
ASQ Automotive Division Webinar

Structured Concept Development-
seeing it happen in a real workshop



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Automotive
Division

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Structured Concept Development-
seeing it happen in a real workshop



**Everyone is muted.
We will start at 7pm EDT.**



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Agenda

- **Housekeeping Items**
- **About ASQ Automotive Division**
- **Our Vision**
- **Division news**
- **Structured Concept Development-
seeing it happen in a real workshop**
- **Questions & Answers**



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Housekeeping Items

Everyone is muted

Session is being recorded

Session will last about 90 minutes

ASQ Automotive members can download the slides and video at www.asq-auto.org

Participate thru chat and questions

Will answer questions at the end:

- Q&A at the end of the presentation
- Please type your questions in the panel box



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ASQ Auto Chair

Jennifer Schneider



Jennifer Schneider has 20 years of automotive experience in Launch Planning and Training, Process Management and Improvement, Organizational Development, Audit Management and Quality Management Systems. As a Senior Quality Manager, Hydraulic Brake Systems (HBS) at Continental Automotive, she is responsible for Regional Business Unit Quality improvement strategies, Customer Quality interface to ensure customer satisfaction, monitors and tracks financial aspects of corporate quality, leads cross functional teams within the region to identify and solve problems with our products and interfaces with worldwide HBS Management. Ms. Schneider holds a Bachelor's degree in Psychology from the University of Detroit, Master's in Industrial/Organizational Psychology and MBA from the University of Detroit Mercy.

In addition, she holds certificates from the Minority Business Executive Program, Tuck School of Business, Dartmouth College; Customized Lean Mfg. Program, School of Engineering, University of Michigan; Capability Model Maturity Integration (CMMI), Carnegie Mellon University; and UAW-Ford Employee Involvement Leadership Skills Program, Wayne State University.

Professionally, Ms. Schneider has worked in the areas of Customer Service, Litigation, Manufacturing, Human Resources and Quality for Ford Motor Company, Visteon, SiemensVDO and Continental Automotive.

Within ASQ Automotive Division, she has volunteered and given her leadership as Chair, Global Products Committee; Chair, Scholarship, and elected to the Executive Council as Treasurer 2010-2011 term, Chair-Elect 2011-2013 term and Chair 2014-2016 term.



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American Society for Quality (ASQ):

ASQ is the world's leading professional association and authority on quality

ASQ Automotive Division Mission:

To be the recognized global network of automotive quality professionals that is helping individuals and organizations to achieve personal and organizational excellence



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Our 2014 Strategic Plan will focus on the following objectives:

1. Customer Focus - increase Member Engagement
2. Community Outreach - Collaborate with external and internal organizations
3. Division Leadership - Enhance Leadership Team
4. Process - Improve Process / Operations
5. Communication
6. Branding and Marketing Strategy

ASQ Automotive Division Call for Papers

ASQ Automotive Division Call for Papers

Event: ASQ Automotive Awards Symposium June 2, 2014 Automotive Hall of Fame, Dearborn, Michigan

Purpose: Two papers will be chosen for presentation at the symposium. Other submitted papers will be considered for publication in Automotive Excellence, the Division newsletter.

Theme: The Global Impact of Quality emphasizing any of the following focus areas:

Customer Relationships

Risk Management

Building and Sustaining a Culture of Quality

Making the Case for Quality

We especially encourage the following types of content:

Case studies: Step-by-step descriptions and results of specific projects that you or your organization completed.

Perspectives pieces: Your own assessment, based on experience and/or research, of trends and developments in quality.

Tutorials: How-to discussions or illustrations for quality practitioners of any experience level.

Human-interest features: Less technical discussions of your own role, experiences, or insights about working in the quality field.

Submit: Title, abstract (150-250 words), author(s) names with ASQ member numbers

To: asqautodiv@gmail.com

By: April 4, 2014 Results will be announced by April 11, 2014



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Resources / Contacts:

Contact: Jennifer Schneider, Chair - ASQ Automotive Division

E-mail : asqautodiv@gmail.com

Website: www.asq-auto.org



Group: ASQ Automotive Division Group



twitter.com/ASQautomotive



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Main presentation
Start Recording

Introduction of Speaker

**Presenter: Harry B. Flotemersch,
Sr. Consultant, Shainin LLC**



Harry. B. Flotemersch has more than 30 years of experience in manufacturing engineering, quality science and workshop facilitation as an engineer, quality engineering department head and technical consultant.

**BS: Electrical Engineering, Rose-Hulman Institute of Technology,
MS: Manufacturing Management, Kettering University.**

He has a passion for tackling tough challenges with optimism and has learned multiple methodologies to support him to the finish.

Harry has deployed his multiple methodology flexibility successfully to the point of winning quality and innovation awards from Delphi Automotive, DaimlerChrysler and BAE Systems.

As a Senior Consultant at Shainin LLC, Harry is applying this experience while delivering Resilient Design and Development services to their clients.

Shainin's Global Reach

Shainin, a global consulting company, solves and prevents critical problems in any environment.



Languages Supported

- | | |
|----------|------------|
| English | Portuguêse |
| Español | Čeština |
| Deutsch | Polski |
| 普通话 | Bosanski |
| Français | Italiano |

→ Knowledge Base and Practical Experience of 1.000.000 Projects

→ Proprietary, Proven Methodologies & Tools



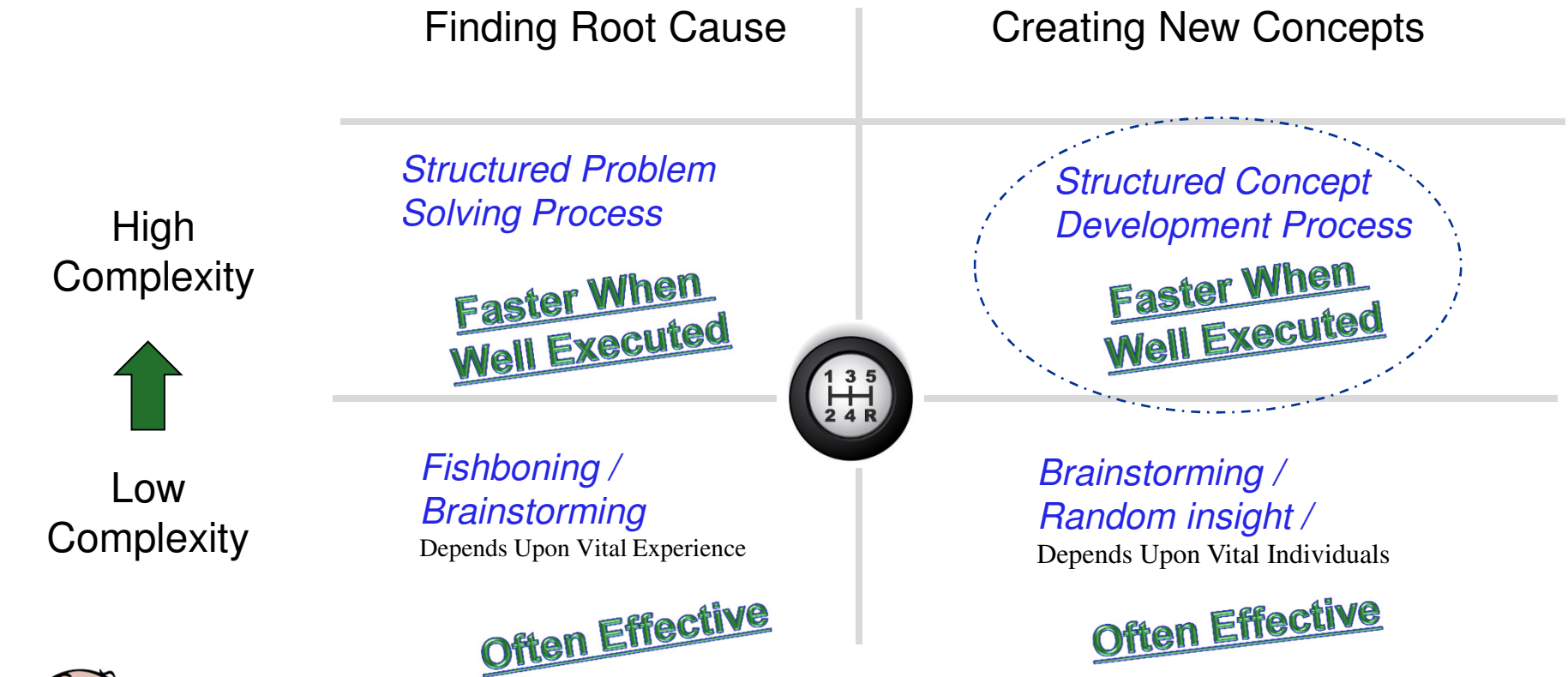
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Concept Development 12

From the November 2012 ASQ Webinar:



It's vital to know when to switch methods to suit the situation.

Webinar Contents

Structured Concept Development

- When does it make sense to do this?
- Overview of the Structured Process
- Walk through of real workshop.
- Challenge to try out first steps.
- Question and Answer
- Open Discussion

Structured Concept Development Application

Forget it... when you.....



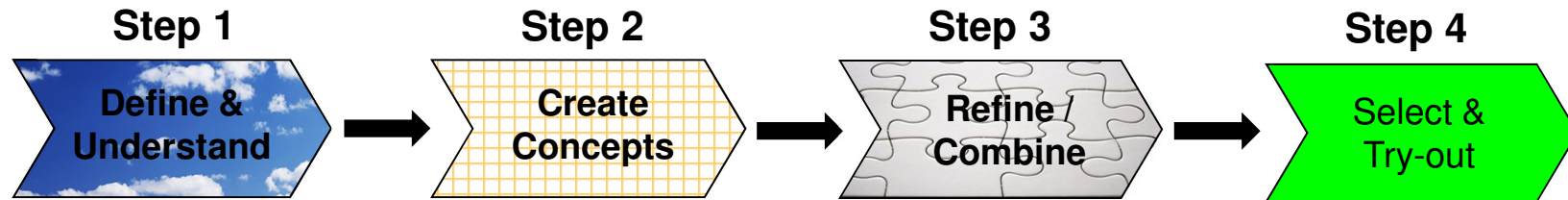
- Are committed to a design.
- Meeting all requirements.
- Have no resources.
- Have no interest structured methods.

Consider it... when you.....



- Reluctant to invest in prototypes yet.
- Can't wait for a miracle.
- Need to insights to handle the complexity.
- Need a way to manage diverse thought.
- Have new requirements and conflicts.

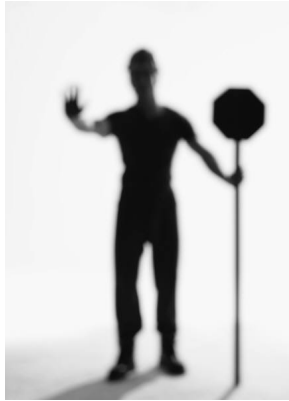
Concept Development Process



This process moves the cross functional team through a dialogue:

- Foundations are laid with background information clarified,
- observations are discussed,
- ideas identified and merged collaboratively,
- challenges are clarified and solved together,
- convergence on concepts,
- more willing to move forward with action.

Benefits: More understanding *earlier* and Less rework *later*.



A quick walk through a workshop.

Upfront Alert:

This is a peek into a day's worth of dialogue.

Does show how ideas are put together into concepts.

*Does **not*** show how conflicting design ideas are resolved in detail.

*Does **not*** show how competing concepts are evaluated.



Our “Concept Challenge”

A leading recreational vehicle company wants to add some additional functionality for market differentiation to one of its high volume, midsized pull behind campers.

The marketing feedback points to the need to be able to store the bicycles inside the camper so that a second vehicle would not be needed.

Drivers of this need are:

- Rising Fuel Costs.
- Single Parent Families.
- One parent coming late / leaving early.
- Offer more than the competition.



Mission

Create concepts to put a bike rack to hold ~5 bikes for a typical young family on the inside of the midsized camper model chosen.

Timing Goal:

Build at least one working prototype to tryout quickly!



Define: Main Need for New Concept



Paradigm: “If you're going to take the family bikes . . . you are taking a 2nd vehicle.”

What are useful Innovations?



“Often a new combination of technical and organizational resources that increases the value / cost ratio.”

Value / Cost Ratio = $\frac{\text{More of the things that are wanted.}}{\text{Less of the things that aren't wanted.}}$

First Action:

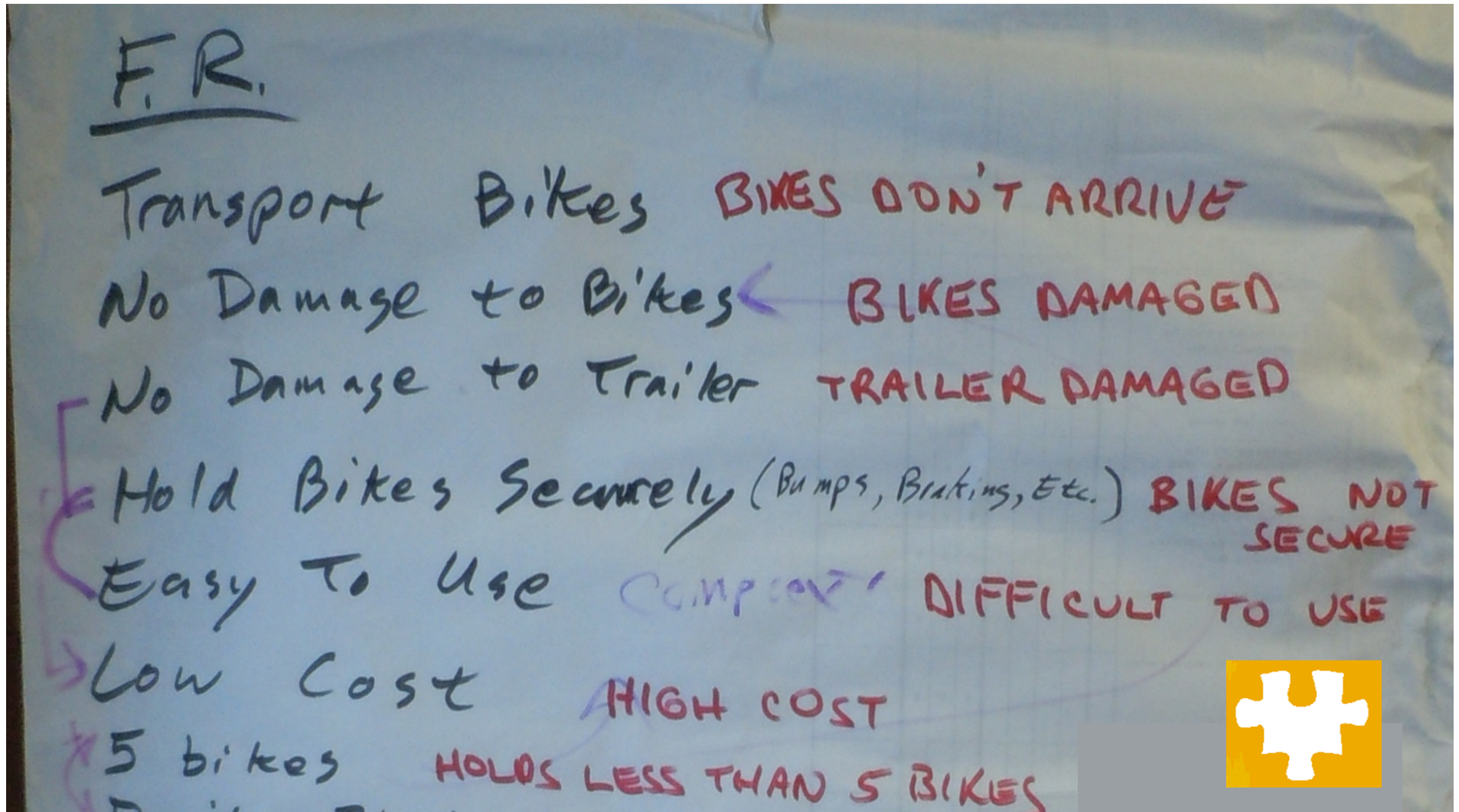
Clarify all the things that are wanted and aren't wanted.



Define & Understand

Define: Functional Requirements

Define & Understand



Define: Constraints

Define & Understand

CONSTRAINTS:

- < \$100 COST OF MTLCS
- < NO BLOCKING ACCESS TO KITCHEN
- < DON'T REQUIRE GREAT STRENGTH
- < DON'T TAKE TOO LONG TO SETUP / TEARDOWN
- < BE ABLE TO HANDLE DIFFERENT BIKES
- < DON'T DAMAGE TRAILER / BIKES
- < STORE IT OUT OF THE WAY

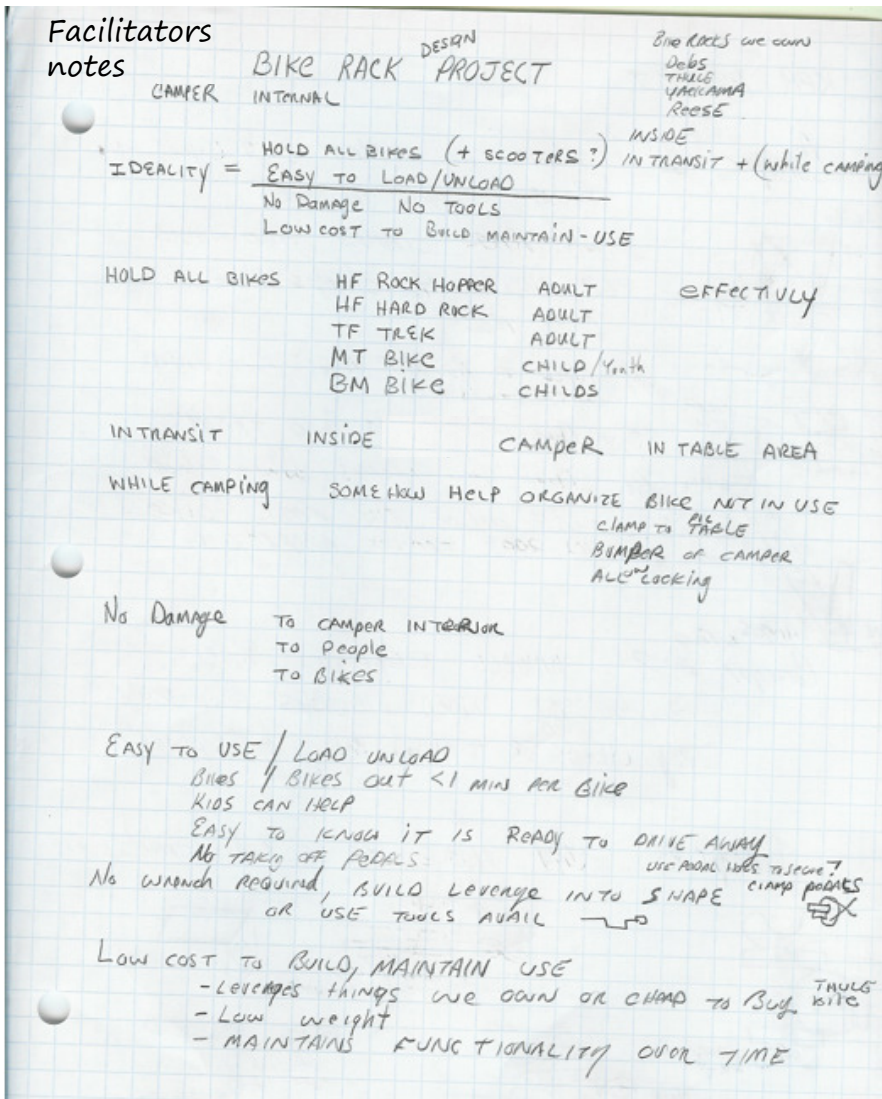
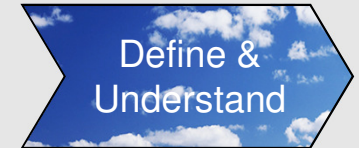


Elaborations from Dialogue

- ➔ Need to be able to get lunch on the road, change clothes etc.
- ➔ Make it so that wife and kids can load it if the dad isn't there.
- ➔ Field Study: 20 minutes is a good target.
- ➔ Bikes change as family changes.

~~HEAVY LIFTING~~

Understand: Clarify Meanings



These are my 'facilitators notes' captured in dialogue to get more detail about what is wanted. I was picturing my own family bike situation.

We were asking:

“what is meant by...”

- Holds all bikes?
- No damage?
- In transit?
- Easy to use?
- Low cost?
- Inside Camper?

Understand: The Ultimate Solution

Define & Understand

IDEALLY WE WANT:

- No cost
- Holds INFINITE BIKES
- Zero damage possible
CAMPER
BIKES
- So EASY KIDS DO IT FOR US!
- No TOOLS REQ.
- NEVER COMES LOOSE ON ITS OWN
- DISAPPEARS WHEN NOT IN USE

Defining the vision of what is the ultimate “pie in the sky” solution will help orient the concept team to the direction of the innovation.



Without this clarity, there is wasted time and effort to get to the destination.

Understand: Truly Innovative

Define & Understand

Ratio =

Bikes transported inside camper.

Easy to load and unload bikes.

Bikes stay stowed over bumps and hard stops.

Easy to store system when not in use.

Free access to inside for food and rest stop use.

Damage to camper, bikes and people from weak mounting.

Special skill or tools required to fabricate.

Cost of material. (Derived target < \$100)

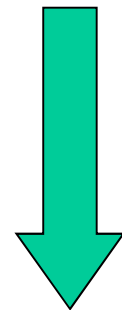
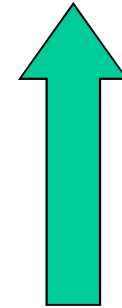
Additional towing load, weight or drag.

Storage space required while actually camping.

Time to load / unload. (Derived: max 20 minutes)

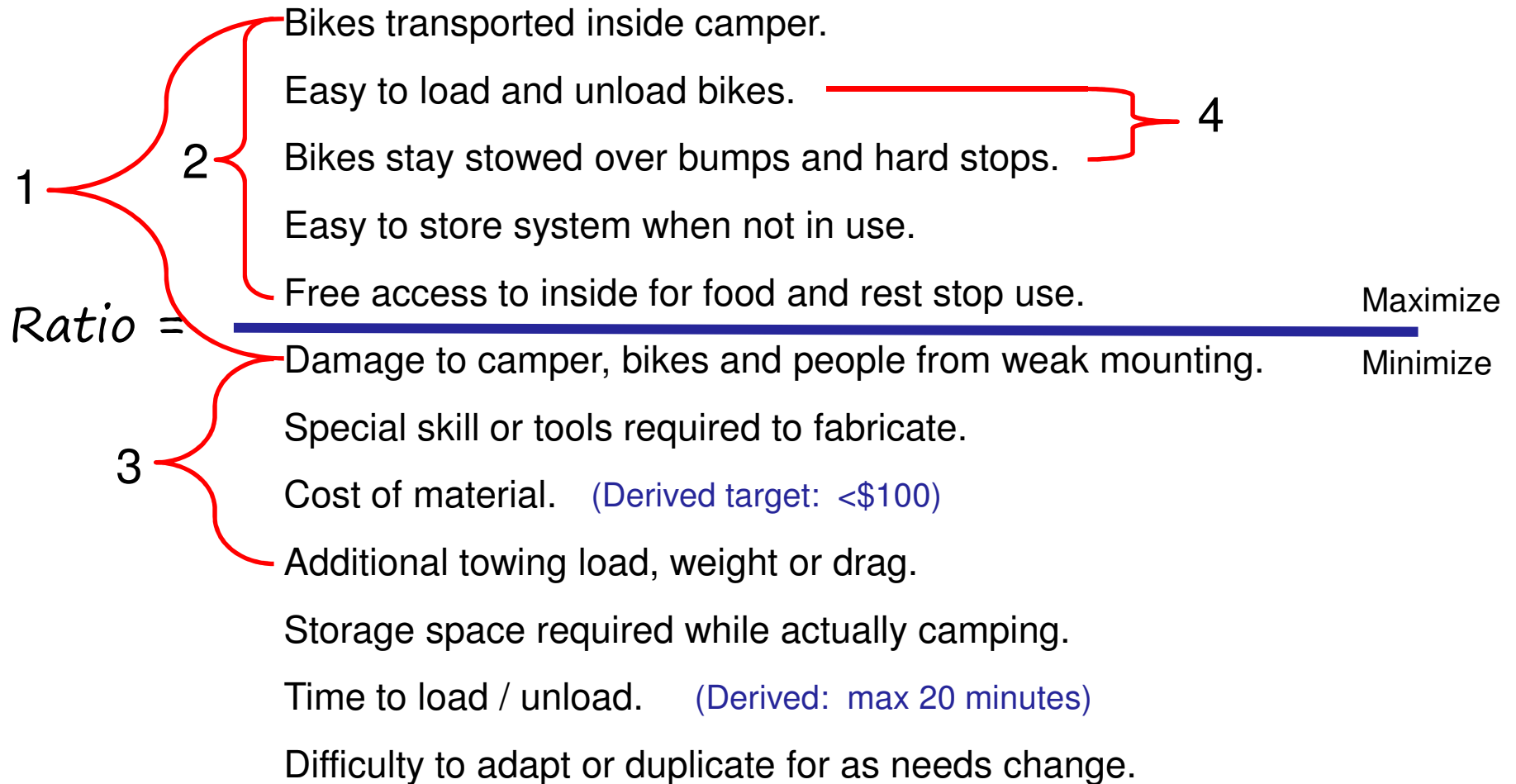
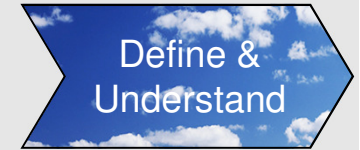
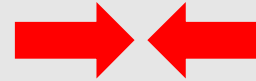
Difficulty to adapt or duplicate for as needs change.

Maximize



Minimize

Understand: Conflicts



Understand: Approach to Conflicts

Define &
Understand

*Dialogue
about
conflicts:*

{ Bikes transported inside camper.
Damage to camper, bikes and people from weak mounting.
Tactic #1: Minimize or eliminate bikes coming in contact with camper.

{ Bikes transported inside camper.
Free access to inside for food and rest stop use.
Tactic #2: Designate available and unavailable floor space inside.

{ Damage to camper, bikes and people from weak mounting.
Additional towing load weight or drag.
Tactic #3: Utilize as much strength in existing structure as possible.

{ Easy to load and unload bikes.
Bikes stay stowed over bumps and hard stops.
Tactic #4: Consider proven bike holding methods that are easy to engage but have high holding force when engaged.

Understand: What is Really Needed

Define &
Understand

What must *be created in the solution*?

- A method to connect a bike an intermediate structure.
- A way to connect intermediate structure to camper structure.
- A method to prevent the floor / walls / doorway from being damaged.
- All interior evidence of the system must disappear when bikes unloaded.
- Strength of the mechanical connections >> higher than energy applied to bikes.
- A method to prevent the bikes from damaging each other.
- Strength of users required is << strength to lift entire bike overhead.

RESULT = Secure stowage of multiple bikes inside front of camper.

What would be 'nice to have' but not critical to have?

- Geometry that can be stowed out of sight nicely when camper parked?
- Something nice looking?
- Perhaps it can double as a rack also while at the campsite or at home?

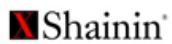
Do you call out the conflicting items before you start discussing solutions?

1. Always
2. Sometimes
3. Never
4. Not sure what you are asking.

What has already been done? & Resource surveying

Understand: What is out there?

Define & Understand



The Red X® Company

Bike Stowing Concept Development

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Concept Development 33

Understand “Resources” in the Context

Understand: Camper Resources

Define & Understand

The Outside



Ask:
What is
available to
utilize and
what is not?

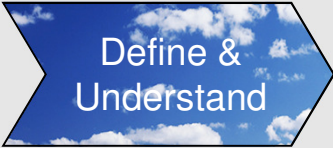
Understand: Camper Resources

Define & Understand

The inside:
As used while camping.



Understand: Space Available and Not

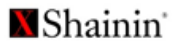


Available space for bikes



Top View

Bike Stowing Concept Development



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Understand: Camper Resources

Define & Understand



Target area for bikes.

Note: Very sturdy hardwood ledges for holding table when it becomes a bed frame.

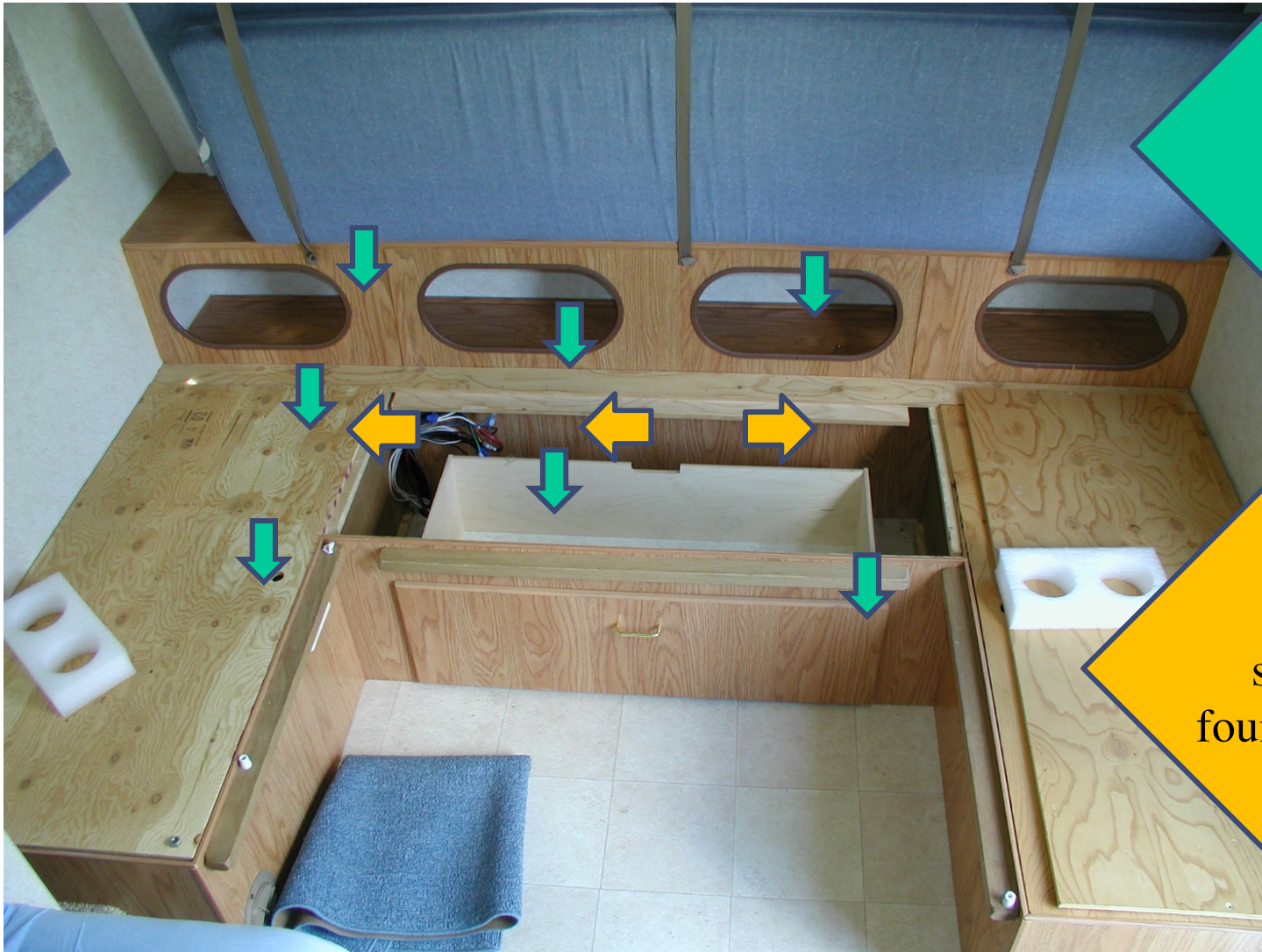
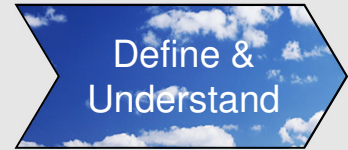
Understand: Camper Resources

Define & Understand



Cushions removed, non-cosmetic structure is revealed for consideration.

Understand: Camper Resources



Many attachment points found!

New system stowage space found when unused.

Understand: Bike Resources



Available Resources

Wheels, frame, front fork, handle bars, seat, braking ability, helmet, Air in tires, tires and tubes, pedals, pedal threaded holes, x 5 units. Bike structure fixed and flexible joints.

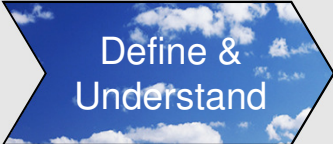
Unavailable Resources

All greasy parts, plastic water bottle holders, spokes, painted surfaces, if not protected.

Note: An Example of bikes secured by the frame tubes or an adaptor tube when it is too small.



Understand: Rack Resources

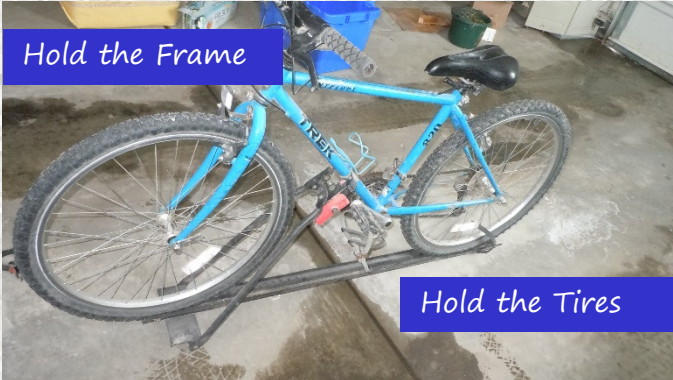
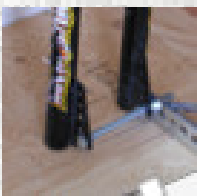


Available Resources

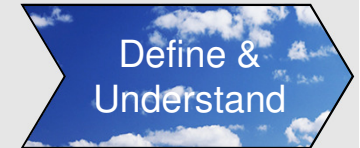
All details for holding bikes to racks and racks to vehicles securely, straps foam, clamps etc. Note that there is an air pump that usually comes along on the trip!

Unavailable Resources

NONE: If components from an existing commercial rack system can be used, it is completely available.



Understand: Resources Summary



In Camper

Available Resources

Volume of empty space in walking area, length, width, height etc.

Structures behind cosmetic surfaces entry door opening.

Unavailable Resources

Roof, rear, front and sides of trailer, entire tow vehicle off limits.

Cosmetic surfaces of all cabinets, floors, ceiling, windows, zipper fold outs, door.

In Bikes

Wheels, frame, front fork, handle bars, seat, braking ability, helmet, air in tires, tires and tubes, pedals, pedal threaded holes, x 5 units. Bike structure fixed and flexible joints

All greasy parts, water bottle holders, spokes, painted surfaces if not protected.

In Rack Systems

All details for holding bikes to racks and racks to vehicle securely, air pump, straps foam, clamps etc.

NONE

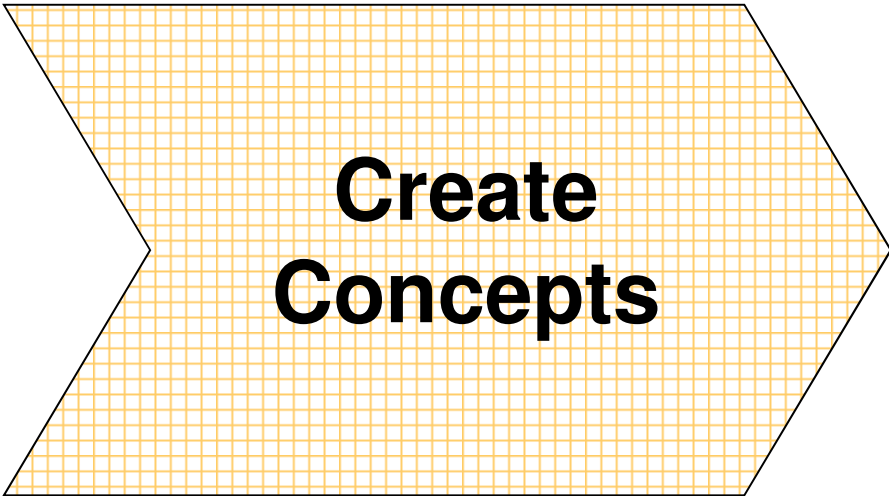
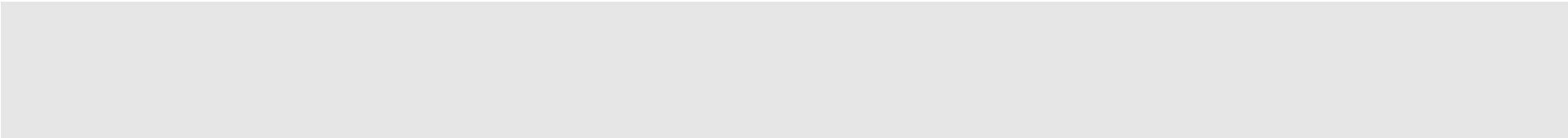
In People

Strength to hold 1 bike up on 1 wheel at a time, ability to adjust bikes and securing methods to suit a variety of bikes for any trip.

Strength to lift one bike up to chin alone.

Does your team collect and clarify the current solutions and resources before you start creating new solutions?

1. Always
2. Sometimes
3. Never
4. Not sure what you are asking.



Create Concepts

Ideas and Concepts: know the difference!

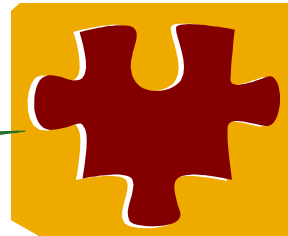
Create
Concepts

CONCEPT



Concepts are collections of **ideas** designed to meet collections of needs.

IDEA



Ideas are often specific, singular and usually mentioned to answer a specific need but not all needs.

Individual Thought *Then* Group Thought

Create
Concepts

It is well known that blurting out ideas to a group creates the illusion of productivity but does more harm than good for diversity of thought early on.

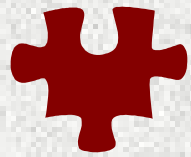
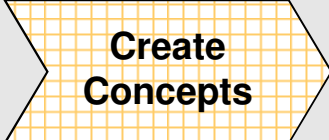
Individual Action:

Sketch out what has already come to mind privately.

Group Dialogue:

Have people quickly share and capture feedback from the team.

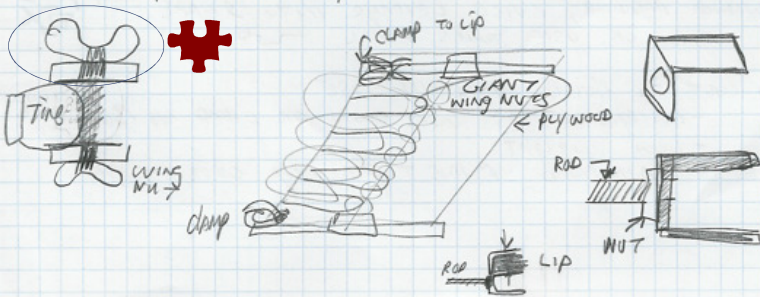
Thinking Through a Concept in Detail



= A notable idea the team recognized as something to hold on to in idea inventory.

Concept #1a WHEELS LODGE IN WALLS
BOUNDED BY WOODEN BLOCKS SECURED
BY CLAMPS OR TIGHTENED BY TITREDS ON ROD

Concept #3 COPY TABLE USE AS BED A-mount style



KPR PROJECT

#1

Concept #1

FLOOR HAS FLAT 2x4 LIKE
BEAM TAPPED IN SHAPE



Bike Rack CLAMPS HOLD WHEELS

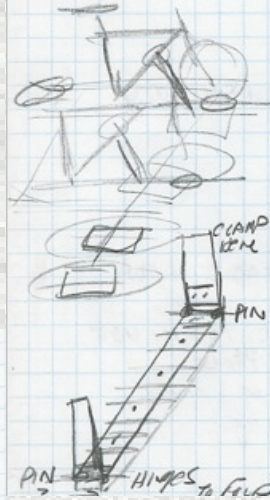
WE HAVE 4 CLAMPS WE
COULD ROB

SP1 NEED TO REVERSE BIKES FRONT WHEEL
WITH TWIST

SS1 = DON'T HOLD WHEELS HOLD FRAMES

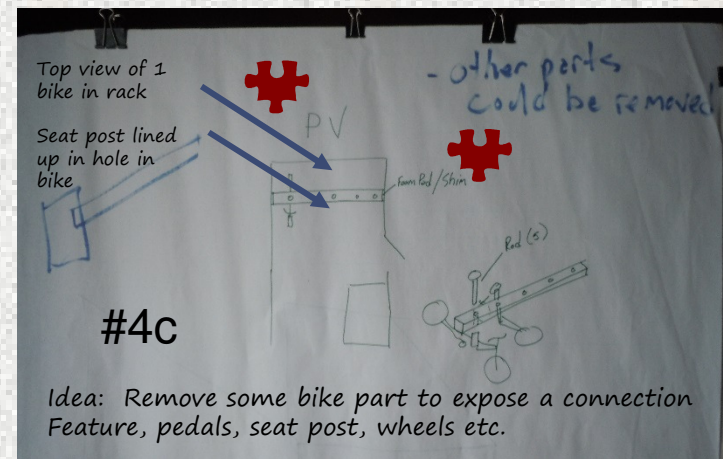
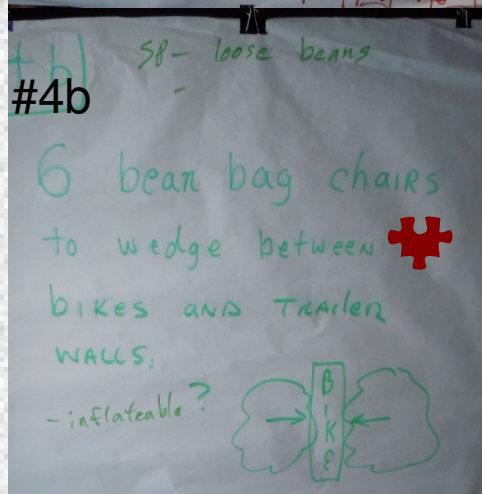
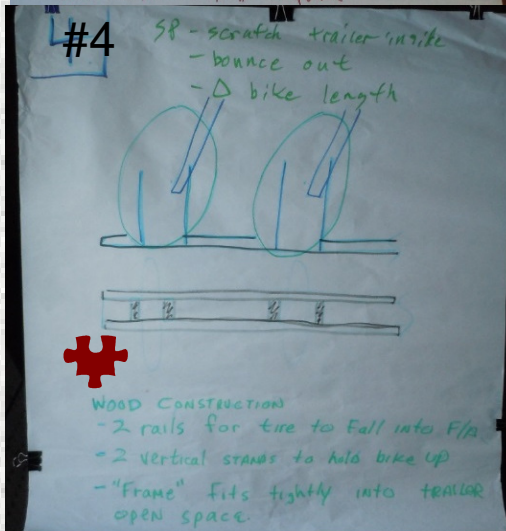
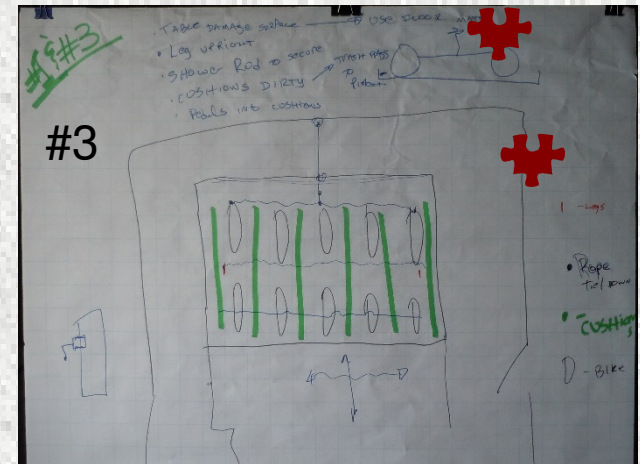
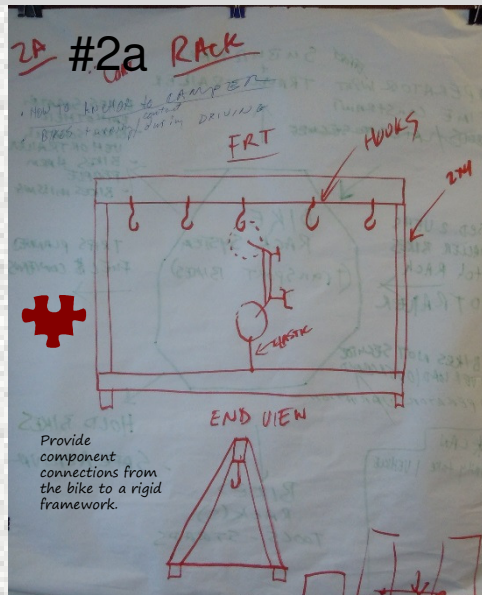
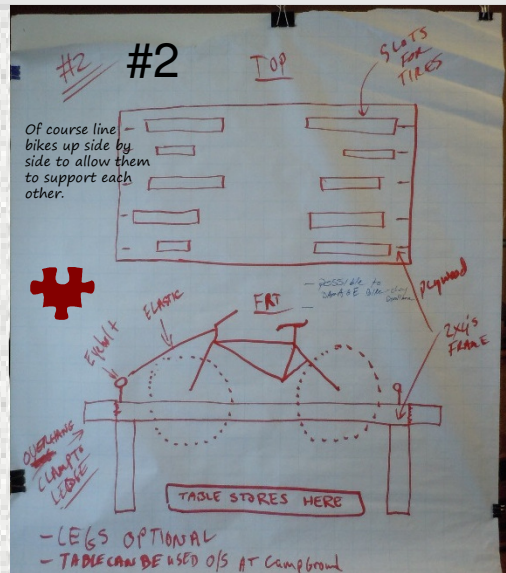
SP2 - HOW HOLD FRAMES, WHAT CLAMP

SS2 - USE ALL OF BIKE RACK LIKE
IN 2004 TABLE ADAPTATION

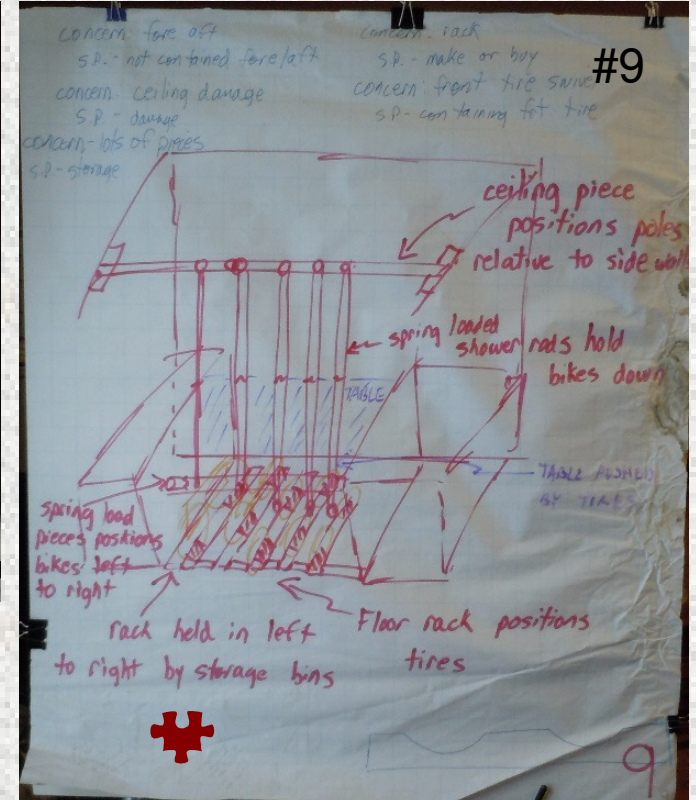
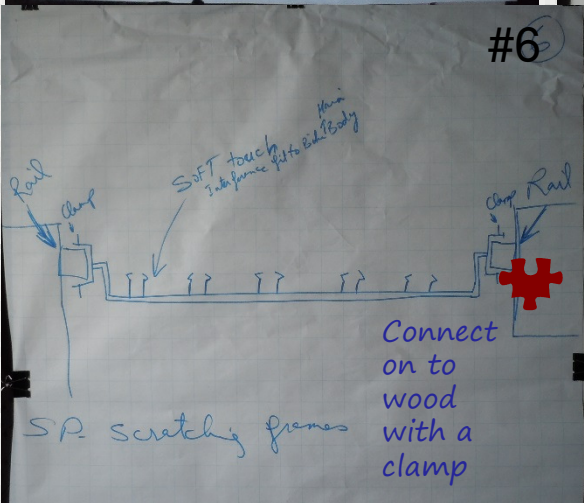
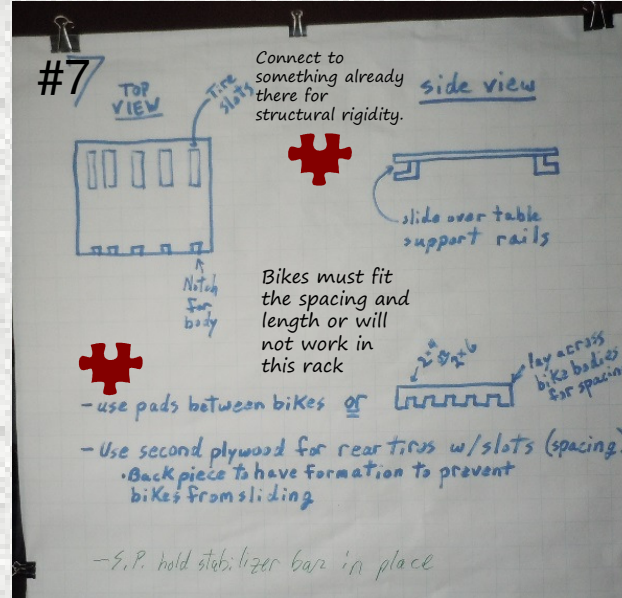
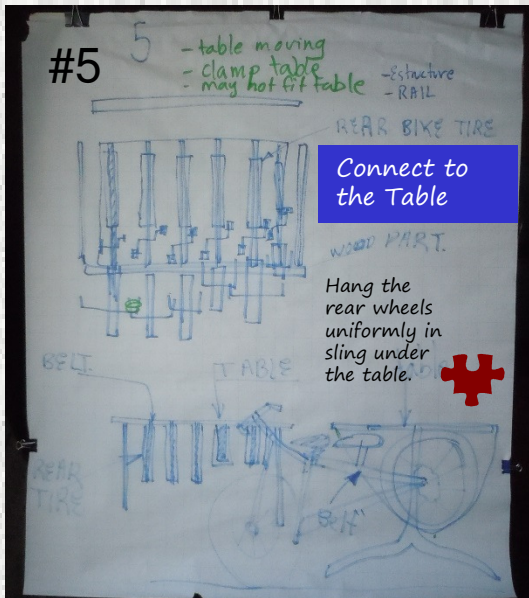
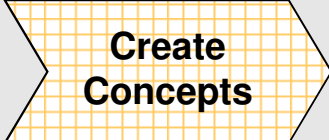



Create Concepts: Individually First

Create Concepts



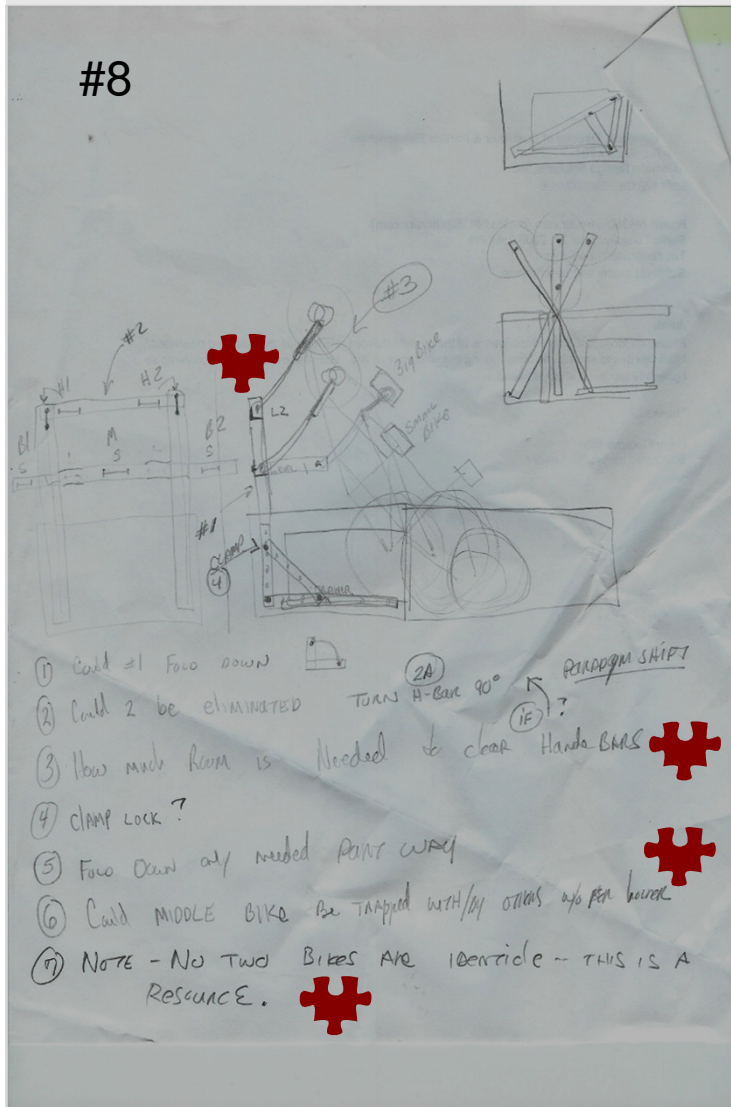
Create Concepts: Combining



 = = A notable idea the team recognized as something to hold on to in idea inventory.

Creating Clarity Through Dialogue

Create Concepts



Exploration into hinged rack structure to connect to each type of bike height led to realization that bikes are not identical and this is a problem that might be a useful resource to put to work for us!



Crazy concepts spurred lots of ideas to be captured:

1. Fork can be rotated any angle, can this be leveraged?
2. Can we use "C" Clamps to lock the system to the camper?
3. Can one bike be trapped in with the rest of the bikes?
4. Can we stow the long rail somehow in the drawer space?



Refine / Combine Usable Ideas into New Concepts



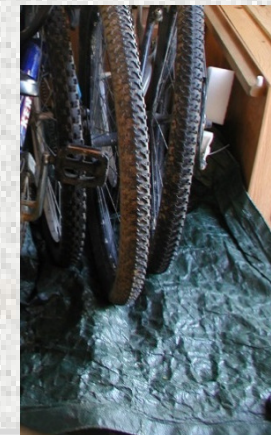
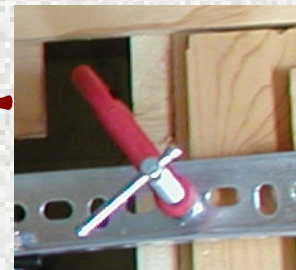
- Use force clamps to connect to the bike.
- + if wheel is removed it will be lighter to lift.
- If wheel is removed it will have to be secured also!



- Use a steel rail to connect the fork clamps.
- steel could scratch camper when moving around.
- +steel would require less support structure and mount easily.



- Connect the rail to camper with C clamps with no other fasteners.
- +clamps need no wrenches, no holes.



- Use mats, carpets, tarps to protect the floors.
- +no special mats to be created for this!



Refine / Combine Usable Ideas into New Concepts



Use foam / towels / pool noodles and pads to separate bikes from banging.



Store steel rail in available space drawer when bike are gone.



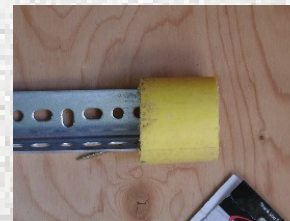
Bungee bikes together to form rigid structure



Connect smaller bike force with custom mount.



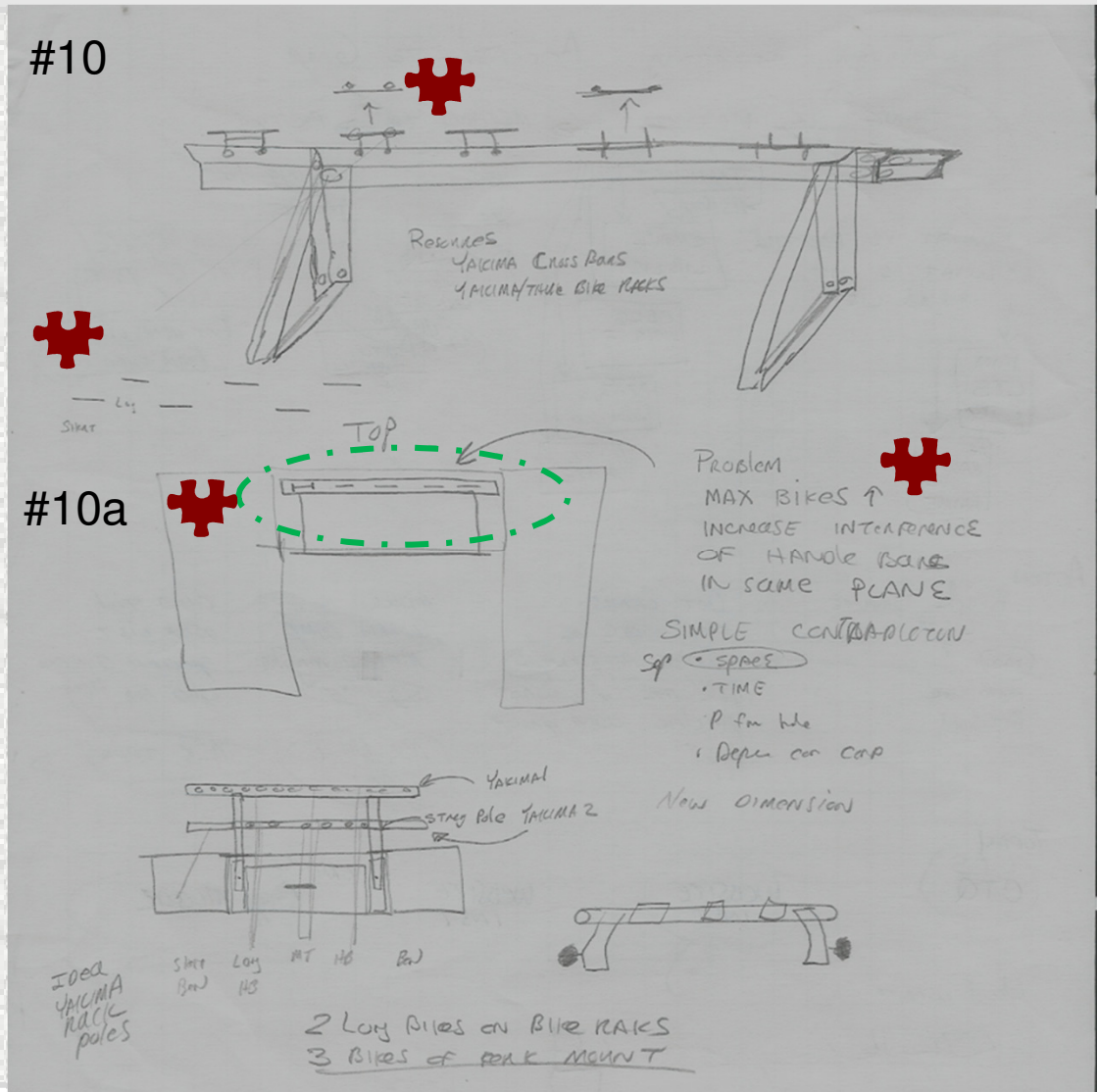
Protect sharp ends of steel with soft cap.



Working Through Specific Problems with Dialogue



1. Can we nest the bikes close enough on one rail to make them take up less space?
2. Can we take advantage of the fact that the bikes are not identical to next them closer?
3. Can we put the fork clamps in a variety of places on the rail to help stagger the bike handle bars and pedals?
4. Can we eliminate the braces and keep the rail?

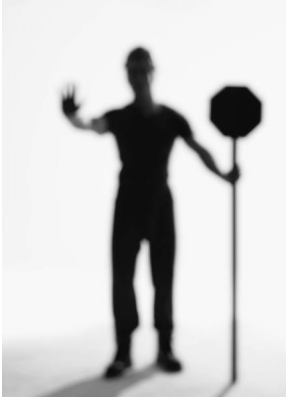


Bike Stowing Concept Development




The Red X® Company

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Normally, we'd create multiple 'Concepts'

We'll follow one concept through
as being selected and prototyped
to show a result for this webinar



Select &
Try-out

Combination of Ideas That is Required

Select &
Try-out

What must *be created in the solution*?

- ⚙️ A method to connect a bike an intermediate structure.
- ⚙️ A way to connect intermediate structure to camper structure.
- ⚙️ A method to prevent the floor / walls / doorway from being damaged.
- ⚙️ All interior evidence of the system must disappear when bikes unloaded.
- ⚙️ Strength of the mechanical connections >> higher than energy applied to bikes.
- ⚙️ A method to prevent the bikes from damaging each other.
- ⚙️ Strength of users required is << Strength to lift entire bike overhead.

RESULT = Secure stowage of multiple bikes inside front of camper/

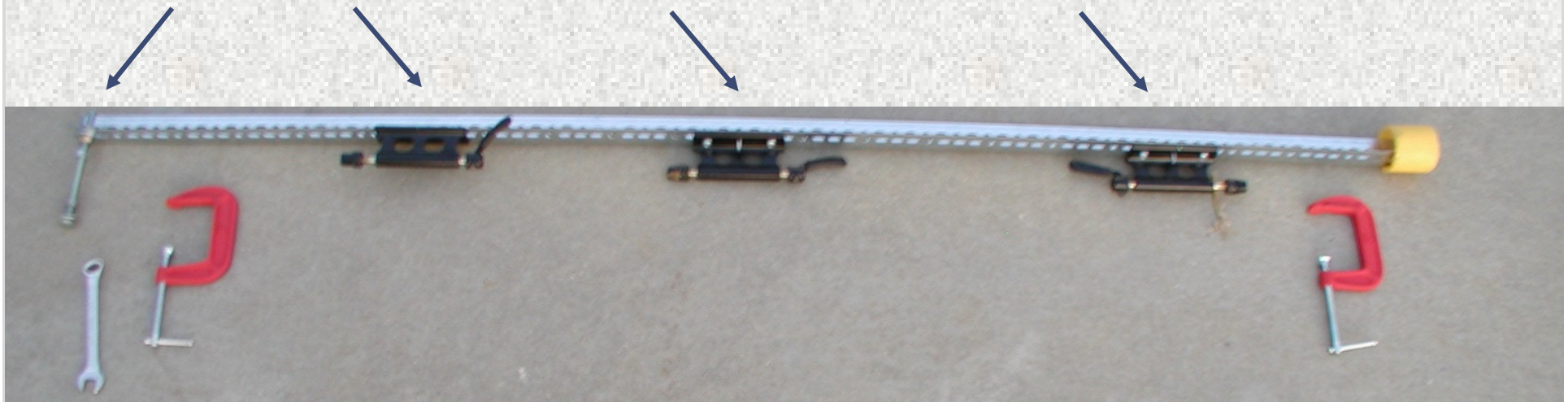
What would be *nice to have but not critical to have*?

- ⚙️ Geometry that can be stowed out of sight nicely when camper parked?
- ⚙️ Something nice looking?
- 😞 It doubles as a bike rack also while at the campsite or at home?

Solution: 1 Prototype Was Built

Select &
Try-out

- 4 bikes would be clamped, the 5th strapped in between the 3 to be staggered a little behind but secure.



- No holes were drilled for this project. Only the end of the rail was cut and bent for the long bolt on the left. The yellow end protector was cut from a scrap plastic pipe stub.
- Bonus Feature: The pink color of the clamps was chosen to be more appealing and easier to find identify later.

Tryout: Fully Installed for Loading

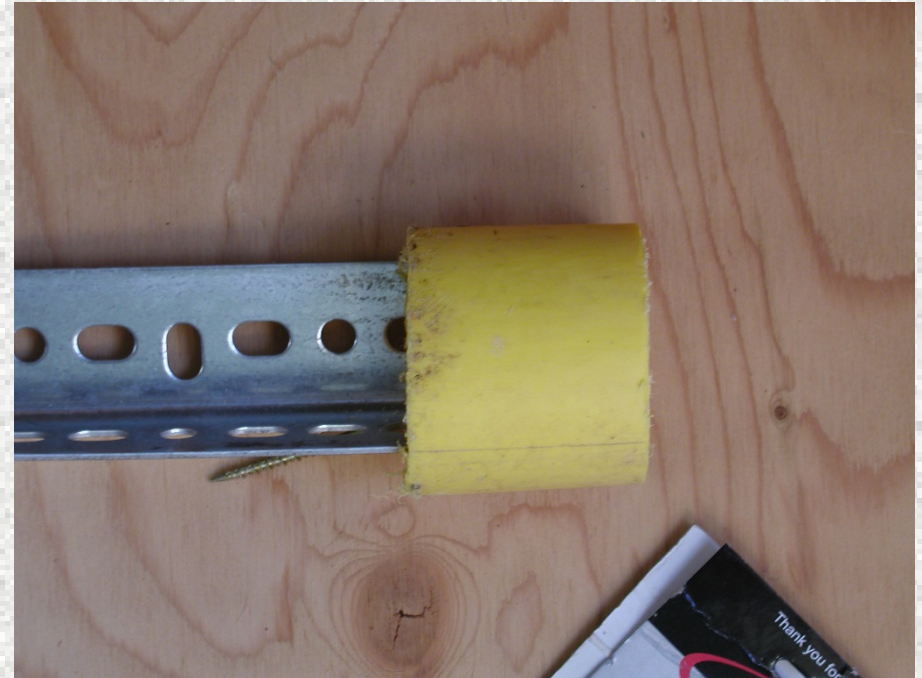
Select &
Try-out



This is the whole thing, installed with two pretty pink C clamps ready to use!
Almost nothing more than a big umbrella in size!

Minimal Damage: No bolts or Screws

Select & Try-out



End protection from sharp metal corners provided by 'found object'.

Micro Innovation: Object will not naturally fit on end but with deformation will fit and stay in place with no fasteners! Free fastening. Ideal!



Clamping Method Top / Side View

Select &
Try-out



Note: Handlebars staggered to miss each other allowing bikes to nest.

It's because we noted the bikes are non-uniform.

Final Implementation 1st Try a Winner

Select & Try-out



Door Access

“It was very satisfying to build it and have very few surprises and even those were minor and easy to handle.”



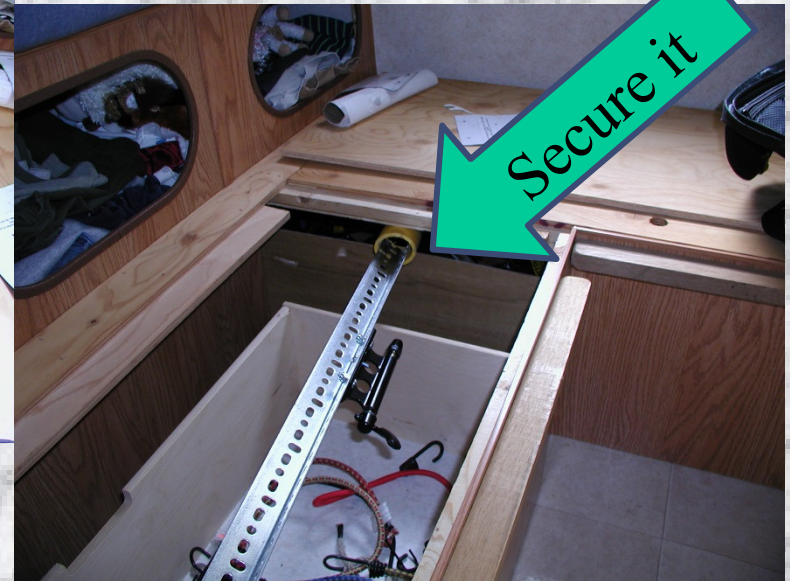
5th Bike

Storage: Hide it in Cavity Discovered

Select & Try-out



The bike rack can be stowed in space totally unused for anything out of site, covered by plywood sheet and cushions as before.



Understand: Conflicts

Four Early Identified Conflicts



Bikes transported inside camper.

Damage to camper, bikes and people from weak mounting.

Tactic #1 Minimize or eliminate bikes coming in contact with camper.

With front wheel off it is easier to control.

But we have to secure the wheels now too.



Bikes transported inside camper.

Free access to inside for food and rest stop use.

Tactic #2: Designate available and unavailable floor space inside.

Got specific on space and found room to make it work.



Damage to camper, bikes and people from weak mounting.

Additional towing load weight or drag.

Tactic #3: Utilize as much strength in existing structure as possible,

Connecting to existing hidden hardwood structure.



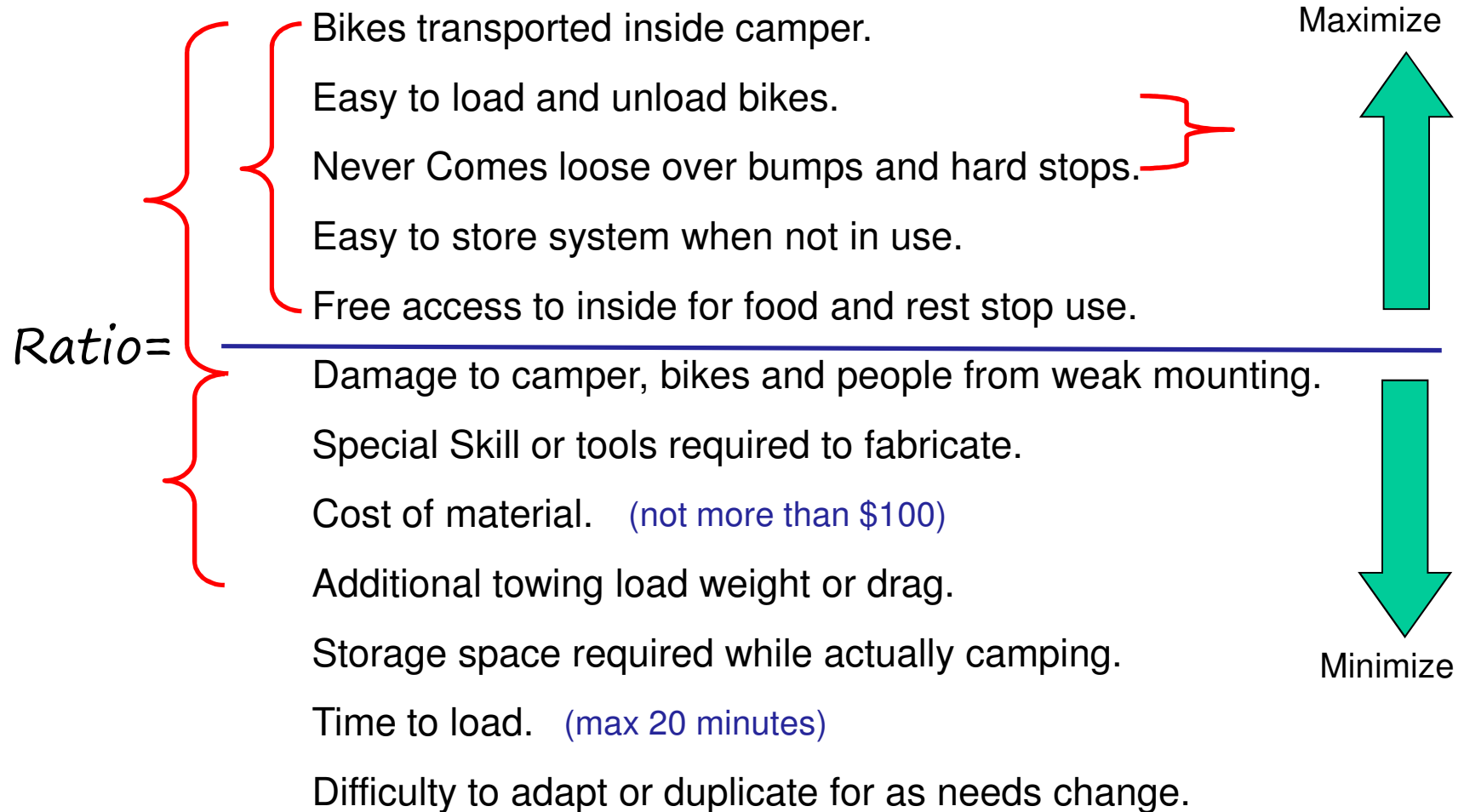
Easy to load and unload bikes.

Bikes stay stowed over bumps and hard stops.

Tactic #4: Utilize existing bike fork clamps that are easy to engage but have high holding force when engaged.

Minimal tools, utilizes standard fork mount technology.

Where did those conflicts go?



What are Innovations?

- Often a *new* combination of technical and organizational resources that increases the value / cost ratio.

We can leverage our teams that have so much knowledge and experience. .

. . .to come up with clever new solutions to complex challenges!



Homework for You Where You Work:

- Identify a situation where new concepts are needed.
- Answer the questions shown on the next slide.
- Give me feedback on your experience and questions.

Post Webinar Challenge Homework:

Define &
Understand

- What is the challenge you are facing?
- What are the all functional requirements and constraints?
- What needs to be clarified to help you think clearly on this problem?
- What would you want to have more of and less of?
- What resources are available and unavailable in the situation?
- What would be ideal if you could have exactly what you want?
- What are the conflicts that exist in the situation you see from the start?
- What are some tactics you could use to get around those conflicts?

**SCREEN DUMP
THIS PAGE NOW
AND PRINT IT.**

Measurement Concept Challenges

Examples

- Measure static voltage on plastic parts with very high repeatability quickly out on the plant floor.
- Determine the air flow setting of a pick and place arm without an air flow meter.
- View the dynamics of a car steering system linkages while it is on a high crown road.
- Measure the vibrating frequency of the headlight filament of a car going down the road without touching it.
- Determine the precise angle of a projection mirror in mounting frame without turning on the projector or touching the mirror.

Design Concept Challenges

Examples

- Have outdoor washing sinks in freezing environment not freeze at the trap.
- Bend many layers of uncured carbon fiber sheets w/o forming ripples.
- Reduce the thickness of a cured chemical layer without giving up mass.
- Mount racks on a roof with no fasteners and to prevent leak paths.
- Tool up 1 standard high volume cover that fits over many different sized holes.
- Temporarily hold a harness in place during assembly without throw away material.

Summary:

- Structuring Concept Development is useful in some situations.
- Absorb Requirements, Constraints and Resources early.
- Leveraging the diversity of individuals.
- Facilitator must know how to manage progress through steps.
- Document ideas and concepts to leverage later.



**Presenter: Harry B. Flotemersch,
Sr. Consultant, Shainin LLC**

Email: Harry@Shainin.com

More to Study on This Topic:

Free Online Video: TED talk on collaboration and individual thought:

http://www.ted.com/talks/susan_cain_the_power_of_introverts

Articles:

The Importance of Concepts in Creativity and Improvement by Lloyd P. Provost and Gerald J. Langley

Quality Progress Magazine, March 1998, P31

Creativity and Improvement: A Vital Link by Lloyd P. Provost and R. M. Sproul

Quality Progress magazine, August 1996, P101

Books:

And Suddenly the Inventor Appeared: TRIZ, the Theory of Inventive Problem Solving by Genrich Altshuller.

May 1996 ISBN-10: 0964074028 2nd Edition (my first read, a great first exposure this topic)

Question and Answer Period of Webinar



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Website: Shainin.com**



Next Webinar: ASQ Automotive Division Webinar

Chi Square Test of Proportions for Confirmation Testing



ASQ Automotive Division Webinar

ASQ Automotive Division Webinar Chi Square Test of Proportions for Confirmation Testing

Date: May 7 2014, 7:00-8:30PM EDT

Topic: February 11, 2011 Dick Shainin presented an ASQ Automotive Webinar on B vs C Confirmation Testing. B vs C confirmation testing leverages variable data and small sample sizes to provide a quick simple non parametric test with minimal Alpha Risk. This webinar will cover applying Chi Square Test of Proportions as a quick simple non parametric test when binary data is involved.

The audience will see the some practical applications of the Chi Square Test of Proportions for confirming root cause in a problem solving investigation.

At the end, the Webinar participants will be invited to try execute a Chi Square Test of Proportions using an Excel template.

Presenter: Craig Hysong, Sr. Executive Vice President, Shainin LLC.



Introduction of Speaker



Craig has held a wide range of senior positions within the automotive industry. His management experience includes manufacturing engineering, new product launch, and cost improvement. In 1998, he joined Shainin as a consultant and later became a consulting manager and principal for Shainin. As Executive Vice President of the company, he continues to work with clients to improve the delivery of technology and the development of standardized work practices. Craig is currently responsible for sales and business development. Prior to joining Shainin, he worked at General Motors and ITT Automotive. Craig earned a bachelor of science in electrical engineering from the Pennsylvania State University and a master of science in manufacturing systems engineering from Lehigh, which he attended as a General Motors Fellow. He is a licensed professional engineer and an American Society for Quality certified Quality Engineer, Reliability Engineer, Quality Auditor, and Quality Manager.

Presenter: Craig Hysong,

Executive Vice President, Shainin LLC





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Thank You For Attending

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www.asq-auto.org for future webinar dates
and topics.

