

'architecture' is rather about the possibility of making choices between different combinations of spaces, artefacts, behaviours, ideas and identities, and the relatedness of such permutations to surrounding landscapes and different constructs of place. (Bill Hillier, 2002)

Local Resources New Materials



Illustration >

Shell Brick Quarry in Denham, Westralia

AUDRC Laboratory¹⁴⁰⁷

Potentials of
local resources as
building materials from
the perspective of the
traditional past, the industri-
al present and a sustainable fu-
ture of housing and urban development

Context

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New housing and settlements, from design through to construction and maintenance for remote areas in the growing Western Australian landscape are destined to an import mentally due to the lack of local/regional secondary manufacturing industries. Prefabricated houses are transported over thousands of kilometres through arid landscapes, serving the aspiring housing demand with the same model for five different climate zones.

The social bonding to such shelter products bears big question marks. Another effect is of environmental nature, not only through massive carbon-foot/tire prints and the resulting greenhouse gas emissions thereof, but

also through the dis-integration of such building typologies to their surrounding bio-climatic conditions and the ability to respond accordingly. Examples of traditional pre-hydrocarbon powered eras in similar climate zones elsewhere show the direct connectivity and adaptability to the place through the use of local resources. Climatic conditions and the available materiality used to determine structure, form and shape of the built environment (cities, towns, buildings).

The growing demand of housing/settlement projects in Western Australia under the global threat of climate change and desertification is subject to a vision of environmental approaches of

integrity for long-term viable solutions.

Thus responsive settlements require not only a low-impact, low-energy, low-water strategy, but also responsiveness towards a socio-economic sustainability. The establishment of local/regional manufacturing industries based on local resources in a small and medium scale could offer means to off-import-grid and hence self-organised growth to especially remote areas.

With this motivation this proposal seeks funding to investigate available local resources from the perspective of the traditional past (biotic and abiotic materials), the present (natural and industrial resources) and also transferred into potentials for future applications (processed materials) in the perimeter of future housing/cities development.

AIMS

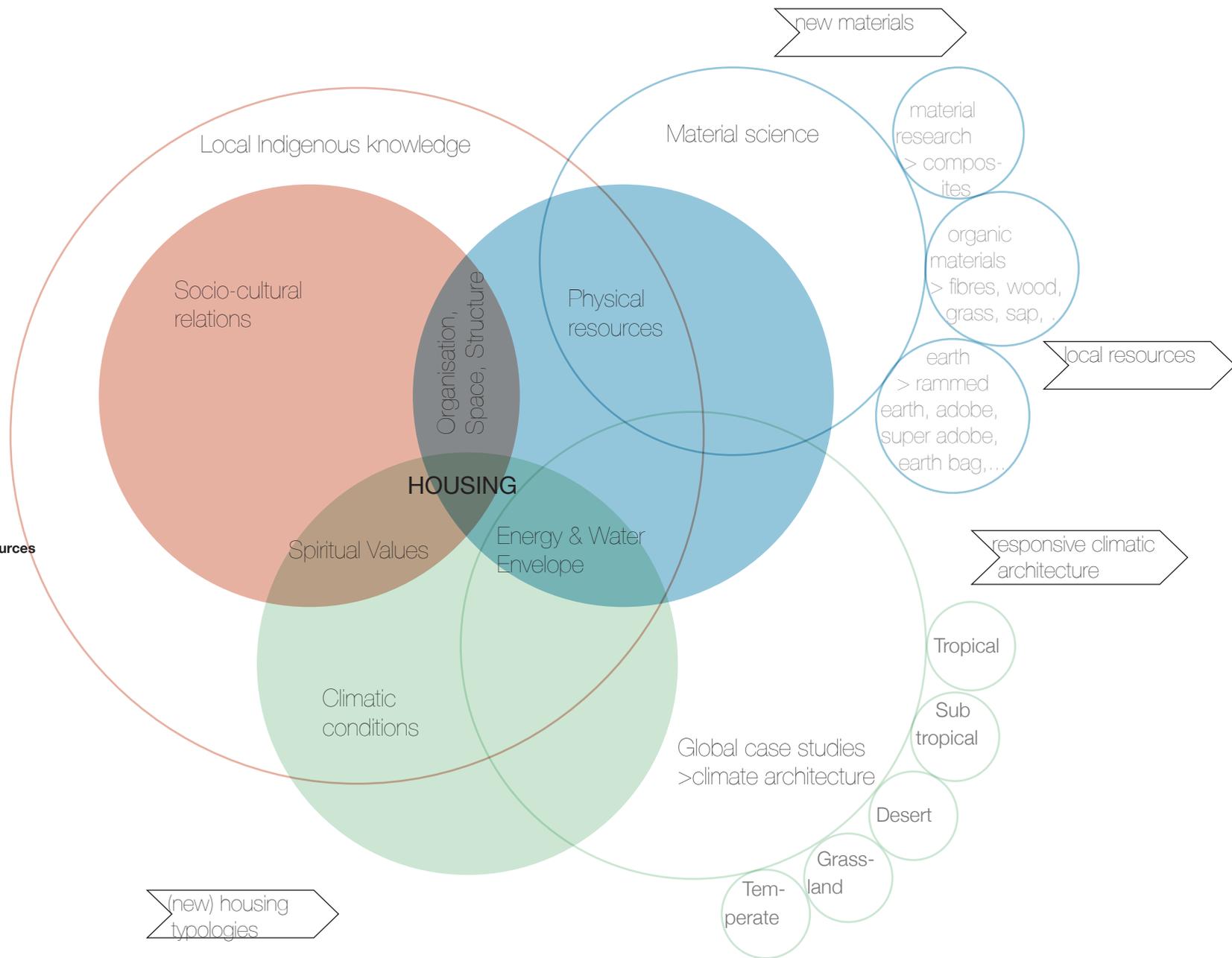
- > Investigate and collect local resource materials. (Sampling)
- > Discuss future application potentials in the housing and future urban application context. (Concepts)
- > 'New' material development research areas (State of the art) for climatic responsive design.
- > Establish a local resource database for Western Australia that can grow. (Longer term research platform)
- > Result in further research questions on climatic responsive design strategies via materials for prevalent climate zones (Tropical, Subtropical, Desert, Grassland, Temperate) in WA. (Further research questions)

STRATEGY

Scientific research of the broad context of prevalent resources in different climate zones are investigated to build a platform of knowledge for future housing/urban development and other affordable housing projects. A resulting databank of facts and potentials can be used as starting point to conceptualise design, further research and applications alike.

OUTLOOK

- > Promoting ALVA's research capacities
- > Application for additional funding sources (e.g. ARC linkage)
- > Inter-faculty collaboration at UWA
- > Collaboration with external universities (e.g. Singapore-ETH Centre for Global Environmental Sustainability (SEC))
- > Establishing links to industries
- > Offering a platform for discourse



Research Method and Collaboration

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RESEARCH METHOD

Field work surveys, qualitative research, case studies and comparative studies lead into a catalogue of local resources in Western Australia and their potentials for future housing/cities.

RESEARCH TOPICS

As an integrative and future oriented approach, investigations are conducted in a cooperative manner with the indigenous community and their knowledge as well as in conjunction with comparative research topics:

1. Overview of local resources: Natural and industrial by-products
2. Investigation of materials in their traditional use
3. Material benefits for bio-climatic responsive building construction
4. Future development potentials of local resources for housing/future cities

RESULTING investigations of local resources, their traditional use and future application potentials compile a compendium of materials for environmentally responsive housing projects and or future cities.

COLLABORATION

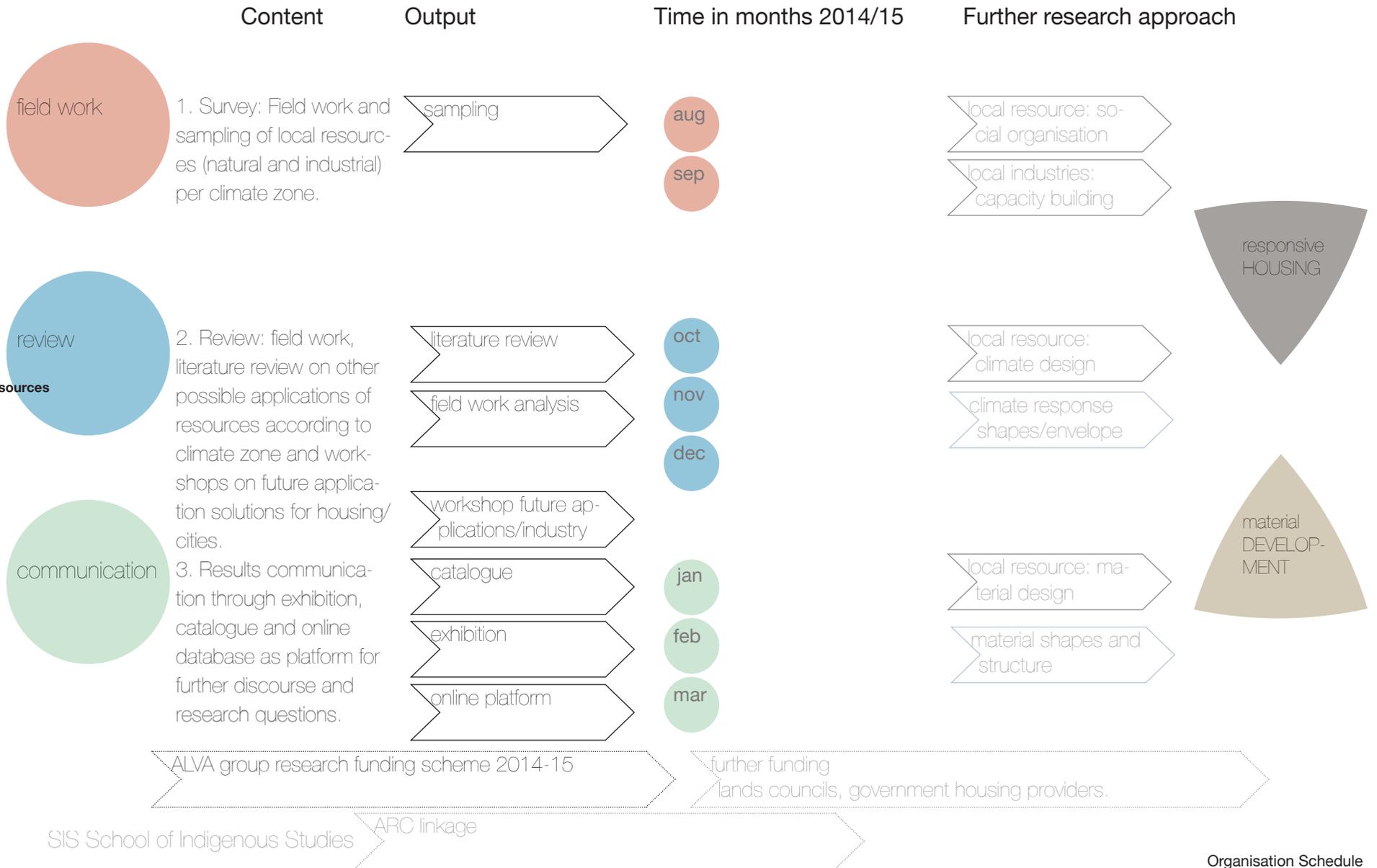
On the periphery of physical resources and climatic conditions and the question for housing revolves the sociocultural context could link to another ALVA research project: e.g. "An Expanded Field of Spatial Design Knowledge".

Here a symbiotic mutual support between the two research projects could be possible.

The Alva group research grant will be used to apply for further funding in order to extend the material database into climate responsive construction methods and to pursue further material research and development.

RESEARCH TEAM

- Winthrop Professor Dr. Joerg Baumeister, Director AUDRC
(Expert natural resources as building applications, Africa)
- Professor Patrick Beale, ALVA, UWA;
(Expert in timber and lightweight construction)
- Assitant Professor Dr. Anthony Duckworth-Smith, AUDRC;
- Assitant Professor Dr. Julian Bolleter, AUDRC;
- Assitant Professor Daniela Ottman, Research Associate, AUDRC. (Principal Investigator) (Expert in traditional building knowledge research, Middle East)



Research Process

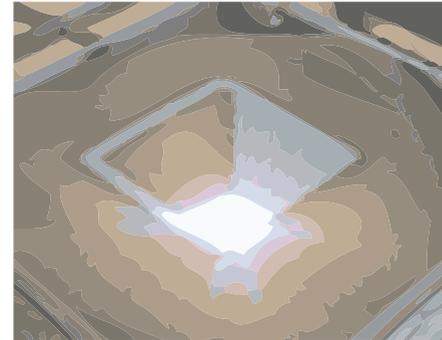
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With the running over one year the research project is structured in three phases (see //// Schedule for further detailing):

1. Survey: Field work and sampling of local resources (natural and industrial) per climate zone.
2. Review: field work analysis, literature review on other possible applications of resources according to climate zone and workshops on future application solutions for housing/cities.
3. Communication: review results

through an exhibition, catalogue and online database as platform for further discourse and research questions.

Research proposal compiled by
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Sand as resource: Solar sintered sand



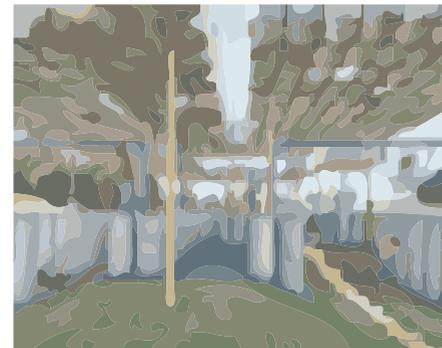
Sand as resource: Superadobe shelters,



Sand as resource: Bio-sand bricks



Timber frame and loam plaster



Re-use industrial byproduct: Lion's Park
Playscape, Rural Studio, Greensboro
Alabama, 2011



Algae-Sand compound