HOW TO PREPARE: AUSTRALIAN HOMELAND SECURITY EMERGENCY PLANNING

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ABSTRACT

This paper examines the impact of specific factors on the level of homeland security emergency planning in Australia. By quantitatively demonstrating which factors most impact a household’s likelihood of developing an emergency plan, policy can be tailored to more effectively improve homeland security preparedness in Australia.

Australia has historically been prone to natural disasters. The uniqueness of the country’s geography has made it susceptible to hazards ranging from tsunamis to brushfires. Furthermore, the issue of emergency preparedness has risen to the top of the docket in current political debate, as the government ponders whether to attempt to replicate a United States homeland security model.

The Australian Bureau of Statistics produced a plethora of data that can be analyzed to unearth real-world dynamics of emergency preparedness efficacy. This paper identifies factors that appear to increase the likelihood of a household at least meeting a minimum standard of preparedness. Testing whether a household has an emergency preparedness plan is used as the proxy for this minimum threshold.
Thank you to Christopher Toppe. Thank you also to my wife.
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Chapter 1. Introduction

Last year alone, there were 405 natural disasters reported worldwide, affecting 201 million people (Kelly 2008). Massive recent disasters such as the Indian Ocean Tsunami, September 11, and Hurricane Katrina forced governments to enhance their roles in providing emergency management (White House 2006). Indeed, governments have allocated billions of dollars in the past few years to enhance their preparedness levels for the next disaster (White House 2006). Both in the U.S. and in Australia, much of this funding has gone to improving the response capabilities of the central governments themselves. Yet, recent disasters have demonstrated that the bulk of immediate response to a disaster actually occurs by the victims themselves. Due to logistical lag time and scarcity of resources, governments are rarely able to meet the immediate needs of its citizens in a major disaster, as Arlington Fire Chief Plaugher recently noted, “The real first responders are our citizens” (Plaugher 2005). As such, governments are now again formally attempting to ensure that citizens, themselves, are prepared for disasters.

The concept of citizen emergency preparedness is not new. For example, the United States conducted air raid warnings and plane spotting activities in the 1940s, before drilling school children to “Duck and Cover” in the 1950s (Homeland Security Task Force 2006). The formal mechanism of direct federal government emergency preparedness communication with citizenry has been revived in the U.S. through the
creation of the Office of Citizen Corps within the Federal Emergency Management Agency (FEMA). The explicit aim of Citizen Corps is to “bring community and government leaders together to involve community members in all-hazards emergency preparedness” (Citizen Corps 2008).

In Australia, however, there has been less formal effort to prepare households for emergencies. Indeed, the country’s focus has been on preventing terrorist attacks rather than on preparing for natural disasters, despite no modern history of terrorist threat to Australia. As such, the government has spent $A10.0 billion in the past seven years on counterterrorism programs, versus only $A0.5 billion to prepare for a natural disaster (Australia 2008). This lack of government focus on preparing for natural disasters has led to an unprepared citizenry. For example, most believe that the Australian Defence Force (ADF) will respond to domestic disasters, even though the ADF does not view this response as part of its purview. Lack of information is also apparent as an increasing number of households move to disaster prone areas. Furthermore, the government has recently announced that a number of reports detailing Australia’s ability to respond to a disaster have been embargoed because they would “frighten people” (Templemen and Bergin 2008).
Chapter 2. Background

Australia is a threatened area. Natural disasters have devastated Australian communities: Cyclone Tracy left 25,000 Darwin residents homeless in 1974; more recently, Cyclone Larry caused $A1.5 billion in damage in 2006 (McLaughlin 2004). Flooding has also caused devastation, as when Cyclone Wanda dropped 1,318mm of rain, killing 16 people and leaving 8,000 homeless (Australia 2008). Moreover, the continent is located near Indonesia, where terrorist organizations are reported to have established a major foothold. As a result, Australia must be prepared to respond to large-scale natural or man-made disasters. Historically, the frontline of response for Australians has been at a household level, necessitating robust policy targeted to enhance emergency preparedness by citizens themselves (Australia 2008).

Australia is at a policy crossroads concerning the future of homeland security in the country. The current Labor government campaigned on a platform of replicating the U.S. model of homeland security, including creation of a Department of Homeland Security and a corresponding office similar to U.S. Community Preparedness. Controversially, however, current Australian Prime Minister Kevin Rudd has not released the findings of a high-profile government report that served as a review of the country’s homeland security strategy (Dorlingnational 2008). As such, improvements in policy for household preparedness have stagnated, pending announcement of the nation’s overall homeland security strategy.
Many authors have already established the importance of household preparedness in Australia. Indeed, when disaster happens, there is little probability that government officials will be immediately available to help any one particular household. As such, much of the initial response to a disaster will be done by the victims themselves at the household level. In line with this view, some argue that community based preparedness is more effective than centralized government preparedness in Australia (Buckle 2001). Building upon this premise, subsequent studies have focused on how government can better engage communities for disaster preparedness in Australia (Buckle, Marsh, and Small 2004). Generally, however, these suggestive studies focus on methods by which the central government can reach out to communities to improve preparedness, so they address the medium rather than the message. There are no robust studies that quantifiably identify how Australian household could most effectively improve disaster preparedness, only studies that suggest households should improve disaster preparedness.

In the United States, however, there are numerous studies that attempt to quantifiably identify areas in which gaps remain in household disaster preparedness. For example, the U.S. government publishes a newsletter that summarizes current academic literature on household preparedness effectiveness (United States 2005). This academic landscape is generally comprehensive, as the studies are often subsidized by local governments that conduct this research to better serve their citizens. For example, the State of Oregon regularly surveys households to determine preparedness levels (Johnson
In Washington State, survey and focus group data were combined to determine household preparedness levels (Friedman 2007). These types of multivariate studies help to establish the menu of variables that can affect preparedness levels. For example, the Mason-Dixon National Hurricane Survival Poll found that 56% of coastal residents in the U.S. have no emergency plan (Coker 2008).

Like the Mason-Dixon National Hurricane Survival Poll, several U.S. studies have used household establishment of an emergency plan as a proxy for preparedness levels. ORC Macro conducted one such survey for the Red Cross, which unearthed a fairly dismal portrait of household emergency planning. Like other such studies, the ORC Macro survey reported planning rates, as well as other indicators, but never attempted to discern the relationships among these variables (ORC Macro 2003). Even the annual survey done by the American Preparedness Project (Redliner 2007) tends to limit its analysis to demographic variables, focusing much of its effort on the relationship between income and emergency planning.

Perhaps the most useful study done to date was commissioned by the U.S. government itself through its Citizen Corps entity. ORC Macro was retained to conduct a Post-Katrina survey with the intention of comparing this to Pre-Katrina data (ORC Macro 2005). The study demonstrated quantitatively that experience in the past two years with an emergency does indeed raise the likelihood that a household will develop an emergency plan. Moreover, ORC compared its survey language against other recent
surveys to show that its language and sample set could be juxtaposed against several other recent surveys to begin looking at the relationships between variables. In so doing, the survey showed that perceived levels of risk are more determinant of establishing an emergency plan than any demographic factors. The breadth of the variable considered are only equaled by the data reported in the Australian Bureau of Statistics Emergency Household Preparedness Survey that this researcher intends to analyze.

In translating these U.S. variables to Australian terminology it will be important to establish a common lexicon, as the homeland security field is still in its infancy. As such, this researcher cross referenced the variables identified in the U.S. government Citizen Corps studies with official Australian government doctrine through the “Emergency Management Australia Concepts and Principles in Emergency Management (2004).” In so doing, I determined a lexicon that is common to both ABS and FEMA guidelines. This lexicon defines the variables that will be presented in the Data Section of this paper. This language is important in realizing the project’s goal of going beyond descriptive statistics and actually identifying the key variables that affect Australian household preparedness.
Chapter 3. Research Proposal

I intend to conduct analysis that will identify the most effective areas that policymakers should target to increase the likelihood that an Australian household has an emergency plan. To-date, most research concerning Australian household preparedness has focused on descriptive statistics regarding the emergency methods employed, rather than analytical statistics to demonstrate the actual efficacy of these methods. For example, Buckle, Marsh, Johnson, and Friedman all describe the state of household preparedness, without attempting to demonstrate either correlation or causation. Yet, the Australian Bureau of Statistics (ABS) reports data that would facilitate a relatively straightforward analysis to identify the factors that lead to increased preparedness. Specifically, the ABS conducted two surveys, one in 2003 and one in 2007, that explicitly measures preparedness variables.

In the United States, much debate has centered on the term “prepared.” Indeed, it is difficult to quantitatively identify whether, as an aggregate, the country is more prepared for a terrorist attack or natural disaster from any one week to the next. As the project manager (though I am a consultant) for Federal Emergency Management Agency (FEMA) Preparedness Analysis, I am well acquainted with the statistical pitfalls of attempting to definitively state whether or not a country is prepared for a disaster. As such, I narrow the scope of this research analysis by analyzing what factors tend to lead towards an Australian household having an emergency plan.
All official U.S. and Australian doctrine agree that having an emergency plan is a prerequisite for preparedness. Hence, my research will only focus on this universally accepted variable, leaving the more controversial ingredients to other scholars. Hence, my research will only identify those factors that increase the likelihood that an Australian household will have an emergency plan, without stating whether this household is holistically more “prepared” (see Australia 2008 as an example). As such, my dependent variable will be: likelihood that a household has an emergency plan. To summarize, my research questions will be:

- What are the most relevant factors in ensuring that a household will develop an emergency plan?
- What is the impact of the relevant factors?
- What are the policy ramifications?

There are many independent variables that I will test to gauge their influence on having an emergency plan. For example, the ABS collected data on the perceived risk of a brushfire. There is also demographic data to consider, such as the number of people in a household. The ABS even provides demographic information at a more detailed level, such as whether anybody in the household volunteers. I expect that my working hypothesis will appear similar to: likelihood of having an emergency plan = perceived risk of brushfire + perceived risk of flooding + person living alone + at least one
household member volunteers + had emergency in past 2 years + emergency services contacted in past 2 years + change made as a result of emergency.
Chapter 4. Data

There are three main surveys I intend to use to measure emergency preparedness data across the territories of New South Wales (NSW), Victoria (VIC), Queensland (QLD), and Australia Capital Territory (ACT):

1) A survey conducted throughout NSW during the two weeks beginning October 6, 2003. Of the targeted 5,420 households, approximately 5,050 (93%) responded. This survey was produced by the Australian Bureau of Statistics and named “Community Preparedness for Emergencies, NSW”, Oct 2003 (4818.1)

2) A survey elicited from approximately 18,600 households in NSW, Vic., Qld and ACT. Of these households, approximately 17,300 (93%) responded. This survey was produced by the Australian Bureau of Statistics and named “Household Preparedness for Emergencies: NSW, Vic., Qld and ACT”, Oct 2007 (4818.0.55.001)

3) A third survey conducted by the Australian Bureau of Statistics and called “Community Preparedness for Emergencies”, Oct 2007 (4818.5). This survey also had a 93% response rate.
**Dependent Variable**

I intend to use the variable “Has emergency plan, written or rehearsed” as the dependent variable. This metric will serve as a proxy for preparedness in that it demonstrates that the household has met the minimum generally accepted level of preparedness because it has completed the planning stage. There are several caveats for this variable. First, the emergency plan, as posed in the survey, is for non-medical emergencies only. This excludes such situations as planning for the route to the hospital when a pregnant woman goes into labor, etc. Such situations do not fall under the general study of homeland security. Second, the response is binary and self-assessed, such that the perception of the respondent as to whether or not the household has an emergency plan cannot be further validated. Finally, the term “rehearsed” was defined as occurring in the 12 months prior to the survey.

**Independent Variables**

The ABS data has a plethora of variables which I intend to test for significance. There are three main categories under which the variables fall: future risk perception, demographics, and history. Risk perception variables include measures such as “perceived risk of brushfire” and “perceived risk of flooding.” There is also demographic data such as “person living alone.” The surveys even measure volunteerism in households. I expect that history will correlate with future risk perception through such
variables as “had emergency in past 2 years”, “emergency services contacted in past 2 years”, and “change made as a result of emergency”.

Specific Household Preparedness for Emergencies Survey Background

This report uses data primarily obtained from the 2007 Australian Bureau of Statistics (ABS) Household Preparedness for Emergencies survey that was conducted across four territories: New South Wales (NSW), Victoria (VIC), Queensland (QLD), and Australia Capital Territory (ACT). Information was collected by either a face-to-face or telephone interview from one adult per household. The survey collected a range of information about household preparedness for and experiences with emergencies. This includes the presence of safety precautions such as installing smoke alarms, identifying easily accessible emergency phone numbers, and creating an emergency plan. Where households had experienced a recent emergency (in the last 2 years), the survey provides information on how the household responded during the emergency and whether any changes were made to ensure better preparedness in the future. The data are used primarily by fire, State Emergency Services and other government departments to assist in policy formulation and review, as well as by private sector analysts.
Descriptive Statistics

This preliminary analysis explores the effects of a household preparedness index on the likelihood that a household will have developed a plan to deal with emergencies. In developing a testable hypothesis using data provided by ABS on their website, I faced notable limitations. First of all, the publicly-available data do not allow for granular analysis, but instead offer total (number and percentage) households, parsed in different categories, for each of the four territories. Due to this aggregation, the results presented will not be as reliable and valid had responses by distinct households been available.

It is hypothesized that households scoring higher on a preparedness index (detailed below) will be more likely to develop and maintain plans for emergencies. The first model specified in this analysis is:

\[
Plan = \alpha + \beta_1 PI + \beta_2 NSW + \beta_3 VIC + \beta_4 QLD + \varepsilon
\]

Where:

- **Plan** is the percent of households in each territory that indicated they had a plan in place
- **PI** is a Preparedness Index of four ABS survey questions that indicate household readiness for an emergency. The Index was created by taking the average of four summed responses from the survey, giving each equal weight. The four responses are:
  - Percentage of households that installed a smoke detector;
  - Percentage of households that own a fire extinguisher;
  - Percentage of households that own at least one fire blanket; and
  - Percentage of households that own a first aid kit.
- **NSW, VIC, QLD, and ACT** are regional dummies for the location of the survey response. The coefficient for ACT is captured in the intercept (\(\alpha\)).
Table 1 provides a comparison of risk and safety factors across the four territories demonstrating that household perceptions of risk and safety affect development of an emergency plan. For instance, of the four territories, Queensland had the highest risk costs per capita, the most uniformed police per capita, and the highest percentage of population with household plans. The presence of high risk cost, coupled with the high number of police, may serve as an indicator for the propensity of households to establish emergency plans.

**Table 1: Planning Incidence Compared to Risk and Policing Elements**

<table>
<thead>
<tr>
<th></th>
<th>New South Wales</th>
<th>Victoria</th>
<th>Queensland</th>
<th>Australia Capitol Territory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent of Population with Household Emergency Plan</td>
<td>13.30%</td>
<td>15.10%</td>
<td>19.70%</td>
<td>14.70%</td>
</tr>
<tr>
<td>Risk Costs per Capita¹</td>
<td>$719.00</td>
<td>$164.00</td>
<td>$1,138.00</td>
<td>$1,043.00</td>
</tr>
<tr>
<td>Citizens per Police Officer²</td>
<td>476</td>
<td>476</td>
<td>555</td>
<td>316</td>
</tr>
</tbody>
</table>

¹ Risk cost per capita is calculated by dividing the total cost of disasters by the number of people affected within the given territory.

² The number of citizens per police officer is calculated by dividing the population of the respective territory by the total number of officers.
Chapter 5. Discussion of Results

Assessment of Data

Coefficient estimates are reported in Table 2 on the next page. The estimate for the Preparedness Index, which is the likelihood of a household having a holistic emergency kit (consisting of all four of the elements smoke detectors, fire blankets, fire extinguishers, and first aid kits), supports the hypothesis stated above by indicating a positive effect on Plans. Each one-percentage increase in the Preparedness Index (i.e., becoming more prepared) will increase the likelihood of plan development by .48%. This estimate is significant at the .01 level. Actual location of the survey (four territories) does have a significant effect, though the sign of the coefficients suggests they may be biased. Lastly, the adjusted $R^2$ shows that approximately 47% of the variance in the dependent variable is explained by the model.
Table 2: Preparedness Index - OLS Results (N = 20)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparedness Index</td>
<td>.48***</td>
</tr>
<tr>
<td></td>
<td>(.15)</td>
</tr>
<tr>
<td>NSW</td>
<td>-.92***</td>
</tr>
<tr>
<td></td>
<td>(.02)</td>
</tr>
<tr>
<td>VIC</td>
<td>-.09***</td>
</tr>
<tr>
<td></td>
<td>(.02)</td>
</tr>
<tr>
<td>QLD</td>
<td>-.85***</td>
</tr>
<tr>
<td></td>
<td>(.02)</td>
</tr>
<tr>
<td>ACT (Intercept)</td>
<td>-.089</td>
</tr>
<tr>
<td></td>
<td>(.078)</td>
</tr>
<tr>
<td>Adjusted R(^2)</td>
<td>.47</td>
</tr>
</tbody>
</table>

*Note:* Numbers in parentheses are standard errors.
***Significant at .01 level.

Table 3: Descriptive Statistics for Household Variables

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Smoke Detectors</th>
<th>Fire Blankets</th>
<th>Fire Extinguishers</th>
<th>First Aid Kit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>93.4%</td>
<td>18.8%</td>
<td>28.4%</td>
<td>57.6%</td>
</tr>
<tr>
<td>Standard Error</td>
<td>0.7%</td>
<td>1.0%</td>
<td>1.4%</td>
<td>2.0%</td>
</tr>
<tr>
<td>Median</td>
<td>93.9%</td>
<td>18.9%</td>
<td>26.1%</td>
<td>58.9%</td>
</tr>
<tr>
<td>Mode</td>
<td>95.1%</td>
<td>15.9%</td>
<td>35.9%</td>
<td>66.0%</td>
</tr>
<tr>
<td>Std Deviation</td>
<td>3.0%</td>
<td>4.5%</td>
<td>6.3%</td>
<td>9.0%</td>
</tr>
<tr>
<td>Minimum</td>
<td>87.4%</td>
<td>12.6%</td>
<td>18.6%</td>
<td>41.4%</td>
</tr>
<tr>
<td>Maximum</td>
<td>98.4%</td>
<td>27.2%</td>
<td>38.2%</td>
<td>73.7%</td>
</tr>
</tbody>
</table>

Table 3 above describes the individual characteristics of the four elements of the Preparedness Index: smoke detectors, fire blankets, fire extinguishers, and first aid kits. In other words, it now parses out the Preparedness Index into separate elements.
Households are substantially more likely to have a smoke detector than any of the other elements.

The next step is to measure how these individual elements affect the dependent variable of likelihood of plan development, which is used as a proxy for a given household meeting a minimum threshold of preparedness. Table 4 on the next page achieves this by showing the separate effects of household emergency equipment on the likelihood of plan development. Of the four variables (described above) several appear statistically significant: fire blankets, fire extinguishers (both at the .01 level), and the geographical coefficients. As the percentage of fire blankets increases by 1%, the development of plans also increases by approximately 1%. The coefficient for Fire extinguishers, however, indicates a negative relationship, where a 1% increase in fire extinguishers in the household actually decreases plan development by .7%. This coefficient is likely biased since it is statistically significant and takes on the opposite sign of what is expected. The same is the case with the geographical variables of NSW, VIC, and QLD.
Table 4: Preparedness Elements - OLS Results (N = 20)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Coefficient (SE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoke Detectors</td>
<td>1.47</td>
<td>(.92)</td>
</tr>
<tr>
<td></td>
<td>1.02***</td>
<td>(.34)</td>
</tr>
<tr>
<td>Fire Blankets</td>
<td>1.02***</td>
<td>(.24)</td>
</tr>
<tr>
<td>First Aid Kits</td>
<td>.09</td>
<td>(.2)</td>
</tr>
<tr>
<td>NSW</td>
<td>-1.31***</td>
<td>(.05)</td>
</tr>
<tr>
<td>VIC</td>
<td>-1.34**</td>
<td>(.08)</td>
</tr>
<tr>
<td>QLD</td>
<td>-1.2***</td>
<td>(.03)</td>
</tr>
<tr>
<td>ACT (Intercept)</td>
<td>-1.21</td>
<td>(.76)</td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>.69</td>
<td></td>
</tr>
</tbody>
</table>

Note: Numbers in parentheses are standard errors.  
***Significant at .01 level.
Chapter 6. Policy Implications

The findings from the above estimates show that households that display some degree of safety investments (by acquiring fire extinguishers and blankets, first aid kits, and smoke detectors) are more likely to invest time and effort in developing an emergency plan. This is particularly relevant since it may reinforce the notion that effective plans should be developed with a primary focus on specific household factors (holding constant external environmental factors such as cities and region) in order to thoroughly engage households in developing, monitoring, and revising them.

Hence, this study implies that Australia should attempt a national strategy for citizen emergency response, standardized across the entirety of the county. Since geographic factors do not seem to legitimately impact the propensity of attaining a minimal level of preparedness, and since Australian population centers tend to face the same risk factors, the government would not risk much of a tradeoff by recommending a standardized emergency kit across the country. Moreover, there may be several benefits for this one size fits all approach, such as lowering cost through economy of scale and reducing confusion.

As Australia ponders whether to adopt a United States type of approach to emergency preparedness, these findings indicate that there would be much to gain in replicating some of the policies of the U.S. Citizen Corps program. Namely, it is evident that a minimal threshold of preparedness for households is more likely to be reached if
Australia provides clear recommendations on the necessary items that household should be able to access for emergency purposes. In the United States, this was learned the hard way: in the aftermath of the World Trade Center attacks, the government pronounced frequent and conflicting guidance to households about the necessary items needed for preparedness. This led to widespread public derision of the government’s recommendation to households to purchase duct tape. In response, the government offered more practical suggestions, similar to the variables in this paper.
Chapter 7. Suggestions for Future Researchers

This section describes an analysis that could be conducted if ABS releases household level data. Despite the fact that the ABS survey captures several variables of interest that could be used to produce estimates of preparedness in the household, these variables are not currently publicly available at the individual household level. If this data was released, using a survey database of individual household responses to survey items would allow for a larger sample size (while preserving degrees of freedom), which would likely improve the model’s resistance to statistical threats, like multicollinearity, and internal validity threats from endogenous variables that cause simultaneity bias. In addition, including household survey responses from previous ABS census years (e.g., 2002, 1998) would allow for a time-series analysis over these three time points. This design would not only compare groups over time, but also would address any possible exogenous shocks that influence perceptions of preparedness across the survey responses. In this regard, the ABS survey data could be used to specify the following model:

\[
Plan_t = \alpha_t + \beta_1 Safety_t + \beta_2 Contact_t + \beta_3 City_t + \beta_4 FamilySize_t + \beta_5 Own_t + \beta_6 (ln)Income_t + \varepsilon_t
\]

*This model includes regional dummies (fixed effects) for territory and year (not shown).

Where, at time \( t \):

\( Plan \) is a dummy for whether a household reported having an emergency plan.
Safety is an index representing each household’s score across safety precaution factors (similar to the preparedness index, above).

Contact is a dummy for whether a household contacted emergency services after experiencing an emergency.

Family is the total number of household member in a single dwelling.

Own is a dummy for whether a household owns or rents.

Income is the natural log of per capita income in a territory.

Additional control variables, such as demographics and risk perception, have been used in other studies and could be included in this model as they are available. ¹ Also, several surveys have focused almost entirely on attitudes surrounding preparedness that may be justifiable in this study as a second “value-centered” index.²

In order to gauge the contribution of any indices used in this study, it would be necessary to calculate the Cronbach’s alpha (for an unbiased estimate of index generalizability/reliability) and conduct a factor analysis (for valid determination of all index indicators loading on one primary factor).

This model can be estimated using binomial logit since future researchers would be working with a dummy dependent variable. We would expect to see that those households that rank higher on the Safety index will, on average, have developed plans more frequently than those households that rank lower, controlling for family and location factors. Again, though, this model can only be attempted if ABS were willing to release individual household level data.
References


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