



# 8

## Establishing the Project Mind-Set

Classic project management is about doing your homework up front and then delivering with iron-fisted discipline. As one executive said to us, “We need people who deliver on their promises!” However, discipline, while always important, is not enough in the face of unk unks. Unk unks require a mind-set of not asking where you are in the plan but asking where you are in the first place, and what you really know.

Take as an example Escend, the collaboration software startup company that we discussed in Chapters 4 and 5. Elaine Bailey commented, “It was the mind-set of stopping and asking, ‘What do I know and what must I know?’ that really helped me.” The problem required an open-ended search with an unknown result. It required “switching gears,” “putting on a different hat,” compared to the execution mode

that characterized the other problem areas at Escend (and most of what VCs usually do). This helped her to prioritize the decisive first two weeks on the job. The other problem areas were mere execution. Settling this fundamental question enabled her to make the decision of further investing or shutting down the company. At Option International, the CEO and the company had to remain very open-minded about opportunities that existed in the market, and explore them to see whether they fit within the evolution of the business model, while at the same time avoiding an inefficient deployment of the limited resources of the small organization.

The mind-set cannot be “programmed” in procedures and process, nor should it rest on the shoulders of heroic individuals. In fact, relying on such project heroes could well be damaging for a project, in particular if their “intuition” is not challenged. We see two fundamental sides of the unk unk mind-set, which need to be balanced: first, the openness to look for and see unexpected things, and second, a shared direction, vision, or “map” that maintains cohesion in what the team does. An additional requirement is the team’s ability to cope with fundamental changes of the project that take away the “safety” of knowing where one is going. We will discuss these three issues in turn.

## **8.1 Open-Mindedness: Expecting the Unexpected**

Probably one of the most essential differences between a planned approach to project management and the approaches we describe is the state of mind. A planned approach requires a disciplined focus on the plan and the elimination, or at least control, of deviations. A learning and selectionist approach requires, as in the cases of Escend and Option International, a preparedness to be open to unexpected events. This ability to be open to unexpected events has, in turn, three parts: (1) experienced personnel who have seen first hand that projects are, in fact, not always plannable; (2) a culture of encouragement—raising issues rather than suppressing inconvenient observations; and (3) a culture of openness that includes external partners, allowing them to accept the occurrence of unforeseen changes.

### **8.1.1 Choosing the Project Team with the Right Experience**

#### *The Project Manager*

Recall the Circored case in Chapter 2, the first-of-a-kind iron ore conversion facility. The project manager was an experienced iron ore mine manager. He was a superb executor, and for him, innovation consisted of introducing new equipment from specialty suppliers, with tight deadlines and budgets. When the team worked its way through the innumerable unexpected problems during the ramp-up, he lost not only his sleep but also all credibility in the eyes of the board because he repeatedly promised success around the corner. He did not have the experience of experimenting and

learning in a project. He wanted to make the original plan happen and saw any deviation from it not as a source of information but as an issue to be taken care of. This was costly for the project and for his career.

The Lurgi ramp-up manager, in contrast, was prepared for experimentation and failures, although he had never ramped up such a complex and novel facility himself. He was prepared because he had gone through an “education” by the veteran R&D manager, Martin Hirsch, the father of the technology, who had been involved with the ramp-up of several breakthrough technologies.

A project has to be led by a person. Innovation and project management literature emphasize the crucial role of the project manager.<sup>1</sup> This person needs to have experience with the possibility of unk unks, at least indirectly through others. Moreover, different complexity and uncertainty profiles require different management styles.

In planned projects with variation and foreseen uncertainty, the key ability of the project manager is to be a master planner, an efficient administrator, and a problem solver. He or she must spot deviations from the plan, solve the underlying problems (or have them solved), and expedite the project within the existing framework of the organization.

In the learning approach, the project manager needs to be able to motivate the team to spot upside risks, to turn around experiments very quickly and learn from these experiments. In addition, he or she needs to be able to foster learning in the team (and thus overcome the NIH syndrome). Finally, the ability to mobilize an external network of resources that are not available within the project itself becomes critical, as unk unks may require resources that could not be anticipated and were not provided for. The project manager must also explain the project’s mission and sell changes and problems to the rest of the organization. Such project managers have a lot in common with intrapreneurs.

In the selectionist approach, the project manager is an arbitrator among the teams conducting parallel trials. A major challenge is to maintain the motivation of the teams whose solution was not chosen for continuation. To accomplish this, the project manager must be perceived as transparent and fair, and a team player. He or she has also to be a people developer, who can ensure that members of teams that are not selected will feel that they still have a role to play in the organization.

### ***The Project Team***

There is a well-established body of knowledge on team composition that suggests how the roles of different team members should complement one another in order to combine to a powerful whole.<sup>2</sup> We do not need to repeat this body of knowledge here.

However, there is a clear difference in team processes that the presence of unk unks requires compared to less uncertain projects. Objectives are less clearly defined and less precisely measurable, and intermediate setbacks are

more likely and often more severe. Communication needs to be broader and less structured, and disagreements more prominent, reflecting the need to perform new problem solving, to improvise (see Chapter 5), and to pursue multiple approaches mid-course.<sup>3</sup> In Chapter 9, we will discuss in more detail the managerial infrastructure supporting such less structured team processes. Because of these effects of unk unks, these classical team roles<sup>4</sup> take a slightly different form:

- ▲ *Idea generator.* This refers to synthesizing information from different sources (such as markets, clients, technologies, and processes) to create ideas for opportunities and solutions. When unk unks emerge, this role will be required not only at the beginning (to create good solutions) but repeatedly over the course of the project as new problem solving must be performed out and as multiple design-check-act testing cycles are carried out. Most likely, the role will have to spread over a larger fraction of the project team than in a routine project, where disciplined execution is the main task.
- ▲ *Entrepreneur.* This refers to taking initiatives: recognizing, proposing, pushing, and demonstrating ideas and proposals for solutions. Again, this activity will have to occur more repeatedly and frequently in a project with unk unks and will have to be spread over several team members because opportunities will arise at multiple places in a novel project.
- ▲ *Technical expert.* This refers to mastery of the detailed problem structure and solving the myriad technical subproblems that occur. In large projects, there are, of course, many experts with different areas of specialization. While in a planned routine project the expertise is needed for competent execution, in a novel project it takes on another function: the source of knowledge to create new problem solutions as unk unks emerge. Recall from Chapter 1 how the risk management office put experts on call in order to provide the subteams with problem-solving expertise as residual uncertainty was resolved.
- ▲ *Project manager or leader.* This refers to planning and coordinating the diverse activities in project execution. The manager in a routine project is the planner who then ensures discipline in executing the plan (and not something else). In a novel project, the plan is a fiction, and thus, the project manager is more of an orchestrator as well as an ambassador: It is the project manager who allows new solutions to emerge, and the project content to change, but still ensures the vision's integrity, the common direction of all activities, and the buy-in and involvement of team, partners, and stakeholders.
- ▲ *Gatekeeper.* This refers to collecting and channeling information about important changes in the internal and external environments. The project manager should probably contribute to this, but in large and complex projects, additional access to the various

networks is usually required in order to be able to stay up-to-date. The importance of this surveillance function becomes ever more critical as uncertainty and relational complexity of the project increase.

While the project manager needs to put a team together and weld it to a unit, senior management must enable the formation of teams (we will discuss this need in Chapter 12).

In addition to the modification of team roles, the less structured nature of work necessitates three requirements for the profiles of the team members: experience, flexibility, and security. The first, experience, refers not only to deep experience in the technical subject area but also to previously having encountered unk unks and the responses to them, so that the person does not panic or become confused when unk unks emerge. At the very least, the person should be made aware of what unk unks are and the devastating effects they can have (this is the same requirement demanded of the project manager, which we discussed above, in the example of Lurgi's ramp-up manager).

The second requirement, flexibility, refers to personality profiles who are not dependent on fixed routines (as opposed to people who find security only in stable work patterns) and who do not become too attached to work that has been carried out under certain assumptions, so abandoning it does not become too stressful.

The third requirement, security, refers to the right, and need, most people have to be protected from adverse events. In other words, the team member must be assured that he or she will not be personally affected by unforeseen circumstances or project failure, if the team has delivered good work. If project members feel that they are held responsible for overly detailed project targets over which they have no control, they will typically tend to act overcautiously. As one manager put it, "People at gunpoint don't perform better; they freeze."

Can these capabilities be taught? Formal training can definitely help, and we argue throughout this book that a better understanding of selectionism and learning and their trade-off or complementarity will improve the team members' intuition. But such formal training needs to be complemented by on-the-job learning, rotation, and mentoring. The team will be able to cope with unk unks if they have previous experience with them and if they can rely on mentor(s) who, while not necessarily directly implicated in the projects, can allay fears that will undoubtedly rise during the execution of a project that is confronted with unk unks.

### **8.1.2 Mindfulness: A Culture of Openness**

Having a project team that has encountered unk unks before and therefore knows what they are is important but is not enough. If the culture of the organization discourages people from questioning the project's assumptions,

they may not dare to initiate responses to unk unks, or they may feel that it is not appropriate because of expectations and social pressures. The mind-set must be “automated” in a *culture*, or *habits*, of never taking things for granted and always looking left and right for things we may have overlooked.

The culture of alertness is well captured in Weick and Sutcliffe’s concept of *mindfulness*, which we have already mentioned in Chapter 3 in the context of control-and-fast-response. While this approach is designed to prevent the “system state” from spiraling out of control, the cultural ability to detect and respond to unexpected events is the same as in novel projects. Mindfulness has five components.<sup>5</sup>

1. *Preoccupation with failure.* This means that the organization (in our case, the team) treats any lapse as a symptom that something is wrong with the project plan, something that has been missed and could have severe consequences for execution. Such teams encourage the reporting of errors, they elaborate experiences of “near misses,” and they are wary of the potential liabilities of success, including complacency, the temptation to reduce margins of safety, and the drift into automatic processing.
2. *Reluctance to simplify.* It is a common recipe of prioritization to simplify in order to stay focused on a handful of key issues and key indicators. Teams that are alert to unk unks try to simplify less and see more, acknowledging the complex and unpredictable nature of the project. They encourage boundary spanners with diverse experience to challenge assumptions, and negotiating tactics that reconcile differences in opinion without destroying the nuances of knowledge that the different opinions represent.
3. *Sensitivity to operations.* Normal operations, procedures, and processes often reveal observations that have no immediate consequence but are “free lessons” that could signify the development of unexpected events. Take, for example, a conversation with someone from the regulatory agency who says something funny, or the unexpected behavior by a customer in a test, which does not affect the desired test result but could point to a big change in another context. These lessons are visible only if there is a frequent assessment of progress in a multifaceted way, not just tracking indicators. The management team must know in depth what is going on, listen to employees’ opinions, and encourage them to express even vague hunches, not so much to react to each hunch, but to be able to detect patterns.
4. *Commitment to resilience.* A key characteristic of unk unks is that no matter how well one prepares, the unexpected *will* happen. Thus, the project team needs the ability to respond to unk unks, to bounce back from disaster, and, perhaps, even to turn them into opportunities. Such teams put a premium on experts with deep experience, skills of recombining bits and pieces of different strategies to a new

whole, and training (this is, of course, closely related to the previous subsection on choosing the project team). Such teams also repeatedly simulate scenarios of surprises and “fire drill” practices of what the team would do. Although the surprise that finally emerges may be different from all the simulations, the team has practiced running through real-time problem solving. For example, the Sydney Olympics preparation included a major subproject of improving wastewater canalization around the harbor to keep debris out. The project faced unforeseen uncertainty because of community relations and unknown ground conditions. The team used a “future perfect” scenario technique of frequently running through the desired project outcomes *as if* looking at them in hindsight and running through the necessary actions to get there.<sup>6</sup>

5. *Deference to expertise.* Diversity of decision making enables an organization to better respond to unexpected situations: faster detection, more knowledge where the decision is made, and more variety in approaches, which increases the chance of finding a good solution. In other words, decision making is pushed down. This does not contradict the requirement to coordinate upward, with the (possibly changing) strategy for the project as a whole, and laterally, with other parts of the project. The prerequisite of delegating decisions is that all team members are informed about the status of the entire project and the key interactions, and that management is well informed about the tasks’ status.

Such teams also differentiate between normal times, high-tempo times and emergencies or fundamental changes in the project. Decisions come from the top when progress is normal, but they migrate down when unks strike, with collective input to the charting of a new course. The team must know in which mode it operates at any given moment.

These characteristics refer to a team culture that is prepared for unforeseeable uncertainty. Culture refers to shared basic assumptions about the “right” way of operating. This is not something that can be ordered or put in place rapidly; it has to be consistently practiced over a long period of time (on the order of years) before it really sinks in, just as habits or trained routines of a proficient athlete are for an individual.

Instilling a team culture of being alert to unk unks requires the commitment by top management to running projects this way, and then repeated communication and rewards and punishment for behavior in a way that is consistent with the culture. This is not trivial; we often talk to project managers who understand the requirements of unforeseen uncertainty on project management, and even have a corporate statement about it, but report that supervising management falls back into the habit of blaming the team for missing targets when times get tough. When a team receives mixed signals, and supervising management is perceived as capricious and unfair, a culture of responsiveness to unk unks cannot easily develop.

### 8.1.3 Open-Mindedness among Project Partners

Mindfulness and the willingness to accept unexpected events are particularly difficult to achieve among project partners who come from different organizations. As their project collaboration is temporary, it is harder to establish the trust and alignment of objectives necessary in order not to interpret the unknown as a manipulation attempt by the other side, and not to opportunistically press an advantage when it arises.

In routine projects, alignment of incentives and actions can be achieved (or at least reasonably attempted) contractually. But this is not possible in novel projects with unforeseeable uncertainty, when changes are major.<sup>7</sup> Contractual arrangements, while indispensable, must be complemented by common expectations, have a shared definition of acceptable behavior and success, and have mutual commitment to win-win actions. Only then are partners usually willing to accept changes without suspicion or counteractions. This can be achieved by irreversible investments in the relationship on *both* sides (that is, both lose when the project suffers), both economically and in terms of personal commitment.<sup>8</sup> We will elaborate on these arrangements when we discuss relationship management in Chapter 10.

## 8.2 Project Vision, or a “Map” of Unknown Terrain

Openness to changes in the plan, without a common direction, means utter chaos.<sup>9</sup> Openness must be balanced by a flexible, yet cohesive, direction for the project, like a map in unknown terrain. Along such a cohesive direction, team members can orient themselves, coordinate, and censor their own local decisions.

A map of this kind is not only a rational decision coordination device, but it also gives team members a feeling of security in the light of changes that are unexpected and hard to interpret. The following story, illustrating this function of a map, has entered the lore of management teaching:<sup>10</sup>

The incident happened during military maneuvers in Switzerland. The young lieutenant of a small Hungarian detachment in the Alps sent a reconnaissance unit into the icy wilderness. It began to snow immediately, snowed for two days, and the unit did not return. The lieutenant suffered, fearing that he had dispatched his own people to death. But on the third day, the unit came back. Where had they been? How had they made their way? Yes, they said, we considered ourselves lost and waited for the end. And then one of us found this map in his pocket. That calmed us down. We pitched camp, lasted out the snowstorm, and then with the map we discovered our bearings. And here we are. The lieutenant borrowed this remarkable map and had a good look at it. He discovered to his astonishment that it was not the map of the Alps, but of the Pyrenees.

Thus a map, even a bad one, can help the organization to cope with the threatening and uncontrollable nature of the unknown. It helps to make team members action-oriented and discover other sources of information



that may be more appropriate than the bad map. The role of a map in the ability to cope with unk unks, which we call “robust mind-set,” is further discussed in Section 8.3.

### 8.2.1 An Example: Rapid Manufacturing Technologies

What does a map for a highly uncertain project look like? There is no general answer; the structure of the map must depend on the nature of the project and the problems to be solved. It should have a clear representation of the mission of the project, of what really needs to be accomplished, while acknowledging uncertainty and including flexibility in the possible approaches. It may not be detailed, in contrast to a plan, but it must give a sense of direction.

To give at least one example of a map, we refer to the case of the “rapid technologies” center in a major automotive manufacturing company.<sup>11</sup> Rapid prototyping and tooling technologies were originally developed to produce rough prototypes quickly in the development process. The technologies are usually categorized in three groups:

- ▲ Rapid prototyping (RP) is based on the layer-wise generation of physical parts from three-dimensional computer data, like an ink-jet printer that sprays plastic or sinter material, building the part layer upon layer.
- ▲ Rapid tooling (RT) technologies quickly and cheaply produce (stamping, pressing, and molding) tools, either generative (layer-wise) or by molding. While such tools wear out quickly, their low cost and production time allow the cost-effective production of small volumes.
- ▲ Rapid casting (RC) technologies cheaply produce forms for metal casting (“lost” forms, meaning that the forms are destroyed when the metal is poured into them to make the tool). The forms may be produced layer-wise (as in RP) or with sand.

Rapid technologies are predicted to soon move into manufacturing. So-called rapid manufacturing has been propagated as the solution for the vision of low-volume production and customization of cars with short turnaround times. The flexibility obtained by eliminating expensive tooling altogether (RP) or making the tools cheaper (RT) would render the production of lower volumes economically appealing. Vehicles of the future could be produced in small series, and maybe even to customer specifications, at competitive costs.

Experts agree that this vision has real potential for the automotive industry, for some components before 2010, and for mass manufacturing in general by 2015. The rapid technologies center had been charged to develop rapid technologies from a tool used for some prototypes in product development to a tool widely used in manufacturing.

The challenge is that behind the three technology categories above hides a myriad of competing RP and RT technologies, each promising that its view will carry the day. These technologies are being developed by many small technology companies, many of them startups. There is a variety of processes and an ever-expanding list of applicable materials, but all of them still have significant performance limitations. No one knows which of the startups will survive, or which technologies will win. The variety of technologies is too large to be pursued across the full range by one company, even by a large automobile manufacturer. In short, the rapid technologies center has no choice other than to place a few bets, observe the market, and learn as the field evolves. This is a difficult thing to do when one has been charged with achieving a clear objective.

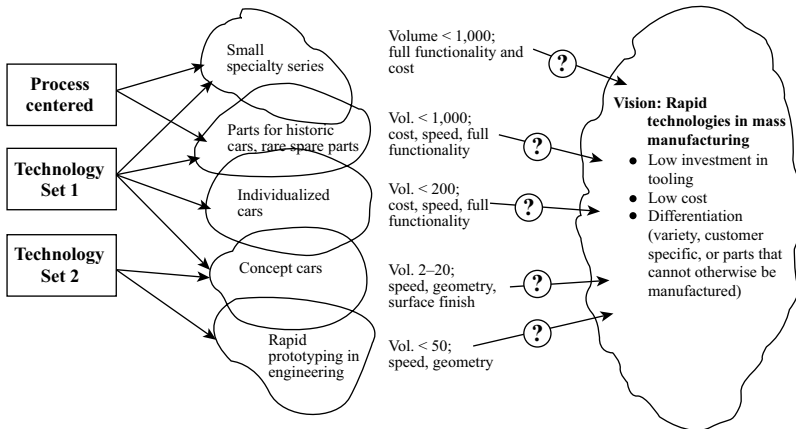
### 8.2.2 A Roadmap into Unknown Terrain

The project team developed a rough map that is reproduced in Figure 8.1. The map shows three currently available technical approaches, each representing a currently possible combination of different technologies to pursue. Technology sets 1 and 2 are not explained in detail here, for confidentiality reasons. The “process centered” approach means that the new technologies are not emphasized at all, but rather, a dedicated organization produces small series of parts with old technologies, for example, production on flexible turning lathes and mills. This approach can offer speed immediately, but in the long run, it will probably not be able to compete with the new technologies.

The center of Figure 8.1 shows the currently possible, or imaginable, applications of rapid technologies: rapid prototyping (already established), concept cars, individualized cars for specific customers (high-profile or high-paying customers), rare spare parts or parts for vintage cars, and small specialty series (for example, a special edition of 1,000 cars). Requirements are shown to the right of each applications area. On the right-hand side, the figure shows the project vision.

This map allows selectionism, as several of the applications may be pursued in parallel; indeed, the rapid technologies center decided to work on concept cars and one small specialty series. The map also acknowledges that the path from these currently visible applications to mass manufacturing is still unknown, as no one knows how the remaining performance gap can be closed. Thus, learning will have to occur through different application areas pursued over time. This learning will determine which of the applications ultimately leads further.

The vision is sufficiently concrete to give an overall direction while leaving flexibility about how to get there and what performance criteria will ultimately be the most important. Thus, the map can help the project team to manage changes within limits while maintaining continuity for the team to have the feeling that it is making progress and to communicate a cohesive program (rather than a hodgepodge of activities) to the rest of the organization.



**Figure 8.1** A map for a rapid technologies development project

## 8.3 Robust-Mindedness: The Ability to Cope

### 8.3.1 Sensemaking and Social Cohesion to Prevent a Team Breakdown

Being open to recognizing unk unks and to changing the project definition is one thing. Being able to cope with fundamental, and possibly repeated, changes in what the project is about is an altogether different, and equally difficult, challenge. This is true for the project leader who makes the plans, but even truer for the team members who may not know the entire background. Fundamental changes in missions and directions can be very daunting and perceived as threatening one's very existence.

Decision making in novel projects (and, in fact, in all ambiguous and complex domains) is heavily permeated by the use of *intuition*. In contrast to analytical and conscious deliberation, intuition is a decision or conclusion that is reached with little apparent effort, and typically without conscious awareness, involving little or no conscious deliberation. Intuition is like “automated expertise” in that it can be learned tacitly (by doing or experiencing) or explicitly (through instruction) and that it is domain-specific (as learning occurs mostly in specific specialized domains, not across the board).<sup>12</sup>

Intuition is used in a much broader set of situations and problems than deliberation. In particular, when situations become complex and ambiguous—that is, open to multiple interpretations, when problems become “wicked” rather than “tame” (see the discussion in Section 3.5 of this book)—explicit and analytical decision methods are insufficient, and people make decisions using at least a heavy dose of intuition. The social psychologist Karl Weick calls this “sensemaking.”<sup>13</sup>

We all dislike it when our intuition is violated to a degree that we cannot interpret the situation, do not understand the causal connections, and do not know what the possible outcomes are. It is one thing to like gambling, when we know exactly the possible outcomes and their probabilities (take

the numbers, black and white, odd and even in roulette). But unforeseeable uncertainty and ambiguity can be very threatening in all cultures.<sup>14</sup>

In particular, Weick has shown that the breakdown of sensemaking, when the situation violates one's intuition and cannot be successfully interpreted, combined with the loss of social cohesion of the group, can have a traumatic and devastating effect, and even lead to the group's collapse. A famous illustration of such a breakdown is the Mann Gulch disaster, a one-day project in which a team of 16 firefighters was parachuted into the middle of the prairie to extinguish a wildfire at 4:10 P.M. on August 4, 1949. At 6:00 P.M., 12 team members were dead and a 13th lay dying from severe burns.<sup>15</sup>

The firefighter team had a foreman and a second-in-command, and the team was assembled by areas of expertise for one occasion only. In other words, the teams were different each time, and the crew members knew one another only superficially or not at all. Their radio was destroyed during the parachute landing. The fire was classified as a moderate one that could be surrounded and extinguished by the next morning.

The fire did not behave as it was supposed to, given its classification, and produced more noise and heat, but the leaders acted casually. When they walked toward a river, they spread out and lost close contact. In the smoke and the noise, only the leader saw that the fire had jumped the river, and led them up the hill, which confused them. Close to the top of the hill, the leader saw that the fire was racing toward them, lit a fire in front of the group, and ordered them to "drop their tools" and step with him into the fire he had just lit. But the crew did not obey the orders and ran. All of them perished in the fire except two men, who found a crevice through which they climbed down toward the river.

Maclean and Weick's reconstruction of the event suggests the following. The inconsistency between the fire's classification, what the crew members saw, and the behavior of their leaders confused them; they felt unsure in their personal judgment of the degree of danger and the fire's expected behavior. When they spread out in the smoke and noise, the group's identity broke down, and each crew member felt cut off. When a group's cohesion is lost, along with the feeling of mutual commitment and consideration, and of a common purpose, panic sets in. Panic is an intense fear that isolates each individual and sets him out on his own. In panic, the crew members did not really hear or see the leader's action and command, or dismissed it as crazy, and ran for it. The leader survived, lying down on the ashen spot of the fire he had lit, while the wildfire passed him on all sides.

Weick's influential interpretation of the Mann Gulch disaster suggests that a severe disruption of sensemaking, a failure to understand the causality of what is happening around people, together with a weakening of team identity and cohesion, can be so frightening that a team, or an organization, may collapse and be unable to function.

The implications for novel projects are immediate: If team cohesion is fragile because, for instance, stakeholders and various subteams have conflicting interests, and then the project definition changes unforeseeably in ways that people do not understand, or if competing teams in parallel selectionist trials are declared winners and losers in nontransparent ways, motivation may be completely lost and collective action undermined.

### 8.3.2 A Sensemaking Breakdown in Automotive Development

Consider a case of unexpected changes and a cosmology episode in an automotive development project, in the subproject of the climate control system (CCS). The CCS contains all components and development activities related to the passenger's climate environment, including air ventilation, air filtering, warm-up, and cool-down. One manager explained: "Here, at the air-intake, you find all the problems we have in the development of new vehicles: coordination with other components (e.g., fire-wall, engine) and information release to tooling." Together with the dashboard, the CCS is the subsystem with the most interfaces to other activities.

Due to its many interfaces, the CCS is impacted by complexity over all three of the domains we explained in Chapter 4: component, tasks, and organizational. Therefore, this CCS subproject was subject to many engineering change orders (ECOs) during the last year of development, many driven by changes not in the CCS itself, but in other parts of the car. As a case in point, the engineer responsible for the design of the air intake of the CCS had been constructing a particular component for over a year, based on design assumptions (such as the available space) that were formally written down and "frozen" in previous information exchanges. Subsequently, he had to cope with a total of 18 ECOs, many of which were based on elements beyond his horizon, which thus had no obvious logic. As a result, his sensemaking collapsed, leaving him in severe stress that resulted in his taking extended sick leave.<sup>16</sup>

It is important to note that this breakdown episode, and its destructive effects, were due not to unkunks but to complexity and the associated coordination problems. There were many changes in the design of the car that represented effects of variation and foreseeable uncertainty, nothing beyond traditional PRM. However, as the changes were not communicated or explained throughout the wider development team, some engineers lost their sense of social cohesion ("I am the lowest of the pack, and everyone jerks me around"), and their feeling of understanding what was going on ("How is this possible? This was frozen and settled; is this project in trouble?"). This episode illustrates that complexity, interdependence, and lack of communication can cause inexplicable events for individual team members that are just as devastating as major unkunks.

### 8.3.3 Robustness: Social Identity and a Map

An example of successfully navigating unforeseen uncertainty and fundamental changes is the effect of the World Trade Center terrorist attack on an investment bank's trading room, and the recovery from it.<sup>17</sup> In this case, we see how both social identity and an overarching vision, a map, allowed a group to survive through threatening changes.

The investment bank, International Securities, operated a large trading room on the 19th to 21st floors of the World Financial Center, directly adjacent to the World Trade Center. The trading rested on a combination of different types of arbitrage, novel interpretations of value linkages of stocks leading to opportunities. Thus, the trading room was one social unit, in which information and strategies were shared, allowing more novel interpretations and trades. Thus, the whole was more than the sum of the parts. Sharing and social cohesion were supported by the manager and personnel policies.

On September 11, 2001, the traders were interrupted by a loud explosion in the next-door building. As they rushed to the window, they saw one tower go up in flames, and a few minutes later, they witnessed the approach of the second plane. A tumultuous escape to the Hudson River followed; when the towers came down, they were all on a boat or already in New Jersey. Fortunately, no members of the trading room were harmed.

Deep uncertainty and anxiety followed, above and beyond the fundamental shattering feeling that the integrity of the United States had been violated. The traders were cut off and did not know whether the Financial Center was also destroyed, whether their jobs would still exist, or even whether the company would survive the disaster. People frantically tried to contact one another, and shared their confusion over a Web site of "accounted-for traders" that the bank put up. After two days, an executive sent a message to everyone: "We are trying to reestablish the systems and contact you," in effect communicating, "Be patient, you are valued employees."

As the chairman of the NYSE announced on September 14 that trading would be back up by the 17th, the bank also decided that they had to start trading again as quickly as possible, and eventually return to the Financial Center. Thus, a project was formulated, although it was not clear how long it would take to resume trading. An important part of the project was to retain the personnel and maintain morale, in spite of terrible work conditions, an undesirable location, and reduced bonuses for that year. It is this part of the project on which we focus here.

By September 17, a makeshift trading room had been reestablished in the basement of a converted warehouse in Escapaway, a small suburban town in New Jersey. To reach the room, one had to weave one's way through several rows of corporate cubicles and corridors. It had no windows, a low ceiling, and walls painted in industrial yellow, and it was filled with desks, phones, laptops, screens, and visibly, American flags.

The first step in their fight to maintain morale was to reemphasize, or reestablish, their identities. The flags boasted, “We are Americans.” Then, they taped prominent signs to groups of desks, “20th floor, Equities,” “21st floor, Fixed Income,” and “19th floor, Risk Management.” The desks were rearranged in the same configuration as in Manhattan, and the same people were neighbors. The three floors had been reproduced horizontally. The traders were beginning to feel like traders again.

Then they developed new procedures to operate under rudimentary conditions. System backup and connectivity were greatly decreased, computing power was reduced, and not everyone even had access to a computer. Junior traders had to help by executing trades manually (booking, registering, breaking into parts), an activity that had been performed automatically by the IT systems. This was such a radical return to old practices from a decade earlier that the junior traders did not even know how to do it. The traders resourcefully combined available technologies, personnel, and space to operate. In this process, some traders became clerks, others manual operators, and all shared now-scarce bandwidth in their connection to the NYSE. In the process, they adapted the dress code from business casual to jeans and boots. The changes in roles did not detract from their status as traders; in fact, it is how they reaffirmed their status as traders.

Over time, however, group cohesion was threatened by the drab location—an hour away from the informal networks and information circuit of Manhattan, in a suburb with lots of fast-food restaurants and surrounded by an endless succession of indistinguishable shopping malls. The circumstances began to threaten their identities as sophisticated Manhattanite professionals. One trader remarked, “I have to use a backup chemical toilet; that’s unheard of in the securities industry.” In December 2001, the merger, options, and convertible bond trading group broke away and established a temporary office in midtown Manhattan. They cited “critical need for access to networks of informal information” as a reason, which obtained them permission from upper management for the move.

It was widely felt that this move could jeopardize the unity of the trading room and, ultimately, the existence of the firm: The move cut the other desks off from vital information that was no longer flowing within the trading room. More deeply, it could mean the end of the trading room, as the manager said, “If it becomes clear that we can trade separately, you wonder what’s keeping us together, what’s preventing some of us from starting an independent hedge fund . . . This introduces personal economic uncertainty for me, too.”

Management’s answer to this threat was to emphasize the move as temporary and to present a “map” back to normalcy: a plan of the reestablishment of the World Financial Center room. In the eventuality that the building would be declared unsafe, a backup facility was developed, five minutes by ferry from the Financial Center, in Hoboken. Thus, the firm used selectionism for the return (the Hoboken facility was later turned

into a permanent recovery site for future disasters). The map back to normalcy maintained, for several months, two parallel routes.

The race was on—the employees had collectively set a tacit deadline; if the move back from Escapaway did not happen by the time annual bonuses were paid in April (everybody knew the bonuses would be much lower than normal because of the disaster year), people would start defecting.

In the end, the move back took place successfully at the end of March. “Thanks—Welcome Back” read a huge sign next to an American flag over the entrance to the Financial Center as the traders returned. All the desks were once again together. In spite of the six-month displacement, not a single trader had left the organization, and the bank had retained its most precious asset.

Hard work had been invested to maintain social cohesion of the group, and to keep sight of a stable overall direction, in spite of the chaotic and incomprehensible day-to-day changes. Maintaining these two guideposts allowed the organization to maintain morale and continue to function.

## **8.4 Summary: How to Foster an Unk Unk Mind-Set**

In summary, we have seen that the unk unk mind-set requires a culture of mindfulness and the ability of the project team to cope with fundamental changes without losing orientation and morale. The ability to cope is related to maintaining social cohesion of the team and offering a “map” that allows for changes to the project without losing a sense of continuity of purpose and reference.

Mindfulness refers to a culture of constantly looking for symptoms indicating that the project plan may be obsolete—a culture of encouraging problem reports and valuing diversity in problem interpretation. In such a culture, a project cannot be led by simply tracking performance indicators; the interpretation of problem symptoms requires management to engage deeply in what is going on. This includes experience and problem-solving capabilities of the members of the team. The unk unk mind-set is incompatible with a management style of holding people responsible for their targets and milestones without otherwise engaging.

We have seen that teams who lose their frame of reference, their sense of understanding what is going on, become confused when the project fundamentally changes, and may even panic if a sense of common identity and security is not maintained. Team identity refers to the individual team members feeling that they are part of something bigger than themselves, that there is a common purpose and a mutual commitment of the team members. This must be maintained by ongoing social interaction (not only technical information being exchanged) and enforcement of a standard of behavior for the good of the team.



Social cohesion also depends on the ability of the team to understand, and articulate, a common purpose. A “map” is any tool that allows the team to recognize continuity, in spite of project changes, and to articulate what that stable common purpose is.

## Endnotes

1. For example, Tampoe and Thurloway 1993, Pinto 2002; in innovation literature, Clark and Fujimoto 1991 emphasize the necessity of heavyweight project managers in their seminal study on the automobile industry, and Wheelwright and Clark discuss the heavyweight project manager in a broader context.
2. See, for example, Boddy 2002, Chapter 8, and Roberts and Fusfeld 1997.
3. See Boddy 2002, Chapter 9.
4. An additional function is sponsorship; we will discuss this function separately in Chapter 12.2.3.
5. The following discussion is based on Weick and Sutcliffe 2001, Chapter 1.
6. This example is based on Pitsis et al. 2003. We will come back to it in Chapter 9.
7. See, for example, Miller and Lessard 2000, Floricel and Miller 2001, or von Branconi and Loch 2004.
8. The importance of such arrangements has been empirically shown by Doz 1996.
9. This has long been known in innovation research; see, for example, two classic references in Quinn 1985, or Van de Ven 1986.
10. Cited from Weick 1995, p. 54.
11. This example is based on Loch et al. 2003, and on an unpublished report to the company that was involved. Figure 8.1 is a disguised version of the map that was produced within the company.
12. A definition of intuition can be found in Hogarth 2001, p. 14; the discussion of emotion is *ibid*, pp. 62–65, and the comparison to expertise on p. 205.
13. See Weick 1993: “Sensemaking is about contextual rationality. It is built out of vague questions, muddy answers, and negotiated agreements that attempt to reduce confusion, (...) the more frightening feeling that old labels are no longer working” (p. 636).
14. Psychological studies have established that humans dislike unforeseen uncertainty and ambiguity; see, for example, the classic 1985 study by Cohen, Jaffray and Said. The disliking of ambiguity has also been shown in sociological studies across cultures. For example, Hofstede 2001 identifies “uncertainty avoidance” as a measurable tendency (with different relative emphasis) across cultures.
15. The Mann Gulch disaster is recounted in Maclean 1992 and analyzed in Weick 1993.
16. More details of this example are recounted in Terwiesch, Loch, and De Meyer 2002.
17. This example is cited from Beunza and Stark 2005.