

**Urban Lab #2: Smart Campus, Karunya University,
Coimbatore**
6th – 8th of December, 2017



**Integrated Development and
Co-Production for Indian Cities**

Imprint



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Marcus Jeutner, 2017

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| **Preface**
Introduction by Marcus Jeutner

Photo: M. Jeutner, 2017

Welcome to the UrbanLab #2 !

Dear colleagues and friends of the Indo-German Smart Initiative, we were very glad to hold to our second UrbanLab in India.

But this would have not been possible without the support of our partners at Karunya Institute of Technology. We are very grateful for this partnership and would like to express our thanks, especially to Dr. Esther Jegathamba, who has put a lot of energy and effort in organizing the conference and workshop.

For me and the Indo-German Smart Initiative, this UrbanLab sets a final act of a very exciting year. In February, the Federal Ministry of Education and Research announced IGSI to be one of ten German research networks under its Campaign "Shaping the Future – Building the City of Tomorrow". This campaign gave us the opportunity to reach out to India, to find institutions, stakeholders or even individuals, which are passionate about the development of urban environments, keen to tackle global urban challenges and curious to learn from each other. After one year we are happy to announce that we were not just able to build up new connections and partnerships, but in

some cases also friendships that will lay the foundation for future collaborations.

Building the City of tomorrow. Nothing more but also nothing less the Federal Ministry asked us to work on. How do our cities appear today? How should they look like in the future? What are our visions and hopes? And what are obstacles and challenges to implement them? These are complex questions we are yet not able to answer, but they certainly require international cooperation. We truly believe, that an intense dialogue and discourse on the manifold aspects that determine the appearance and functionality of our built environments can lead into tangible visions that are able to develop our cities into livable living environments. The registration of 185 participants for this conference showed that we again found people believing in this collective idea.

During the three days, representatives from academia, NGOs, industries, and students debated on several aspects and challenges of cities. They shared their experiences, perspectives, and knowledge not only in the conference. On Thursday

and Friday, they also sat down in a hands-on workshop to define specific challenges, and to create tangible solutions.

Eventually, I would like to encourage you: Get in touch with us and let's think together, how to put proposals for future cities into practice.

- Marcus Jeutner



Photo: M. Jeutner, 2017

Profile and Approach IGSI

Founded by four Berlin-based architecture companies in 2014, the Indo-German Smart Initiative (IGSI) today is a broad network of German research institutions and planning offices that aims to contribute as an interdisciplinary think tank to the Indian urban development processes. IGSI recognises integrated planning as fundamental principle toward smart cities: Planning, which relates infrastructure and spatial planning with socio-economic development and unlocks new potentials by a goal-oriented use of technological solutions.

With its integrated approach, IGSI can develop holistic solutions, that are focusing on specific challenges of an urban setting and is looking for an exchange of ideas with academia, planners, politicians, stakeholders and project developers for Indian smart cities. It offers expertise in applied fundamental research, integrated approaches and profound knowledge of all relevant sectoral fields of a smart city.

The Network

- gmp International GmbH
- DGI Bauwerk Gesellschaft von Architekten mbH
- se·g architects
- Patzschke & Partner Architects insar consult, schwartze, wessling and partner
- P2m Berlin GmbH
- Harbauer India Private Ltd.
- Ingenieurbüro Hausladen GmbH
- Innovation Centre for Mobility and Societal Change (InnoZ) GmbH
- Thomas Waschke Strategy Consulting and new Mobility Systems
- IAV GmbH Berlin
- BuroHappold Engineering
- von kories consultants
- Remondis Aqua India Pvt.Ltd.
- ARGUS GmbH
- Klaus Hoppe Consulting

Human-centred Approach

Contemporary challenges of urban transformation processes – e.g. rapid urban growth, shortages in housing and infrastructure provision, demographical and social changes, digitalisation, climate change mitigation – require an intense collaboration of relevant stakeholders from governance, science, economy and citizens; from the first phase of

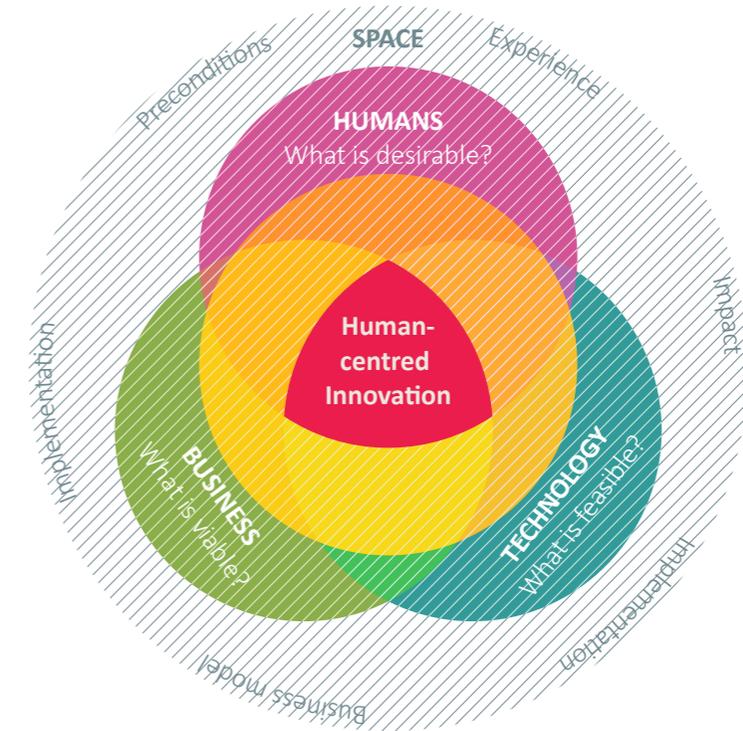
needs assessment to the phases of implementation and operation.

Concept basis and starting point of the activities of IGSI is the principle of “human centred innovation”, which merges human needs, technical feasibility and economic viability to innovative solutions. Both, initial position and spatial and functional consequences of planning decisions, are consistently analysed and visualised. By this, results can be used as basis and for a transparent process of decision making.

By doing so, IGSI strongly focusses on the concept of “Urban Design Thinking”, a method and planning tool developed at Technical University Berlin, which sets citizens as user and main designer of urban spaces in the centre of development processes. Dialogical events, called “UrbanLabs”, are crucial part of the collaborative process. Herein users, stakeholders and planners are jointly working together on specific problems and their solution.

Excellence supported by German Government

In 2017, the German Federal Ministry of Education and Research (BMBF) announced IGSI as one of ten research networks of excellence within its campaign „Shaping the Future – Building the City of Tomorrow“. The approach of the campaign is to promote research networks from Germany to present their ideas and innovations for urban development abroad. Within this framework IGSI set up a series of UrbanLabs and network activities in India.



Human-centred innovation concept, M.Jeutner/E.Pahl-Weber: 2016

UrbanLab #2 – Coimbatore

From 6th to 8th December 2017, the sequel of the UrbanLab series took place at the Karunya Institute of Technology in Coimbatore. IGSI invited Indian urban planners, researchers, initiatives, academia and business representatives to a three-day UrbanLab. With about 180 registered attendees, we were questioning, how an Indian university campus of the future could look if we were not focusing on the infrastructure, but on the people frequenting the daily college life. The UrbanLab has been supported by experts of our network partners and the supportive staff of Karunya Institute of Technology,

Conference “Integrated Development and Co-Production for Indian Cities“

The first day of the UrbanLab built a platform to exchange knowledge and ideas on urban development and smart city approaches. 17 speakers from India and Germany gave insights into their recent research and development projects and discussed different positions on several issues.

Besides portfolio presentations, there have been talks on specific fields e.g. collaboration, govern-

ance, legal frameworks, solid waste, water management and mobility.

Key Speaker

Marcus Jeutner: IGSI: Integrated Urban Development and Co-Production for Indian Cities

Prof.T.M.Vinod Kumar: Smart Living for Smart Cities

Dr. Yifat Reuveni: Community development finance institutions (CDFIs)

Ankit Bhardwaj: Integrated approaches in India’s Smart Cities: Rajkot, Davanagere & Coimbatore

Klaus Hoppe: Municipalities as actors of urban development – approaches towards cooperation

Nidhi Dixit Laturkar: Environmental Planning for Indian cities: BNCA approach

Ulrike Walter & Vipul Toprani: Mobility and Energy for smart urban environments

Prof. E. J. James: Smart Campus for Sustainability

Margret Böthig: Architecture and Urban Design

Akash Ravikumar: Internet of Things

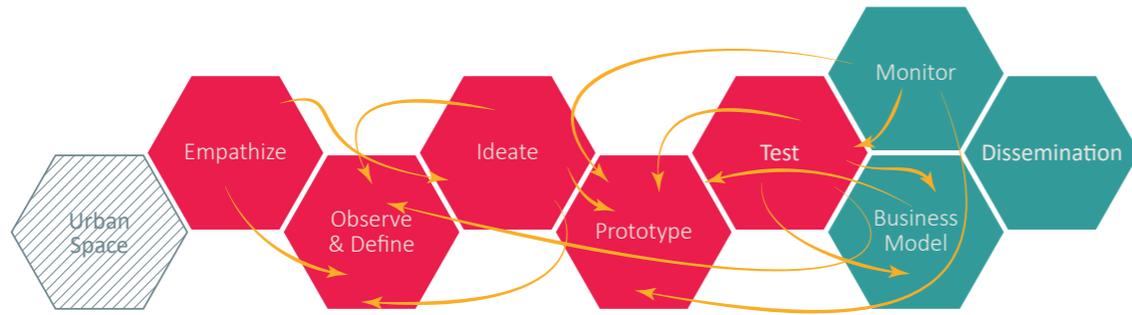
Robert Patzschke: Traditional Urban Design. An inspiration to modern Smart Development?

Dr. Jag Mohan: Green Educational Campus

Tanvir Ahmed: Challenges of providing safe drinking water and its solutions



Photos: Karunya University 2017



Urban Design Thinking Process (Graphic: Jeutner/Pahl-Weber; based on the Design Thinking Concept of the Institute of Design, Stanford)

Workshop

During the second and third day, the team of TU Berlin applied its unique planning methods to facilitate a process, in which the participants investigated specific issues and created solutions, which put citizens first.

As a starting point, IGSI has chosen a planning task, which addresses a specific sort of Smart City Development: the transformation of a university campus. The main campus of our cooperation partner Karunya Institute of Technology is located an one-hour-drive southwest of Coimbatore. With its student hostels, offices, seminar rooms, auditoriums and facilities, it functions as a small city. It is a place where people live, work, spend their leisure time and interact socially. The participants were developing ideas, tangible solutions, and visualisations in the form of small models and other prototypes,

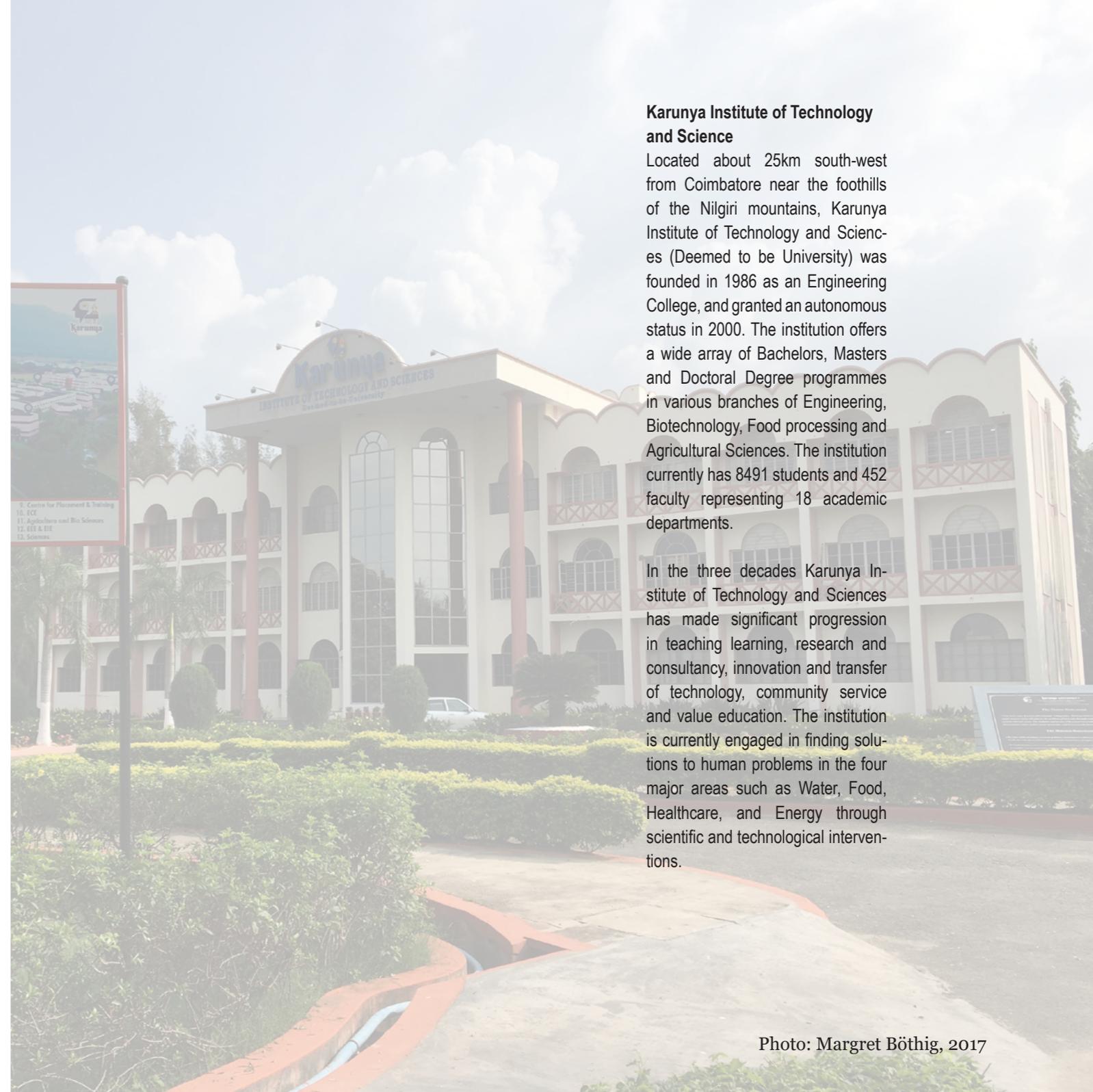
to bring the idea of a smart campus into practice. The participants were supported by eight German planning experts and scientists out of the IGSI network.

The participants worked in five thematic groups:

- #1 Functions (supported by Margret Boethig, gmp)
- #2 Buildings (supported by Robert Patzschke, Patzschke und Partner)
- #3 Waste (supported by Klaus Hoppe, Hoppe Consulting)
- #4 Mobility (supported by Ulrike Walter, innoZ)
- #5 Energy (supported by Vipul Toprani, innoZ)
- #6 Water (supported by Ahmed Tanvir, Happold)

The kick-off for the working-phase was given by a guided tour around the campus, where our colleagues

of Karunya held a presentation about the history, status quo and possible futures of their campus. The following group work dealt with several questions that are concealed by the major challenge: What is the right starting point for planning? What do we consider? What does it mean for people who live or work on the campus, when it becomes smarter? What is going to change for students, researchers, lecturers, administrative staff or guests? The answers have been given in each of the groups: human-centred, adaptive and contextualised solutions.



Karunya Institute of Technology and Science

Located about 25km south-west from Coimbatore near the foothills of the Nilgiri mountains, Karunya Institute of Technology and Sciences (Deemed to be University) was founded in 1986 as an Engineering College, and granted an autonomous status in 2000. The institution offers a wide array of Bachelors, Masters and Doctoral Degree programmes in various branches of Engineering, Biotechnology, Food processing and Agricultural Sciences. The institution currently has 8491 students and 452 faculty representing 18 academic departments.

In the three decades Karunya Institute of Technology and Sciences has made significant progression in teaching learning, research and consultancy, innovation and transfer of technology, community service and value education. The institution is currently engaged in finding solutions to human problems in the four major areas such as Water, Food, Healthcare, and Energy through scientific and technological interventions.

Photo: Margret Böthig, 2017



Group #1: Functions
Margret Boethig

UNDERSTAND

The team was a good mix of different disciplines of campus students and outsiders: IT, Computer Science, Oil & Gas, Architect, Civil Engineer, Mechanical Eng., Environment & Research, renewable energy. The team decided to ask different "actors" in the field of functionality and common spaces, from students to shop vendors all related to the Karunya campus. The topics that had been agreed on were:

- functions within the Campus - Circulation & daily ways between hostels and faculties/ workshops/ library/ cafeteria etc.
- availability of work stations/ studying areas on campus apart from private hostel room
- opportunities on campus for social meeting & informal interaction & recreation spaces
- conditions for day scholars (non-residential) and residential students
- conditions/ differences for male and female residential students
- activity groups

Afterwards, they split up into 4 different groups, 2 persons each and started the interviews.

EMPATHIZE & DEFINE

The groups met and talked to a variety of different people on the Campus. As 6 out of 9 group members were students, they mostly interviewed students to find out about their everyday routines between all functions of the campus and their accommodation and gained an insight of the problems mainly of the girls.

Key-persons: a vendor of coffee shop in outdoor cafeteria; two students of Aerospace Research Department-Angelina & Rohan; singers group (males & females) in auditorium; group of musicians in studio; none-residential student (day scholar); Biotech female student;

All interviewed persons were very eager and supportive in answering the questions. Back in the workshop venue, each group presented their observations, experiences and findings. Group by group the results were summarized on post-it notes and presented to the overall group.

The key findings were:

- no studying space/ co-working area in common spaces
- day scholar students disadvantaged in particular between lectures (no common space to study/ eat lunch).
- lack of common social meeting points & informal interaction & recreation spaces for all
- long ways between faculty/ library and accommodation
- lack of privacy (tiny shared hostel rooms)
- many restrictions mainly for girls: green card/ long confirmation process to leave the campus for the weekend or even the evening after 6:30 p.m.

- sport facilities are good, but less time to use it due to many formal activities, but no space for informal activities. Interaction and communication between male and female students are undesired by management.
- canteen is a mess; mosquitos; poor hygiene; complains about food: low quality, not very healthy (too greasy/oily)
- lack of photocopy station, only one on campus (crowded/ time consuming), but hard copies requested by faculty.
- limited lockers on campus. Scholars disadvantaged in particular.
- 19 clubs: Aqua Club, Eco Club, Rotary Club, Kala Club, NSS Club, etc.: make them more public!

In a next step, the many findings of the morning were analysed thematically, obtaining a better overview and thematic clusters. These clusters helped to concretise the topics for further processing in the following steps of the workshop.

The general topics were defined as:

- Common & interaction spaces
- Informal lunch places for scholars
- Time management: economical use of spare time & circulation efficiency
- Recreation & Playground Facilities/ Play-Gym
- Hygiene & Food
- Efficiency
- Knowledge Hub
- Information Flow/ Automated Information

The most striking observations were:

- unfair restrictions for girls on the excuse of their safety and security; no equal rights for female students.
- no common spaces for interaction for residential students & scholars.

In the next step of the process the following questions were elaborated jointly.

I wonder if that means that...

- there is generally not enough common spaces or recreation of Karunya campus?
- there is generally no equality for female and male students on the campus?
- the daily ways to walk on the campus are too long?
- there is no space to have lunch on the campus for day scholars?

PERSONAS

1. Leema: female student of computer science, 20years. She lives on Karunya campus in girls hostel.
2. Ajay: Student of Mechanical Engineering, 22 years old, day scholar student
3. Ashok, Student of Electrical Engineering, 22 years old, residential student

Leema - complains that her activities are restricted to girl's hostel after 6:30. She can't leave the campus on her own without green card. There are no equal spaces to meet other students (female & male).

Ajay - complains that there is no space to eat lunch as a day scholar. He has to wait for the bus transport on fixed timing.

Ashok – waste his time by walking back and forth to the hostel as there is no working space elsewhere.

IDEATE

Based on the previous steps and findings and condensed information the next task was to develop concrete solutions for the personas defined above. The main focus of this task was to change the current situation in way that improves the conditions of the respective persona of Karunya University subsequently. Not all topics of the first round of the brainstorm were deliberately pursued to maintain the focus.

In a second step it was decided to “Display of information” and “Incentives” as the prototyping part of the workshop required a concentration on one or two topics. Here are the results of the additional solution-finding process:

- display of information on the board/ map of Campus: explaining the functional connectivity & potential common spaces on the campus.

Incentives: **‘Make in Campus’ Campaign as interactive program**

1. Functional Spaces:

Student activity center – Identify active zones & vacant spaces on campus with public quality for meeting points (next to junctions/ common paths etc.)

2.Functional Modelling:

2.1.Knowledge Hub

Potential stakeholder: invite Industries to create Knowledge Hub & Industrial training center on campus. Information flow to uncover junior talents/ Referrals for internship/ jobs. Job on campus (student help students).

2.1. ‘TIFOO’ app (food order & delivery)

PROTOTYPE

Make in Campus Campaign –

Create the **Interactive Student Centre** as a social meeting point with co-working space and lunch place.

Create a **Knowledge Hub** – as virtual interdisciplinary platform for students. The prototype was displayed in two parts:

Part 1: The result was explained on the map of campus.

Part 2: The 3 Personas and other group members demonstrated a usual day on the campus in a play involving emerged problems as well as solutions: The desired Interactive Student Centre & Knowledge Hub including the TIFOO app.





Group #2: Buildings
Robert Patzschke

UNDERSTAND

To get to know the Karunya University Campus and its adjacent public surrounding e.g. the main road, the participants were to observe the site. In preparation to that we brainstormed based on a satellite image which could be the places of interest, we defined four focus areas, namely cafeteria & assembly hall, boys hostel, mess, kitchen and road side, various department buildings and their surroundings. The team split in groups of two to explore the site. The following stakeholders and users were interviewed:

- Female and male students of various subjects, standards and ages. The participants observed that they come from all kinds of places in India with different cultural backgrounds. Even though other religions are represented, e.g. Hindus, Moslems, Sikhs, etc., most of them are Christians.
- Academic staff from various departments
- Non-academic staff, e.g.: purchase/ storage department officer, security guard, etc.
- External entrepreneurs, suppliers, workers, e.g.: on-campus restaurant operator, hostel mess operator, kitchen workers (chefs, cleaners, suppliers, etc), construction workers
- Off-campus: Restaurant owner.

Whereas the overall impression and feedback from stakeholders and users was positive, the following observations were made:

Students criticized the following points.

- The hostel rooms are very small and cramped. There is little room for storage. 4 Students share one small room. In general, there are few entertainment options. The only entertainment is “the smart phone”. Both boys and girls felt there is too little possibility to meet with friends in a relaxed environment on campus. It is felt that social interaction between girls and boys is seen very critical. Especially some teaching staff is actively dispersing mixed-gender groups. Girls did mention that there is a large range of shopping and eating offers in the girls’ hostel. However, they feel very restricted as they are not able to leave the campus on their own at all. Both girls and boys feel there should be a wider range of cultural activity where students from different parts of India could perform, show or celebrate their culture. Non-Christians feel that they are not able to live their religious habits

Most stakeholders commented on bad ventilation in various parts/ buildings of the campus:

- Whereas class rooms on lower floors are stuffy, top-floor rooms are too hot. Mess and kitchens are extremely warm and stuffy. An exception is the first-year boys hostel which is well-ventilated. Due to its floorplan layout every room has a cross ventilation. All other hostel rooms (boys and girls) are considered as badly ventilated. This intensifies wherever there are buildings with double loading corridors.
- In terms of campus landscape, it was observed and criticized that there were no benches to sit down and talk to other people. Especially near the coffee shops this is seen as very necessary. There are no properly shaded walkways so that all users must walk through the sun in many places.

EMPATHIZE & DEFINE

In the following session we defined two main areas of challenges.

One is a technical/ structural issue of the buildings. The climatic conditions within the buildings are not suitable to create a comfortable living and working atmosphere. The main problem here is a lack of proper ventilation. The second challenge is a social issue. There is a lack of opportunities paired with restrictions that prevent various student groups to connect. Students are the main group of representatives for life on the campus. They are confronted with both areas of challenge. Two “Personas” were created to represent this user group with different aspects to crystallise the specific challenges and hints to find solutions.

Personas:

- **Persona A:** Anugra is a female student in the 3rd year CSE, she is from Sikkim in North-East India and Hindu. Anugra feels lonely. As a Hindu and person from a far away place from Coimbatore she feels disconnected from her own culture. Back home she can mingle with boys and explore the neighbourhood. Here at campus she feels a deficiency of choice and space and need for social interaction. Girls are not able to leave the campus on their own: “I wonder how the world is outside.”
- **Persona B:** Subir is a male student from Bihar. His thoughts are: “I can’t sit in the class room, it is too stuffy!”, “But I can’t stay in my hostel room either, no ventilation!”, “I have a headache!”, “I wish I could move back to the first year hostel, there we had some fresh air!”, “Food isn’t my choice either!”, “I can’t concentrate!”.

The team used the collected information to generate ideas.

It would be helpful if...

- there was a place where students can meet and practise cultural entertainment and activities.
- there were opportunities for girls to leave the campus and explore.
- one could sit in a ventilated room.

I wonder if that means that...

- a deficiency of shared gathering spaces leads to less social interaction/ social skills?
- an absence social/ cultural events leads to loneliness/ frustration/ monotony?
- inadequate ventilation in the class rooms leads to a lack of concentration/ attention/ performance/ effectivity?
- inadequate ventilation leads to discomfort?
- a lack of natural ventilation leads to unhygienic environment?

IDEATE

In the next step, we attempted to find possible solutions to solve the respective challenges. For this purpose, two brainstorming sessions were held. In the first session a wide range of ideas was collected. In the second session those ideas were selected, clustered and specified. This resulted in the following main points:

- Climate: Fans, window shutters, chimney ventilation, larger windows, thermal insulation, adjust roof shapes to allow natural air flow, app showing current temperature specific locations (sensor humidity & breeze), air jets in corridors, "gym-fan", mosquito mesh for hostel windows to allow open windows, larger rooms, air condition, water fountains/ water bodies, tensile roofs for shading, pergolas, channelize natural breeze, shaded outdoor classrooms, increase trees and greenery
- Social Interaction, Food & Entertainment: Central gathering place on campus including social spaces to enjoy time in groups open air amphi-theatre, cultural events, group cooking, food court, food rating app for various food stalls/ hostel messes/ snack bars, hobby groups

PROTOTYPE

In the final round the group decided to elaborate on the idea of a central gathering space. This space was supposed to be a meeting point for all students to interact and enjoy cultural activities as well as food varieties. The activities and programme of this space were to be organized by the students themselves. It was supposed to have a pleasant climate a) in terms of temperature and air circulation, b) in terms of social and cultural atmosphere, c) in terms of design and appearance and d) in terms of variety of activity.

Our prototype "Cool Junction" consisted of a large open but shaded space with an amphi-theatre on one side and a covered lounge with a natural "chimney" ventilation system on the other. It was located on the lawns near the entrance area with direct access from the girls and the boys hostels as well as the main central alley of the educational area. Around the central space various facilities and amenities can be placed to encourage activities and interaction.

In addition, the main alley as the central artery of the campus, was further enhanced to create a pleasant climate and atmosphere while walking from one class to the next

or enjoy the space with friends or alone. To achieve this, the alley was covered with a web of tensile elements for creepers to grow on to create shade and fresh air. Benches and other seating arrangements as well as landscaping features with water fountains allow people to enjoy a pleasant moment.

The prototype itself was presented as a collage on top of a large satellite image of the campus site. Sketches and small models illustrated the various ideas. Stickers with key notes supported the content. The prototype was presented to the work-shop participants and guests by Jisha and Thaddäus.

SUMMARY

The general experience of the work-shop participants of this group was seen very positive.

Whereas participants entered the group with certain preconceptions, this method of Design Thinking revealed very deep insights into the specific life and needs of the campus. At times, completely different challenges and solutions as expected were found and developed.

For instance, one of the key challenges was rather a social issue than a technical. And even the solutions

for supposedly technical issues, such as improvement of climate within buildings resulted in a concept for an out-door area with non-technical passive solutions to improve the climate at the location.

Although the initial topic How to re-invent energy efficient campus buildings was present throughout the workshop, it was interesting to see how the method of Design Thinking encouraged the participants to work through all layers of the locality - social, functional, technical, environmental – to then highlight an issue that differs from the initial preconception.



Photos: Marcus Jeutner, 2017



Group #3: Waste
Klaus Hoppe



UNDERSTAND

The team decided to ask different “actors” in the field of waste segregation and collection, mainly students and owners of local waste companies, all related to the Karunya campus. The topics that had been agreed on were:

- General segregation opportunities on campus
- Paper waste collection and processing
- Medical waste
- Plastic waste
- Food waste and its processing

Afterwards, they split up into 5 different groups, 2 people each and started the interviews.

EMPATHIZE & DEFINE

The groups met with and talked to a variety of different interviewees on the campus. As 9 out of 10 group members were students, they mostly interviewed non-students: the technician and a worker in the recently constructed paper mill on the campus, two professional waste company owners, a biogas plant responsible worker, a canteen worker, the nursery supervisor and a researcher on waste and waste segregation. They gained an insight into everyday routines of the interviewees and additional information about positive and negative aspects of their work regarding hardware, revenues and salaries. All interviewees were eager and supportive in answering the questions.

Back in the workshop venue, each group presented their observations, experiences and findings. Group by group the results were summarized on post-it notes and presented to the overall group. The key findings were:

- One waste collecting company segregates waste into paper, plastics and tins
- The separate sale of waste increased the company’s revenue
- The consciousness of what happens to the waste after selling it is not high
- Medical waste is segregated in recyclable, infected and sharps
- A semi-automated prototype for segregation exists but is not used
- Since 2017 good quality paper is produced on campus
- On weekends and exams higher amounts of paper are delivered to the paper mill > capacity problems
- Workers in the paper mill are proud of their work but salaries could be higher
- Paper booklets from exams are mostly only half used
- The biogas process in the gents area lacks a crusher to better pre-treat the food waste

In a next step, the findings of the morning were analysed thematically, obtaining a better overview sorting them into thematic clusters. These clusters helped to concretise the topics for further processing in the following steps of the workshop.

The general topics were defined as:

- Waste segregation on campus
- Waste collection
- Waste processing (especially paper and food waste) and disposal
- Awareness and Consciousness
- Economies of waste

The most striking observations:

At first, several groups recognised a discrepancy between the provision to segregate waste on the campus and the actual content of the bins. The segregation was often not correct.

On the other side, especially regarding medical waste, opportunities for more thorough segregation of difficult and dangerous waste in the hospital were missing.

In the case of food waste, they recognised, that the food waste is processed together with human waste. Waste is partly cared of by the university itself (food waste, paper) and partly subtracted to at least two different private companies.

Moreover, there is already ongoing research, regarding future segregation technologies.

Grouping into knowledge, personas and first fields of action

In the next step of the process, especially to further improve the waste management on campus the following questions were jointly elaborated.

I wonder if that means that...

- there is generally not enough awareness among the “inhabitants” of Karunya campus?
- people generally do not about waste unless there are incentives?
- there is not sufficient information available for students, faculty members and workers how to segregate waste?
- there are not enough opportunities to segregate waste on the campus and in the student’s accommodations?
- there are no incentives for waste segregation on the campus?
- there are not enough resources to optimize the processing of organic waste?
- the exam booklets are generally too voluminous?

Personas

Mr. Pangam: waste collector on Karunya campus. 48
He lives nearby and is contracted by the university to collect waste and dispose it. Although he deals with

waste every day, he is not very much concerned about the whereabouts of the waste after he sold it. He brings unsegregated parts of it to landfills. The segregated waste, nevertheless, is giving him a good salary. He seems quite content with his situation. Maybe he would sell more segregated waste if he had more (technical) opportunities to sort and/or find places that would process this segregated material and pay him accordingly.

Mrs. /Mr. Average Student: student at Karunya University, 22
She/he lives on Karunya campus in a student accommodation. The “waste behaviour” of the persona is similar among all students: not always using the provide bins, not much consciousness about the consequences of non-segregation. Maybe they lack information and opportunities to segregate better. Maybe it would be helpful if she/he was better informed by respective educational and information programmes and campaigns or if there were more opportunities at the accommodation to segregate. Moreover, an overall integrated waste system of the university – built upon the paper and food waste processing – would increase awareness. General incentives would be helpful, too.

IDEATE

Based on the previous steps, findings and condensed information, the following task was the development of concrete solutions for the personas defined above. The main focus of this task was to change the current situation in way that improves the behaviour of the respective persona and the overall waste management of Karunya University subsequently. Not all topics of the first round of the brainstorm were deliberately pursued to maintain the focus. The following topics remained in the final discussion, answering the question "How might we increase information and awareness of members of Karunya (students, faculty members, workers) for a better waste management on campus?":

Display of information, creative action, active involvement of the students (own ideas and/or field trips), incentives and technical solutions

In a second step it was decided to dig deeper in two groups regarding "Display of information" and "Incentives" as the prototyping part of the workshop required a concentration on one or two topics. Here are the results of the additional solution-finding process:

Display of information:

- Different kinds of displaying options (signs in study rooms, on campus, balloons)
- Creation of an attractive logo and slogans for waste management
- Easy to recognise dustbins with colours for the different sorts of waste
- LED system and displays showing the monthly development of waste collection
- Rules of waste in general: reduce, reuse, recycle
- Instruction of how to separate in strategical places (accommodations, cafeterias, auditoriums...)
- Sign posts leading to the next "segregation station"

Incentives:

- Incentive programme, point based
- App development for incentive programme
- Provision of prize for point collection that meet students interests
- Notification about current status of waste collection on campus (app-based)
- Installation of segregated waste collecting machines, e.g. organic, paper, plastics on campus (one or more)

PROTOTYPE

Two prototypes were built.

One (display) showing and explaining the overall waste management system, the display of monthly waste collection and segregation development on campus and a sign-post signalling where to find multi-coloured bins for segregation.

The second prototype was a collection machine for different types of waste (paper, plastics, organics) that worked with a sensor to identify the person using it and rewarding her/him with respective points or coins that will eventually reward the participant with e.g. free coffee or tea etc. at cafeterias on campus.

Problem to be solved - How might we increase information and awareness of Karunya's members (stu-

dents, faculty members, workers) for a better waste management on campus?

The user pain points – not enough information and not enough opportunities to act more environmental friendly on campus

The solution – information material and campaigns to raise awareness, involving the students actively (e.g. designing a logo, field trips, workshops); establishment of an app-based incentive programme including collection machines for better segregation of waste on campus.

The impact – improvement of awareness among "residents" and workers on campus. Optimisation of segregation of waste and reduction of waste for disposal on landfills.

The actors – several actors are involved in this project: Starting with Karunya administration, students, faculty and workers as well as collectors and designers (for displays).

The costs – additional costs (for design and production of material and displays, bins, collection machine(s))

The revenues – Although we could not calculate the overall costs and revenue, it was clear that most costs would be compensated by reduced amount waste for disposal and increased revenue for increasing amounts of segregated material. The resulting reduced amount of waste for disposal and consequently less environmental pollution is an additional benefit of the project.

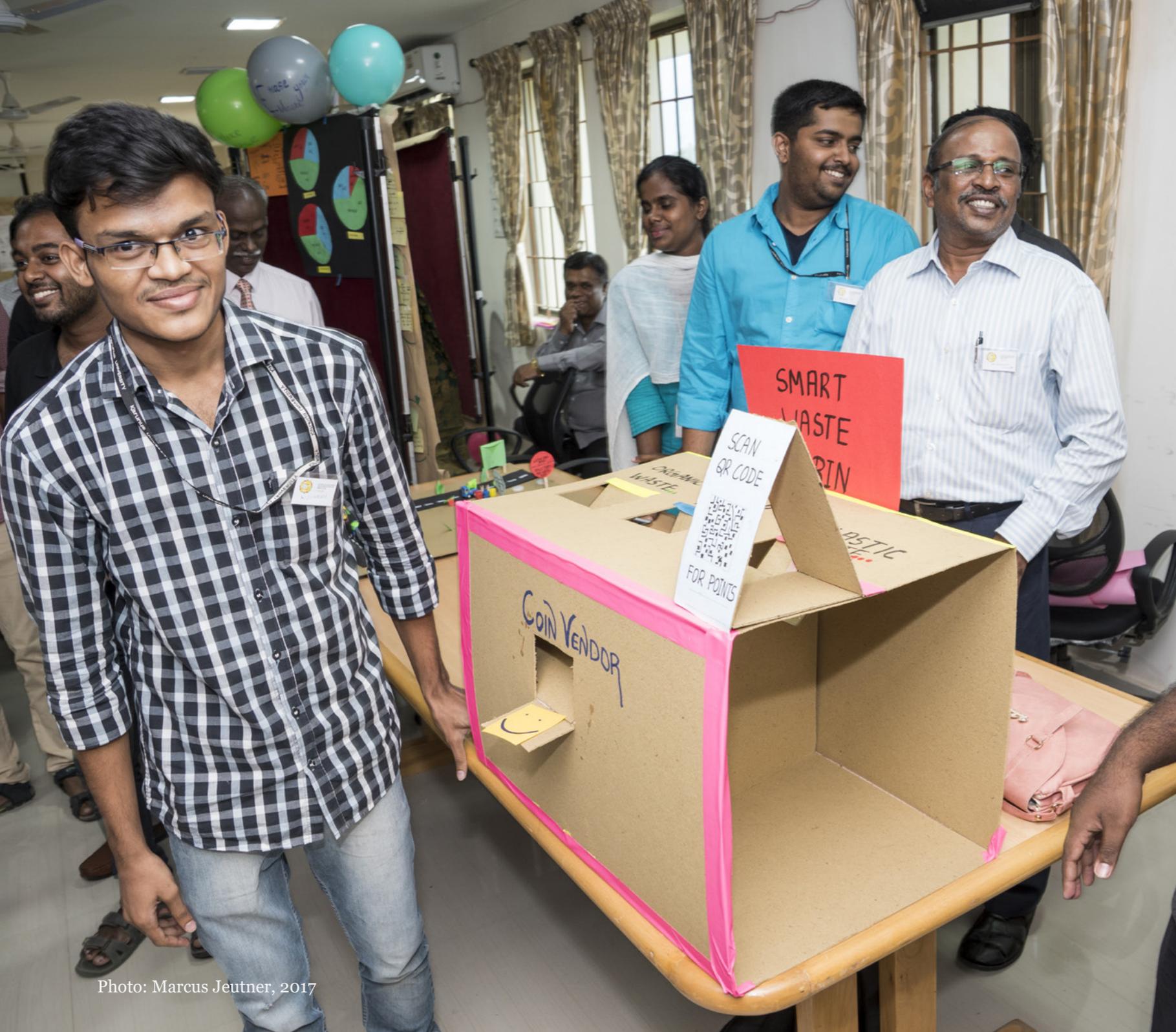


Photo: Marcus Jeutner, 2017





#4 Mobility

#6

Group #4: Mobility
Ulrike Walter

Photo: Marcus Jeutner, 2017



UNDERSTAND

The team was asked to gather insights from different stakeholders who move to or within the Karunya Campus. These stakeholders have been students, faculty staff, facility staff and visitors. Furthermore, they were divided into three small groups to explore different areas within the campus. This should provide a broad insight into the different kind of stakeholders and their movements on the campus. Neither a questionnaire nor a fixed structure was given for the interviews. It was much more important to gather the personal impressions and experiences of the people.

EMPATHIZE & DEFINE

From the talks, different topic clusters derived, which several people mentioned in different contexts:

Public Transport (for commuting to and from the campus)

- Missing real time information on transport services > unpunctuality
- Poor frequency of busses and connectivity to Coimbatore > crowded busses

Modes of transport within the campus

- Majority of people walks within in the campus, minority uses bikes
- Some like walking, some say it takes too much time because of the long distances
- Walking is uncomfortable in summer or on rainy days
- Sometimes streets and pathways on campus are too crowded (e.g. after assemblies) > poses a grave danger
- Some people feel disturbed by bikes because of rush driving

Health

- emergency run by the campus often delayed
- access to medical facility is poor

Transport Department

- Complex transport booking
- Daily needs
- Difficulty in getting daily needs (distant locations)
- Daily products are very expensive

Disabled

- Walking routes and travel times are long at the campus
- Poor facilities for disabled

Lift

- Lift operation for visitors not possible
- No lift in the boy's hostel

Navigation

- Routine commuting is easy for students (block – library- canteen or similar)
- Campus mapping and notification about sites missing

Light

- Needs to be increased in certain areas

Main road

- Needs to be crossed by every student several times a day
- Many accidents happen

The team members took the collected information to generate the following conclusions:

I wonder if that means that ...

- a person has to miss class by not being punctual.
- the mobility for medical emergencies is insufficient.

Based on these findings, the team defined two personas with their specific needs and possible fields of action.

PERSONA 1: Ravikumar, 20 years old, student on Karunya university. He adores sports and he likes to cycle on a regular basis. He is a state level athlete and has won sev-

eral gold medals in national competitions. He is unhappy with his day-to-day commute, as he is not feeling safe enough to his bicycle.

> It would be helpful for Ravikumar, if the management assured him that cycling is safe

PERSONA 2: Krish, 26 years, gardener working with potentially dangerous tools. He had an accident and was required to rush to a hospital to stop blood flow, ambulance came late, later he recovered in the hospital. The maintenance of the ambulance was not properly conducted. The ambulance had to wait because of students had to disperse after assembly

IDEATE

Based on the personas the team elaborated the present questions:

How might we...

address the medical emergency in an innovative way rather than the existing?

Subsequently, the team began the brainstorming on this question regarding the Karunya campus. After a short individual collection of ideas, the team members presented their results to each other and supplemented in the ensuing discussion.

> It would be helpful to address the poor medical emergency situation

The following topic clusters were developed:

- Connectivity (drone drops medicine, supportive transportation, ropeway, conveyor, waterbody, rollercoaster, air support,)
- Sensing (drone capture images, sensors, siren, telecom service, tracking methods)
- Services & Response (medical persons needed, trained doctors, medi-care rooms, self-supportive medical kits)

The cluster of “sensing” aroused the greatest interest within the team. Therefore, the team members focused on that topic in a second phase of brainstorming to find possible answers for the mentioned “How might we...” question. The brainstorming result was the following:

- communication (SOS phone booths every 100 meters, emergency buttons in personal daily holds)
- drones (drone inspector, drone capture images connected with control room, unusual positions alert, smart insurance connectivity for poor people, mobile care response team – air/land/facility)
- analytics (health care big data and data storage server)
- sensors (sensor based side tracks, fall detector, fatigue sensor linked to mobile, personal device connected with local medical center to track health parameters, smart scan rooms with automated sensors, fitbit for everyone, resting rate warning, tools for spot treatments)
- independent communication (sensors for emergency location, mobile application, alert system using GSM/GPRS)

The results of the brainstorming were transferred into two “Idea-Napkins” to wrap possible solutions.

1) Healthprict

Problem to be solved - How might we...

- address the medical emergency in an innovative way rather than the existing?

The users - The users that we targeted are...

- Students
- Housekeeping staff
- Gardeners
- Labourers
- Visitors
- Plumbers

The pain points – the users pain points and needs are...

- Prevention
- Alerting
- Creating awareness
- Spontaneous response
- Location identification
- Pre-diagnosis

The solution – our solution works like this...

- The solution proposes a wearable device, which acts as an analyzer regarding the blood pressure, blood sugar, heart rate and fatigue.
- A smart room is alerted with the

analyzed parameters

- Hospitals receive a report after the initial diagnosis thus save time

The impact – the benefit of the solution is...

- Efficient mobility
- Quick first response
- Precious lives saved
- Greater clarity
- Cost savings

The actors –our solution involves...

- Paramedics
- Hospital staff
- Ambulance drivers
- System developers
- Local authorities
- Local community

The costs – the solution needs investment for...

- Fabrication of sensors
- Design and software design
- Communication technology
- Ambulance and transportation
- Service and maintenance costs

The revenues – our solution generates profit by...

- Financial savings
- Hospital royalties
- Government aid
- CSR – private companies
- Local educational institutions
- Local fund/ self-help group

- NGOs
- Pharmaceutical companies

2) Humpy Dumpty had a great fall
Problem to be solved - How might we...

- address the medical emergency in an innovative way rather than the existing?

The users - The users that we targeted are...

- Students
- Faculties
- Supporting staff

The pain points – the users pain points and needs are...

- To identify emergency medical issues (like fall due to fatigue, BP, sugar level, etc.)

The solution – our solution works like this...

- Fall detection along the pathways which will indicate emergency
- The location and other details will be transferred to control rooms, hospitals and ambulance

The impact – the benefit of the solution is...

- Immediate response
- Cost and time savings
- Patient: insurance

The actors –our solution involves...

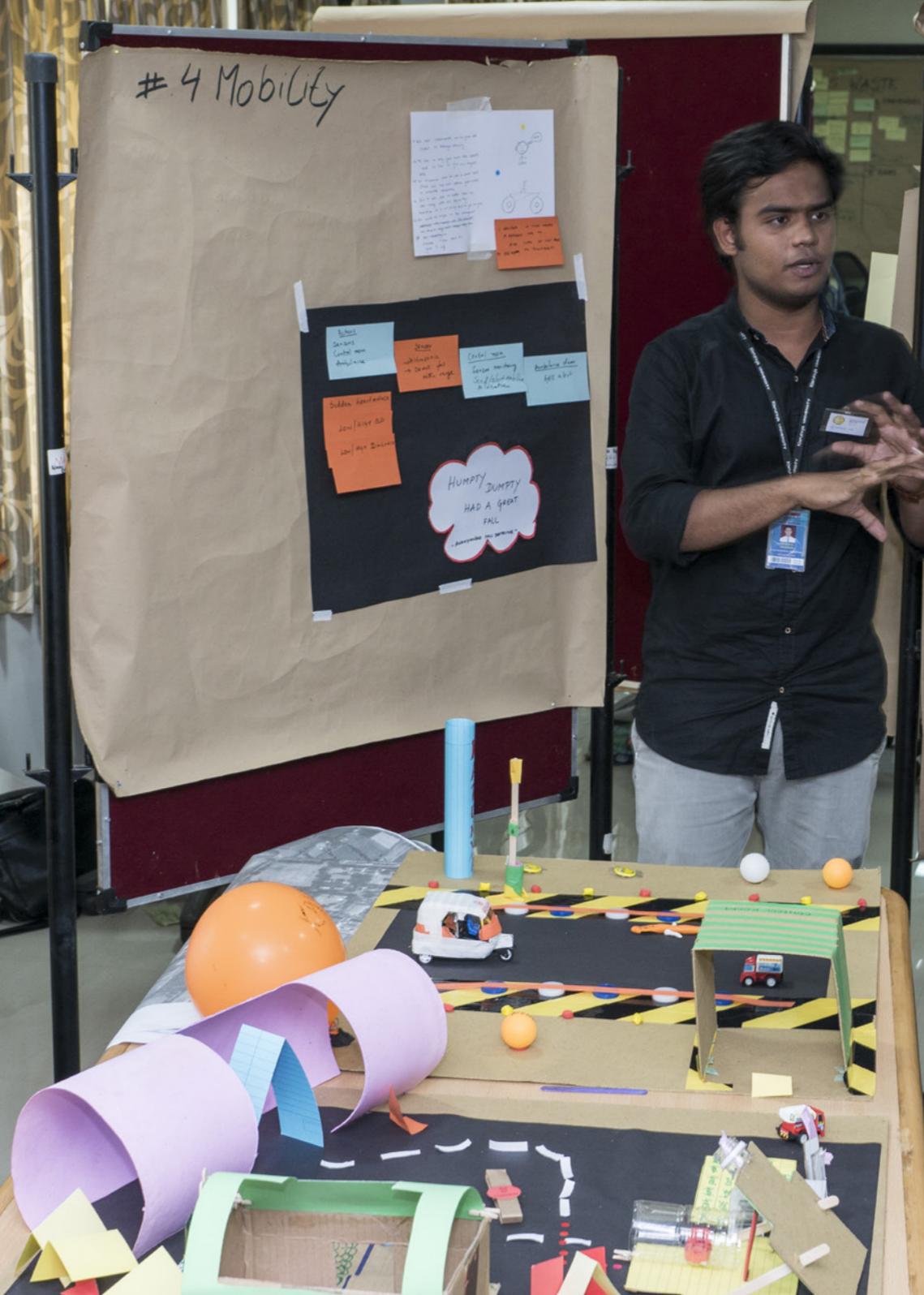
- Sensor manufacturer
- Sensor programmers
- Control room
- Ambulance
- University management
- Patient

The costs – the solution needs investment for...

- Control room (equipment, monitoring team)
- Ambulance (vehicles and drivers)
- Paramedics
- Sensors
- Sensor programmers

The revenues – our solution generates profit by...

- Donation from people
- NGOs
- Local funds





Student Management

Group #5: Energy
Vipul Toprani

UNDERSTAND

Following a short introduction of each group member, the participants raised the question of how to conduct the interviews and how to tackle the topic of “reducing energy consumption of Karunya Campus by creating awareness”. The team decided to interview different stakeholders represented by students, professors, shop owners and residents of the Karunya Campus. The team was divided into groups of 3 with the goal to interview various people about their understanding of energy, its usage and its importance on the Karunya Campus.

EMPATHIZE & DEFINE

The group walked around the campus and talked to following groups of people:

- Education Departments – Professors & Students
- Energy Grid Operations and Maintenance Department
- On-Campus Workers
- Shop Owners (on- and outside the campus)

By asking questions regarding the perception of energy supply, their specific needs and that of their departments, hobbies, shops etc., the groups gained an insight into the and supplementary information about the impact of energy as well as its cost – both monetary as well as environmental. Upon return the group analysed the various types interviewed by collating and presenting the findings of each sub-group. Each group member wrote down a note or sentence accompanied by a little sketch or icon to make quick recognition easier at a later stage. This was repeated by each member until the group felt that they exhausted the received information.

The key findings, depending on the group of people interviewed, could be summarized into:

Students:

- “Power cuts have not been a problem over the past year”
- Most carry power banks
- Unaware of source of energy
- Room rent: 15,000 ₹ – not linked to energy utilization, no restriction on electrical appliances
- Hostel facilities had reduced consumption between 8 am and 5:30 pm
- Common habit to leave the “lights on”
- Cutting down of trees for construction has increased campus CO2 footprint

Energy Department:

- Laboratories are being utilized for 10 months in a year, thrice a week. A total of 50-60 labs are present on the campus, out of which 10-20 have very high energy consumption
- Use of diesel generator (5x) to overcome power cuts. The generators run averagely an hour a day, use 300 litres of diesel

- Energy conservation measures – CFL into LED, movement sensors, automated lighting of streets, common areas manually controlled
- Implemented 95kW PV with proposal to increase PV and small wind generation

Faculty:

- Awareness amongst students lacking – sticker campaigns to make students conscious
- Clubs to create awareness about energy usage and climate change for the villages near the campus
- Lack of energy monitoring
- Wastage of electricity in classrooms

Management:

- High energy costs – 30% on diesel for reserve power generation
- Pollution/ noise is a problem
- Street lights turned on automatically between 6pm and 7am
- No drip irrigation
- Plan to be self-sufficient in the next 5 years
- 4 biogas plants are planned, 2 in operation

The team used the collected information to generate ideas for: **I wonder if this means...**

- ...that students are aware of their energy consumption?
- ...that high energy costs is related to a lack of awareness amongst students
- ...that students know how energy is being produced and what impact it has on the environment?

Personas

Considering the group of people interviewed, it became quickly evident that the students were the most important stakeholders in the process to determine the energy future of Karunya Campus. On this basis, the following persona was defined:

Student named Sona:

Female, 21 years old, studies B. Tech. in EEE (Electrical & Electronics Engineering). She pays 250,000 Rs. as fees per annum. She is unaware of her energy usage and its implications; she doesn't want to pay more fees.

How might we...

- ...make Sona aware of her energy consumption?
- ...increase awareness for greenification of Karunya Campus?
- ...reduce energy costs for Karunya Campus?

IDEATE & PROTOTYPE

Ideas around the following clusters, based on the “how might we” questions were considered:

- Digital solutions for energy awareness (campus app for greenification, energy usage for students, departments etc.)
- Communication (common displays about consumption, competitions, feedbacks etc.)

A number of possible solutions from the ideas brain-storming within above listed headings were discussed and it was decided to develop multiple prototypes for communication about energy – both digital as well as physical. The Energy team was divided into two groups, with each working on one prototype.

Problem to be solved:

How might we facilitate increased awareness of energy consumption at Karunya campus and greenify energy production!

The pain points:

The users' pain points/ needs are energy wastage, pollution from using diesel generators

The users:

The user that we targeted are students and faculty living on campus

The solution:

A digital and physical awareness program that provides energy information to the user

The Karunya Energy Saver was made via posters showing the dashboard and app workflow for the digital communication as well as models and posters for the ideas for the physical awareness programs.

The diagrams on the right show the app work-flow as well as the display dashboards for common areas. These display dashboard would include information about consumption of various departments, hostels, staff quarters etc. On the other hand, the app includes information about private consumption, competitions, feedback etc. Both give an indication of the energy mix as well as the amount of CO2 saved.

To look into the physical awareness program, various initiatives were looked into and ideas were generated from electric rickshaws for on-campus movement, LED bulb usage, demonstration activities from new technologies, conservation and poster drawing contests etc. Additionally changes to the curriculum, creation of flyers and brochures & social events

The Impact:

The benefit of our solution is increased awareness, green campus certification, reduced energy consumption and pollution

The Actors:

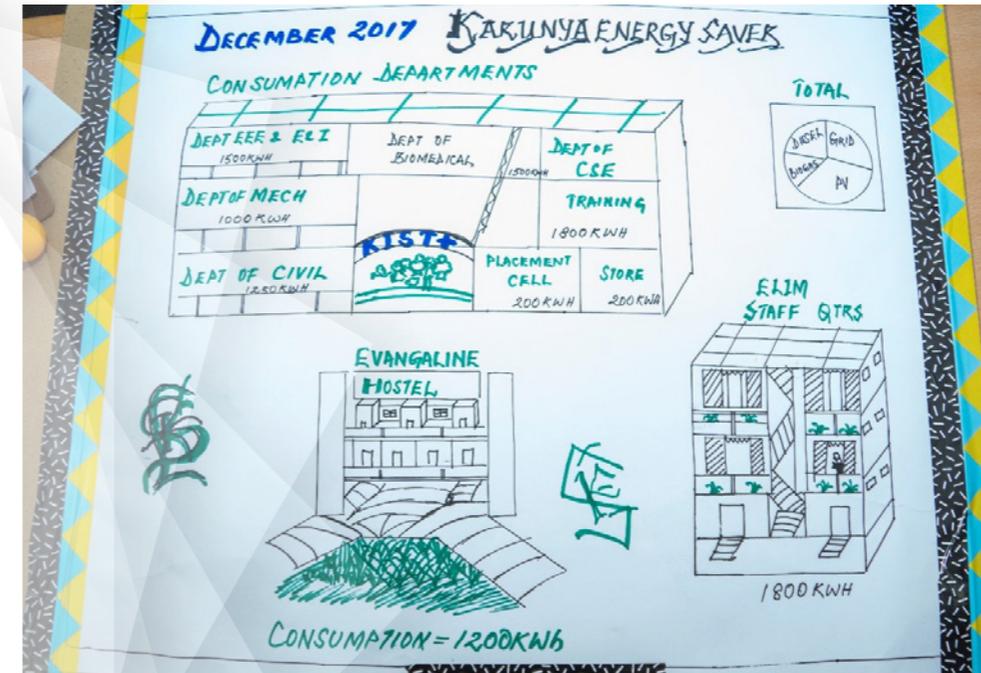
It involves the management of Karunya campus, Faculty, software and hardware developers, designers, energy consultants

The Costs:

The solution needs investment for technology development, hardware and installation (meters, displays), software platform development, printing costs for flyers, prize money for competition

The Revenues:

Our solution generates profit by indirect savings through cost reduction, possible CO2 certificates.



Photos: Marcus Jeutner, 2017



Photo: Marcus Jeutner, 2017



#6 WA

Group #6: Water
Tanvir Ahmed

FILTRATION UNIT
SCADA (REAL TIME MONITORING SYSTEM)
RECOVER
SLUDGE COLLECTION DRYING

Photo: Marcus Jeutner, 2017

UNDERSTAND

The main goal of very first phase is to gain knowledge so that you know the right questions to ask. The methods used for understanding is interviews, web searching and result of which is that you have more questions than answer, you come to know what is placed first.

The team decided to ask different “actors” in the field of water mainly student, hostel staff, guards, and people residing outside all related to Karunya campus.

The topics that had been agreed on were:

- Availability of water
- Problems faces to access drinking water
- Water Management
- Wastage of water
- Various ways of using water

Afterwards, they split up into 4 different groups, 2 people each and started the interviews.

EMPATHIZE & DEFINE

Observe refers to gaining empathy with your target users by observing and talking to them. Watch what they do instead of what they say. You need to understand the audience better than they understand themselves.

During the session, the groups met with and talked to a variety of different interviewees on the campus. The groups met students in campus, hostel staff, professors, other people inside the campus and asked about water availability, access to the same and what are the ways to use water.

They gained an insight of the interviewees and additional information about positive and negative aspects related to above topics. All interviewees were eager and supportive in answering the questions.

Back in the workshop venue, each group presented their observations, experiences and findings. Group by group the results were summarized on post-it notes and presented to the overall group.

The key findings were:

- In a year, there is no water availability for 2 to 3 months
- There is limited access to water during shower and hand wash
- Sometimes water is supplied with sand and other contamination
- Pump operator forgets to switch off the motor after tank is full
- Broken tabs and open pipes
- Inefficient usage of water in campus
- Recycling of water is not done
- People wash their cars with this water

In a next step, the findings of the morning were analysed thematically, obtaining a better overview sorting them into thematic clusters. These clusters helped to concretise the topics for further processing in the following steps of the workshop.

In a next step, the findings of the morning were analysed thematically, obtaining a better overview sorting them into thematic clusters. These clusters helped to concretise the topics for further processing in the following steps of the workshop.

The general topics were defined as:

- Water Management
- Access to Water
- Awareness among public
- Recycling of waste water

Grouping into knowledge, personas and first fields of action

In the next step of the process, especially to further improve the water management in campus the following questions were jointly elaborated:

- There is generally not enough awareness among the “inhabitants” of Karunya campus?
- People generally do not pay attention to wastage?
- There is not sufficient information available for students, faculty members and workers how to manage water?
- There are not enough opportunities to treat waste water on the campus and in the student’s accommodations?
- There are not enough resources to optimize the recycling of waste water?

IDEATE

Based on Point of view, generate ideas as much as you can. Set a time limit and generate minimum number of ideas within the time frame. Come together after activity and brainstorm the teams.

Based on the previous steps, findings and condensed information, the main focus of this task was to change the current situation in way that improves the behaviour of the respective person and the overall water management of Karunya University subsequently. Not all topics of the first round of the brainstorm were deliberately pursued to maintain the focus. The following topics remained in the final discussion, answering the question "How might we increase information and awareness of members of Karunya (students, faculty members, workers) for a better water management on campus?": Display of information, creative action, active involvement of the students (own ideas and/or field trips), and technical solutions.

In a second step it was decided to dig deeper in two groups regarding "Display of information" and "technical solution" as the prototyping part of the workshop required a concentration on two topics. Here are the results of the additional solution-finding process:

Display of information

- Different kinds of displaying options (placard, bulletin board, story board)
- Creation of an attractive design for water management
- Rules of water management in general: reduce, reuse, recycle
- Instruction of how to do so in strategical places (accommodations, cafeterias, toilets, kitchen, ...)

Technical Solution (De-centralized INTEGRATED SMART WATER MANAGEMENT)

- Proper water treatment solution / filtration
- Fresh water is supplied to places like canteen, kitchen, garden, washrooms
- System of waste water collection
- Mechanism of recycling of waste water
- Proper real time display (SCADA) with the help of sensors & micro controller
- Sludge collection system

PROTOTYPE

This stage makes your ideas real and lean from people's reacting to your prototype. Introduce your prototype and background on current design and come up with 2-3 tasks that you want your audience to do with your prototype.

Two prototypes were built.

One (display) showing and explaining the overall water management system, the display of Smart Integrated Water Management system. The second prototype was a story board related to awareness about water.

Problems to be solved:

How might we increase information and awareness of Karunya's members (students, faculty members, workers) for a better water management in campus?

The User "Painpoints":

Not enough information and not enough opportunities to act more environmental friendly on campus

The Solution:

Information material and campaigns to raise awareness, involving the students actively; establishment of Smart Decentralized Integrated Water Management System for better water management.

The Impact:

Improvement of awareness among "residents" and workers on campus. Better water treatment, water flow, waste water management and recycling of water system to optimize the usage.

The Actor:

Several actors are involved in this project: Starting with Karunya administration, students, faculty and workers.

The Costs:

Additional costs (for design and production of material and displays, bins, collection machine(s))

The Revenues:

In terms of optimized usage of water and recycling of waste generated



Photo: Marcus Jeutner, 2017



| Thank You



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