

6. Conclusions

We have presented some initial hints to define *salient client scenarios* expressing the highest-priority goals of the main stakeholders of a website so as they are projected on the user experience. Similarly, *salient user scenarios* have been defined in order to capture the goals and needs of the actual users. On one hand, goal and user priorities for client scenarios are elicited through interviews, focus groups or questionnaires with main stakeholders; on the other hand, goal priorities for user scenarios are elicited through interviews, focus groups or questionnaires with samples of real potential users. The prioritization process can be iteratively carried out through proper validation of the results of the scenario elaboration with users and main stakeholders. The results obtained may be expressed in terms of narrative scenarios that are then used for the elaboration of the requirements to be fed into the conceptual design of the website.

Although the concepts employed are not specific for websites and are generally relevant for requirements engineering, our experience shows the importance of capturing and defining salient scenarios for web projects. The web is increasingly being used as a communication tool between organizations/institutions and their target audiences. In this context, main stakeholder's goals are usually different from user goals. As such, the distinction between user scenarios, client scenarios and their relative importance becomes more and more crucial.

The approach has to be further validated on larger projects. However, the main expected benefit is the ability of focusing on relevant and grounded scenarios that correspond to the actual expectations of the stakeholders and to the perceived importance they assign to their objectives. Reasoning on scenarios and on the importance of the goals expressed may help stakeholders (users included) in better identifying their own needs and concerns. Finally, this technique may be used not only for the requirements analysis phase, but also for selecting salient scenarios and tasks to perform during web usability evaluation, either through usability review or user testing.

A potential limitation is the fact that such a technique will likely give a return on investment exclusively on project with a variety of stakeholders and on large web applications. However, it is obvious that the combination of user profiles, goals, main stakeholders and relative priorities should be kept under control as the number of the analysis elements grows. To this end, more scalable representations and tool support would be desirable.

Finally, note that such a technique focuses only on analytical aspects, leaving aside the problems arising from the difficult of managing the relationships with the project stakeholders (e.g. political influence of the stakeholders on the design, sharing of priorities between stakeholders, justification of requirements decisions to stakeholders without revealing the priorities, etc.).

Future work will be devoted to issues which remain uncovered by this introductory presentation of the approach. Such issues concern a more systematic and refined treatment of the discrepancies between stakeholder priorities (simple weighted sum may not be enough to give reason of potential conflicts), as well guidelines for diminishing the subjectivity for defining the threshold between low and high priority.

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