Can Houses Learn?

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Abstract

Can Houses Learn is a study of housing provided for Asian Tsunami beneficiaries in Tamil Nadu in Southern India based on the "How Buildings Learn" approach of Stewart Brand(Brand, 1994). Brand reports the discussion that started this approach as "…"Porches fill in by stages, not all at once you know". The architect was responding to a talk I gave at a builders' conference. "The family puts screens on the porch one summer because of bugs. Then they see they could glass it in and make it part of the house. But it's cold, so they add a duct from the furnace and some insulation, and now they realise they're going to have to beef up the foundation and the roof. It happens that way because they can always visualise the next stage based on what's already there"…."

Brand charts the evolution of buildings over several generations of owners and in a similar vein (but over a shorter time span of between 6 to 18 months) this study reviews the changes that 109 beneficiaries from 9 different villages along the coast of Tamil Nadu in southern India made to the houses they were provided with and asks "can houses learn". It is an intriguing study as it maps the paths taken by different families from essentially the same starting point. These changes are linked to the demographics of the family, their income and occupancy period, and from that it draws it's conclusions. Such conclusions are relevant for other shelter programs and specifically for those using a "core" house approach where the house is designed with the expectation that it will be modified by beneficiaries in the future as resources and money became available. The idea of this study is that once these correlations between house modifications and family demographics, income levels and occupancy are identified, they will generate more informed house designs with an enhanced adaptive "core" quality.
Keywords: post disaster reconstruction, modifications,

Introduction

The Indian Government's (GoI) decision to standardise the house design for those affected by the 2004 Asian Tsunami was not welcomed by the humanitarian community. Strict controls meant that houses automatically defaulted to a one size fits all design, one basic type for the Tamil Nadu area of main land India and another for the Andaman Nicobar Islands (ANI). ActionAid's report on this approach by the GoI in ANI was negative and was

reflected in the forward to the report written by Miloon Kothari the Special Rapporteur on Adequate Housing for the United Nations Human Rights Council who stated that "…clearly the opportunities that the post tsunami phase offered have been squandered by the authorities". And went on to say "…even now at the two-year stage it is not too late to return to the path indicated by the diligent application of principles of human rights, including the cardinal principles of participation and respect for cultural rights of people, particularly the tribes, in the Andaman and Nicobar Islands. I would urge the government authorities, principally and all other actors concerned, to reflect on the many valuable recommendations contained in this report and grasp the possibilities that still remain to uphold the human rights of all affected people in the Andaman and Nicobar Islands" (Rawal et al, 2007).

The report listed failures that included the following:

- Exorbitant cost: 3-5 times the cost for the "equivalent" in main land India.
- An apparent rejection of the house design by potential beneficiaries.
- Cultural insensitivity: Despite the diverse backgrounds and wide range of lifestyles of communities in ANI there was only one proposal for a single type of house for all 9,714 beneficiary families. The only variation was that the same houses will be on stilts in Car Nicobar.
- Inappropriate materials; communities on the islands have been using timber structure houses which they know how to maintain, repair and extend as per their needs.
- Community participation disregarded. And moreover, communities had minimal if any information about their inclusion in the programme, the location of settlements, allocation of plots within those settlements that were confirmed, minimal involvement in the house designs, and an apparent rejection of community involvement in the construction process in favour of contractors and implementing agencies.
- The ANI communities felt that reconstruction could have provided them opportunities for local employment, particularly for the carpenters and other highly skilled builders amongst them, but that this work would be awarded to contractors based outside ANI.

The impression from that report was that "anything that could be done, was being done wrong". And in response, many INGO's did not become involved with housing in ANI. Those that did however, needed to address such issues to justify their participation in such a program.

From this need sparked the idea of treating this standardised building as a "core" house that beneficiaries themselves could later alter and change to better suit their family and personal requirements as finances and man power allowed. And consequently, the overall (research) question from that thinking was how would the beneficiaries in ANI modify their houses to better suit their needs and redress the perceived failings of the one size fits all approach?

Tsunami relief housing in Tamil Nadu was well advanced and in places beneficiaries had been living in their new houses for upwards of 18 months

while construction of the houses in ANI had not started. And given the economic, climatic and social similarities of both people's the approach adopted was to map the modifications that had been completed in Tamil Nadu housing and to then use that mapping to develop potential alteration schemes for beneficiaries in ANI.

The framework for this mapping is explained below with the overall output being to produce simple sketch plans (and not working drawings) which the beneficiary could then implement themselves. This paper concentrates on the mapping of the modifications of the houses in Tamil Nadu and a later yet to be published paper will look at the production of the sketch plans for houses in ANI from this work in Tamil Nadu. The research basis for the framework/ matrix used for the mapping is presented next.

Research Methodology.

Given this starting point of a "one size fits all" house, how does one ascertain how this design could or should be modified? Such a question could be addressed by any of the following standard approaches (Birkman, 2006):

- Ask beneficiaries what they want in a house.
- Study the demographics of families and then review the present house plans and develop alternatives.
- Study existing low cost housing of the area and then review the present house plans and develop alternatives.
- Ask locally based experts in practice and at universities
- Some combination of these.

However, the approach adopted in this study was to "talk to the buildings". An approach apparent in the role plays of Cooper, the patterns language of Alexander et al and later by Jacobson et al. and finally in the work of Brand on how buildings learn (Cooper, 1974) (Cooper, 1995) (Alexander et al, 1977) (Jacobson et al, 2002) (Brand, 1994). Such approaches had potential advantages that included the following:

- Buildings don't "lie".
- There appeared to be a gap within the tools presently available
- There was the possibility of developing a mapping tool that would be trans-cultural and potentially usable in other geographic areas.
- No need for language translators in the field
- It's novelty had appeal

For Brand "…age plus adaptivity, is what makes a building come to be loved. The building learns from its occupants, and they learn from it…." (Brand, 1994, pg23). And thus a house learns over time and through adaptation.

He suggests a "six S" level of hierarchy with changes occurring at different times for each of these 6 levels as follows (Brand, 1994, pg13):

- Site such as the geographical setting, it's urban location and legal description is eternal and does not change.
- Structure ranges from 30 to 300 years (Brand comments that few buildings make it past 60 years of age)
- Skin changes every 20 years due to technology and fashion
- Services (wiring, plumbing, kitchen appliances, heating and cooling) change every 7 to 15 years
- Space Planning which includes the interior partitioning and pedestrian flow, changes every 2 to 3 years in offices and perhaps 30 years some homes
- Stuff (furnishings) change continually.

But perhaps more importantly his work grounds two concepts applicable to buildings learning namely:

1) Buildings (houses) are modified to <u>find identity</u>
2) Buildings (houses) grow to <u>communicate</u>

Brand states that "What makes a building learn is its physical connection to the people within." (Brand, 1994, pg209) and thus the idea of the building learning is to physically identity with it's occupants. Moreover, Brand sees such change as essential in trying to find identity. And consequently over time the house increasingly becomes a home. He also maintains that "…a building is a communication device, which means that certain volatility is always carving away at the physical building". (Brand, 1994, pg164). And hence the basis for "talking to the buildings (houses)".

Following on from this Brand recognises that there are 3 areas where this communication occurs namely:

- Outward growth (that communicates a community identity) creates opportunities to explore the expansion and domination of the house within the given site.
- Inward growth (that communicates a family identity) is to form containment and enrichment of the enclosure spaces within the house.
- Upward growth (no communication)

These aspects are explored further later in the paper.

For Alexander and Jacobson the language of this learning is the patterns that exist in the building. The original 250 patterns suggested by Alexander et al in 1977 have been trimmed back to what Jacobson describes as 10 essential patterns "..that forms the essence of home". Jacobson et al suggested was that "while it seems to us that the original notion – that good houses are made of deep, traditional patterns, grounded in human experience- is still valid, practice has made us realize that the really crucial patterns are far fewer in number than we had previously thought; and that this smaller group of patterns is more powerful than we had previously imagined". They go on to state that "While there may be many dozens, even hundreds of patterns that go into the making of homes, there is only a handful that we now say are

essential…" (Jacobson et al, 2002). While their patterns could be in Brand's "stuff" or "space planning" it is clear that they are also found throughout the six S.

Cooper's seminal work first published in 1974 (and then later in 1995) is based around a role playing exercise. She describes it that "…after the person had described what they had put down, I would place the picture on a cushion or chair about four feet away and would ask them to speak to the drawing as if it were their house, starting with the words, "House -- the way I feel about you is . . ." At an appropriate moment, I would ask them to switch places with the house, to move to the other chair and speak back to themselves as if they were the house. In this way, I facilitated a dialogue between person and house, which often became quite emotional, sometimes generated laughter, and occasionally brought forth statements beginning, "Oh, my God . . . ," as some profound insight came into consciousness.". And her conclusion based on 60 in-depth interviews over 20 years was that "…the key seems to be in the personalization of space: More and more, I found in the stories I heard that it is the movable objects in the home, rather than the physical fabric itself, that are the symbols of self." And for Cooper it is this alignment (or learning) with self that makes a house a home which she appears to perceive at the "stuff" level of Brand's six S's.

The mapping tool used for this discussion with buildings is essentially based around the work of Brand and Jacobson though it would be possible to include Cooper's perspective as a 3rd dimension to the spreadsheet tool that has been developed (refer to figure 2 below). This paper studies the Brand- learning side of the mapping tool while the Jacobson -pattern aspect of it is reported in another paper (Russell, 2008). The patterns are on the left side of the matrix while the modifications are along the top. Totals for each are along the right side and the bottom respectively.

Figure1. Framework or Matrix used for the Mapping

Village Analysis Spreadsheet
Number of houses = 109

Pattern:	outside front	porch	alleyway	outside back	lounge	kitchen	toilet	bedroom	rooftop	totals
inhabiting the site	54	46	42	78	42	28	3	23	13	329
creating rooms	33	30	32	68	15	13	2	14	7	214
sheltering roof	29	17	10	51	1	2	0	1	5	116
capturing light	10	5	5	12	8	13	5	2	1	61
parts in proportion	25	19	13	29	2	5	1	3	1	98
flow through rooms	25	28	12	40	18	3	2	3	2	133
private edges, common core	26	8	21	37	27	4	1	11	4	139
refuge and outlook	28	44	24	26	21	2	0	2	9	156
places in between	38	32	32	59	5	3	2	15	4	190
composing with materials	31	15	20	43	3	3	1	3	3	122
totals:	299	244	211	443	142	76	17	77	49	

total mods. for house= 1547   Average per house= 14.2

The inclusion of the spatial areas (or social spaces as referred to by Alexander et al in pattern 205(1977)) mapped where this "learning" was occurring in the house and consisted of the following locations:

- the outside front of the house (1),
- the porch(2),
- the alleyway (3) (on both sides of the house in Tamil Nadu),
- the outside back (4),
- the lounge (5),
- kitchen (6),
- toilet (7),
- bedroom (8)
- and rooftop

These are shown in figure 2 below for a typical house provided to beneficiaries in Tamil Nadu.

In all 109 houses from 7 villages in the Tamil Nadu area of south east India were surveyed using the above matrix for each house separately and then later amalgamated into figure 2 for overall totals and also villages and subsequently analysed. So what was found?

Figure2. The Areas Mapped in the Tamil Nadu House
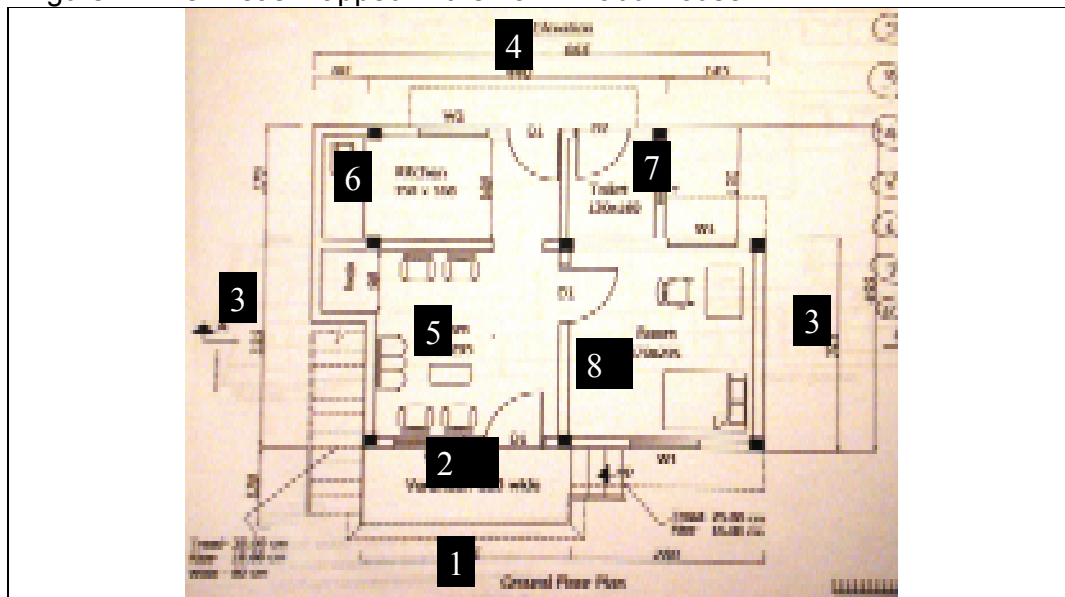
Research Results

Most modifications (or adaptations as Brand refers to) were happening in the outside back (27.4 modifications/ house) and outside front (21.9 modifications/ house) as shown in table 1 below where the average number of modifications are also broken down by village. There were variations between villages that appear to be dependent on set back of the house from the roadway and the provision of back yard space. It appeared that those houses closer then a

pathway and small garden from the road way had minimal or no modifications and it was only after this house set back (of approximately 1.5 metres) that modifications started to occur. A similar situation applied to the back yard with yard provision varying in scale from an access way to a garden. And the relative relationships to the outside "learning" in the front, back and alleyway areas is also evident in table 1 and suggests that Pillumedu village had the best balance of back front and side areas.

Table 1. Average modifications per house objective

Village	Out-side front	Porch	Alley-way	Out-side Back	Lounge	Kitchen	Toilet	Bed room	Roof Top	Total
Pudukuppam	4.3	2.7	2	4.5	2.5	0.7	0.3	0.8	0.9	*18.7*
Pillumedu	5.8	3.6	3.8	4.3	1.9	0.3	0.1	1.1	0.8	*21.7*
Keelapa-ttinachery	3.6	3.7	1.4	2.6	1.2	0.9	0.3	0.1	0.2	*14.0*
Pandgasalai	6.0	0.7	0	1.3	0.7	0	0	0	0	*8.7*
Mandapathur	0.5	1.9	1.3	7.6	1.0	0.4	0.3	0.8	0.1	*13.9*
Palayar	0.6	2.0	0.7	3.3	0.8	1.0	0.1	0.8	0.2	*9.5*
KN I & II	1.1	0.1	3.1	3.8	1.5	0.6	0.1	0.4	0.1	*10.8*
Total	*21.9*	*14.7*	*12.3*	*27.4*	*9.6*	*3.9*	*1.2*	*4*	*2.3*	

The next most popular area (and the first one for the house itself) was the porch at 14.7 modifications/house.

What table 1 does not account for is the time factor as some of the villages such as Pandgassi had been occupied by beneficiaries for less then 6 months (and in some cases for less then 3 months) while others such as Pillmedu had been occupied for 18 months (the average occupancy for the 109 houses was 10.8 months). This time factor has been plotted in figure 3A below. It suggests that beneficiaries almost immediately (within the first month) began modifying their houses that started first (as also noted by Russell (2008)) with the plot of land the house was built on. The maximum value of modifications/ house was 18 at 1 month (as indicated by the arrow), increasing to 32 at 6 months and around 40 at 9 months. The relatively isolated case of Pillumedu village can be seen out at 18 months and is clustered at a lower of modifications/ house. And while it would be reasonable to expect the curve to flatten out beyond the 9 months, the gap in the data does not allow any estimate of when that would occur. However, it appears that the learning process starts immediately, is focused on the outside of the house and steady increases for at least the first 9 months of occupancy.

Figure 3A: Modifications versus Time
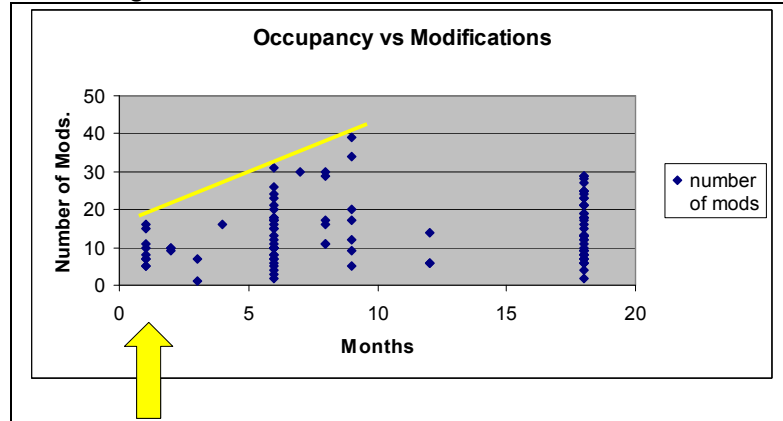
Another expected factor in this building modification/ learning process was wealth and this was evident in the data collected. The maximum number of modifications was around 20 for level1, increased to 28 for level 2 and 39 for level 3. Thus (perceived) wealth, had a significant impact.

Figure 3B: Modifications versus (Perceived) Wealth
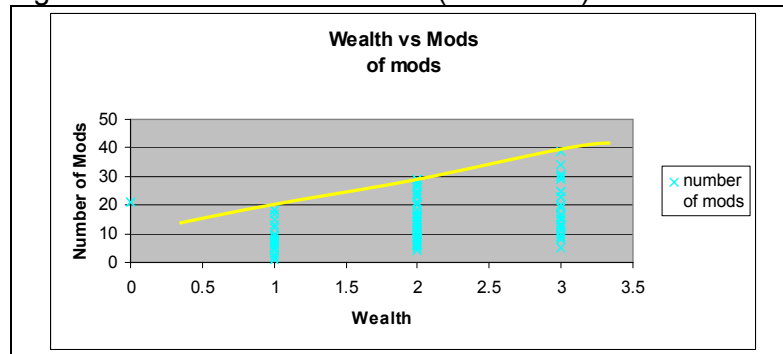
Initially it was expected that taking electrical usage from the meter boxes on each house would be a good indicator of wealth. Such usage reflected not only the ownership of consumer goods but also an ability to pay such costs. However, while this worked in some areas, in others beneficiaries had been granted free electricity and in others beneficiaries (tired of apparently waiting) had informally connected their houses to the electrical supply usually by-passing the meter boxes. And instead an attribute table (refer to table 3 below) that classified 3 levels of wealth was used. In the field it was usually a matter of deciding whether people were in level 1 or then 3: and if not they were counted as level 2.

Table 2: Markers of Relative Wealth in Villages

Wealth level 1.	Wealth level 2.	Wealth level 3.
No furniture Children not going to school Cooking outside with no shelter No/not many kitchen implements Posters the only decoration in the house	Bicycle Fishing nets Animals (usually chickens) Shelves/cupboard Elaborate pooja (alter) Curtains Shelter over kitchen outside	Shop Motorbike Fridge Gas cooker Bed Water tank Extensions in mud brick Paved/concreted areas Sewing machine

Finally family size was studied, and this indicated an increase up to a maximum of 40 modifications for a family size of 5 but then appear to tail off as family size increased beyond 5 members. Similarly, the maximum number of modifications also increased as the number of children in the family increased up to 2 children (at 33 modifications) and then tailed off to around 31 modifications for any further children.

Figure 3C: Modifications versus Family Size and Number of Children
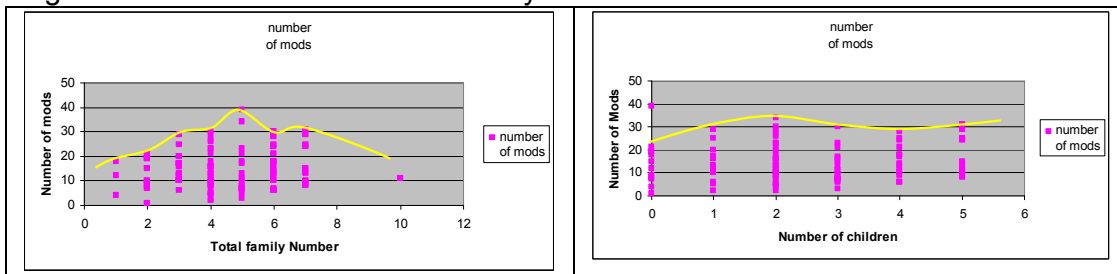
Thus overall, increasing occupancy and wealth resulted in increased modifications. But family size and the number of children had an impact only up 5 and 2 respectively before its impact tailed off.

Hence in summary so far, it appears that modifications will start within the first month of occupancy and will steady increase with time. This is encouraged by greater wealth and by an increasing family size up 5 members and an increasing number of children up to 2. Beyond that, the impact of family demographics tails off.

But what of the other dimensions that Brand considers? When the data is analysed along these lines it would appear that the 109 houses surveyed grew outwards in 79% of modifications, inwards for 19% and upward for only 2%. These percentages are tabulated below in table 3 and are also broken down by village and house occupancy (in months).

Outward growth and communication that was observed included the following:

- Fence around building boundaries: especially outside front.
- Additional open or enclosed kitchen at the outside back
- Additional verandah at outside front area

- Plantings in outside front & back
- Additional enclosed space attached to the front (e.g. as shop front)
- Additional concrete paving around building perimeters.

While inward growth and communication included the following:
- Blessing patterns painted on entrance and on lounge floor.
- Repaint colour of walls/doors different from the rest of the community.
- Build joinery units for storage / or altar for Pooja in the lounge, bedroom and kitchen.
- Enclose porch area for shop front.
- Add thatch sheltering to roof top area for extra storage for fish nets and extra room for day time rest.

Upward growth (no communication) consisted of timber/bamboo structures usually with a thatch roof. And the low percentages suggest that beneficiaries feel more comfortable (or perhaps there is less family need) to go upwards.

These average percentages were essentially found across all villages regardless of how long they were occupied. Outwards varied from 70-92%, inwards from 8-28% and upwards from 0-5%. Certainly, there was the expectation that beneficiaries would have made more use of the roof top for say natural ventilation for thermal comfort, sleeping and socialising then what was measured. Thus suggesting that climate was not greatly influencing this process.

Table 3. Average modification percentages broken down by village and occupancy

Village	Out-side Front %	Porch %	Alley-way %	Out-side Back %	OUTWARDS %	Lounge %	Kitchen %	Toilet %	Bedroom %	INWARDS %	Roof Top % UPWARDS	Months of Occupancy
Palayar	6	21	7	36	70	9	10	1	8	28	2	1-6
Keelapat-tinachery	25	26	10	19	80	9	7	2	1	19	1	6
Pudukuppam	23	14	11	25	73	13	4	1	4	22	5	3-9
Pandgasalai	69	8	0	15	92	8	0	0	0	8	0	12
Mandapathur	4	14	9	55	82	7	3	2	5	17	1	18
KN I & II	10	1	29	35	75	14	5	1	4	24	1	18
Pillumedu	27	17	17	20	81	9	1	0	5	15	4	18
Average	23	14	12	29		10	4	1	5		2	10.8
Overall %	79 Outward					19 Inward					2 upward	

According to Brand, to change is to find identity and it was interesting to note the similarities of modifications associated with different livelihoods. These were not strictly mapped during the data collection but table 4 below was constructed from the data and extensive photographical record taken during the survey. And it the patterns of the modifications relative to the livelihood of the occupant qualitatively supports Brand's position.

Table 4. Comparisons of modifications made among different careers undertaken by the main household of the beneficiary family. (General sense)

	Fishman	Village leader	Shop keeper	Taylor	Labourer
Outside front	Paved area for dry fish. Storage	More details than others / Planting	Additional solid structure to provide shop space.	-	Parking of bike
Porch	Storage, secondary work area	More Decoration	Enclose porch space for good display.	Direct link to work area	Storage
Alleyway	-	Store room	Additional thatch shed for shop space, separated from the house if alleyway area big enough.	-	-
Outside back	Cooking shed/ fish guttering, fixing nets and main work area	Cooking shed / store room / Planting	Additional solid structure to provide shop space.	-	Cooking shed / store room
Lounge	-		-	Extra shelving units / simple division of sewing and cloth cutting area.	-
Kitchen	-	-	-	-	-
Toilet	Store room.	-	-	-	-
Bedroom	-		-	Extra shelving units / separation of bed and sewing area.	-
Roof top	Thatch roof added for day time rest & store. fishing net & gears	-	-	Thatch roof for extra rest/ entertaining room.	-

Conclusions

Can houses learn? And when does a house learn enough to become a home?

Modifications to a house are the critical visual cues that aid agencies need to look for in any housing (or shelter) program. These suggest beneficiary with a better emotional state then those that are not modifying their houses. In particular, modifications outwards are critical and moreover should be

encouraged by the provision of landscaping materials for fences, gardens and screens for example. Perhaps as part of the housing package.

To this end a core house (a compact house design with the ability to add on by the beneficiary) has distinct advantages over any "closed" housing option. And so rather then being critical of a one size fits all option the critical issue is whether that option can be adapted.

It is difficult to say when a house becomes a home. Is it at 10 modifications or 20 or 100? Certainly all beneficiaries when the move into a house will be at Brand's "stuff" level as listed earlier. And the sense of the team was that home occurred somewhere higher in the in the "space planning" level (with the outward changes) and in the next "services" level. An it is these adaptations that need to be monitored as a housing program progresses rather then solely concrete strengths and cost codes. Necessary as they are, they lack sufficiency of a beneficiary face that gently carries the message of this is "This is our house. The house is us."

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