

# Meetings Summary

Fabio Cruz Sanchez \*

Document version: Tuesday 31<sup>st</sup> October, 2017, 15:52

**Date:** October 02, 2017

**Reunion #:** 1

**Place:** LF2L

**People:**

- Fabio Cruz (LF2L)
- Gregory Dupont (LF2L)
- Alaa Hassan (ENSGSI)
- Alexandre Brugnoni (NYBI)
- Benjamin Ennesser (NYBI)

## 1 Goal of the meeting

1. To list the potential problems related to the materials consumption at LF2L
2. Proposition of actions in order to establish a strategy for LF2L.
- 3.

## 2 Discussion/ Comments / Questions

### 2.1 Potential technical issues at LF2L

Some of the main issues at LF2L are presented in the figure 1a:

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(a) Some of the spaces to store the material are not good used enough.



(c) Some of the spaces of the 3D printer's furniture are not used. There is no clear rule about what this space is intended for.



(e) No placement for the materials related to the extrusion process. Optimization of the space could be made.



(b) This space is not used at all inside of LF2L. This furniture could have another different use than to stock some printed/laser-cut pieces



(d) There is no clear localization of the tools inside the toolbox



(f) The wastes of the laser-cut/3D printing process are not well organized.

One of the main issues found is related to the lack of a real strategy for the use of the space inside LF2L. There are certain spaces well defined (laser machine, stock for wood, tables for manual working). However, five different spaces need to be defined inside the fablab space in order to improve the affordability of the space. They are:

- Electronic workshop.
- Mechanical workshop.
- Stock for raw materials for users
- Stock for raw materials for administration
- Gallery for Finished Projects
- Space for projects in development phase.

Somme additonal explanations can be summarized as follows:

1. There is no a specific place for **Electronical** and **Mechanical** workshop. As consequence of this, the mechanical tools and electronical elements are dispersed over the whole space, where it is impossible to identify the tools/materials easily.

2. There is no a specific place for:

- **Projects in development phase:** Many interesting projects could be finished at LF2L because there is no. If we can assure (at least) a certain quantity of projects, it could improve the evolution of the project and reducing at the same time the time of development.
- **Gallery of the finished projects:** The goal of this space is to have an specific space to present the finished projects inside LF2L. The main interest of this space is to have a physical traceability of the projects developed. Also, its is interesting to present the *diversity* of the projects that LF2L could be made. (if the privacy policy of the project enables to do it).

3. Different rules concerning the wastes (MDF and Plastic) need to be implemented in order to reduce as much as possible the quantity of the wastes. Moreover, different strategies have been pointed out such as:

- The contour of each project in the laser-cut must be systematically rectilinear with the purpose to obtain a "waste" more suitable for a second use.
- Put the wastes very close to the laser machine in order to be the firs option as material feedstock.
- Communication efforts about the "good practices" in laser machine.
- Use systematically the wastes for "goodies" of large, medium and small

4. We have a problem concerning the safety issues of the laser machine. More specifically the potency of the extractors of the laser machines which are not able to retain the smoke generated in the laser process. According to Alexandre, the extractors a undersized. Somme options to explore:

- Use more friendly materials such as **Isorel**, **Carton Wood** and **Contreplaqué**

5. Definition of "**Standard Materials**" used at the LF2L. These standard materials can be screws, motors, electronica composants, etc... A exhaustive list needs to be made.

## 2.2 Maintenance issues at LF2L

Technical issues of the machines were found. Figure 2 presents the total of 3D printers available at LF2L: A total of 7 machines are available at LF2L, discriminating by type

Table 1: Status of the 3D printers machines

3D Printer	Type	Status
1. Alto	Alto	OK
2. Uranus	Mondrian	Not Working
3. Jupiter	Mondrian	Working but not good enough
4. Mars	Mondrian	Not Working
5. Mercure	Mondrian	OK
6. Saturno	Alto	Not Working
7. Double Extrusion	Double Extrusion	OK

As we can see from table 1, only 3 of the 7 machines eventually available to use. Also, the **Mondrian** machines are mostly in a status of "Not working". One of the main reasons for that is that Mondrian machine have deep design problems in terms of electronic and mechanical elements.

Two mains needs were identified in terms of 3D printing

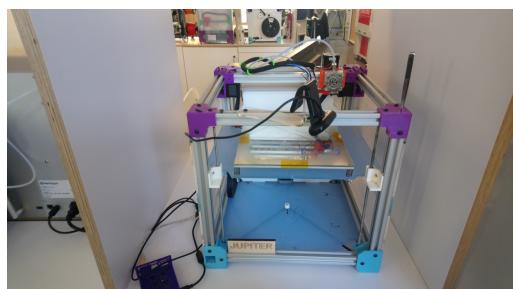
**Reliability** : In order to assure the good development of ENSGSI course/projects, the 3D printers



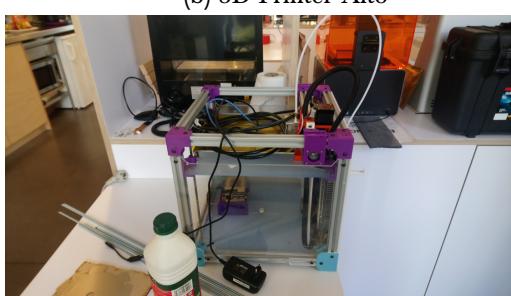
(a) 3D printers at LF2L



(b) 3D Printer Alto



(c) 3D printer Jupiter



(d) 3D printer Uranus

Figure 2: Total of 3D printers machines at LF2L

needs to be easy to use for an student/amateurs. Moreover, these 3D printer needs to be portable for the case of presentation at the Nomalab or in showrooms.

**Customization** From the research side, it is also necessary to have 3D printers guarantee a good reproducibility and printing process, but at the same time, it is necessary to have an open systems in order to study the influence of the parameters for the different materials to be used in the differents research projects of ERPI (Green FabLab, Ecole de chirurgie, etc....).

Summarizing the different issues related to the operational of LF2L, we have:

1. Definition of the operational strategy for LF2L. This action includes:

- Definition of the functional spaces inside LF2L for each stakeholder (NYBI, GSI-Lab, ENS-GSI).
- Proposition of possible options for adequate the functional spaces (considering furniture, cost, human resources.)

2. Resolution of the technical issues: this action includes:

- Reparation/Purchase of the 3D printers in order to guarantee the correct operation.
- Proposition of a charter of use for 3D printings.

3. Definition of a supply strategy.

- Definition of a standard of mechanical/electronic components to buy in function of users needs.
- Definition of the agreement between NYBI-LF2L with respect to the material stock.

### 3 Proposed actions

In short term, different proposed actions have been in order to resolve the whole issue. They are:

1. **LF2L CAD model (Version 2017):** There is a CAD model of the LF2L from 2015. One of the first proposition is to update this CAD model to 2017. Different changes have to be made including the addition of the extrusion/recycling process, additional laser-cut machine, etc. This virtual model will help as a prototype for the propositions of the different options for the functional spaces. The proposition can be made by NYBI members, GSL-Lab,etc... in order to take a final decision.
2. Inventory of the machines/tools in order to know the available tools today.

Concerning the resolution of the technical issues, two main proposition were made in order to give solution to the printing process:

1. Suitable options of Printers for ENSGSI students/Amateurs users are :

- **Dagoma NEVA**
- **Prusa i3 MK3 kit**

The main reasons for the selection of these 3D printers are the ease of use, the reliability of the printing process, and also the speed of printing (they can be configured to use a 0.8mm nozzle)

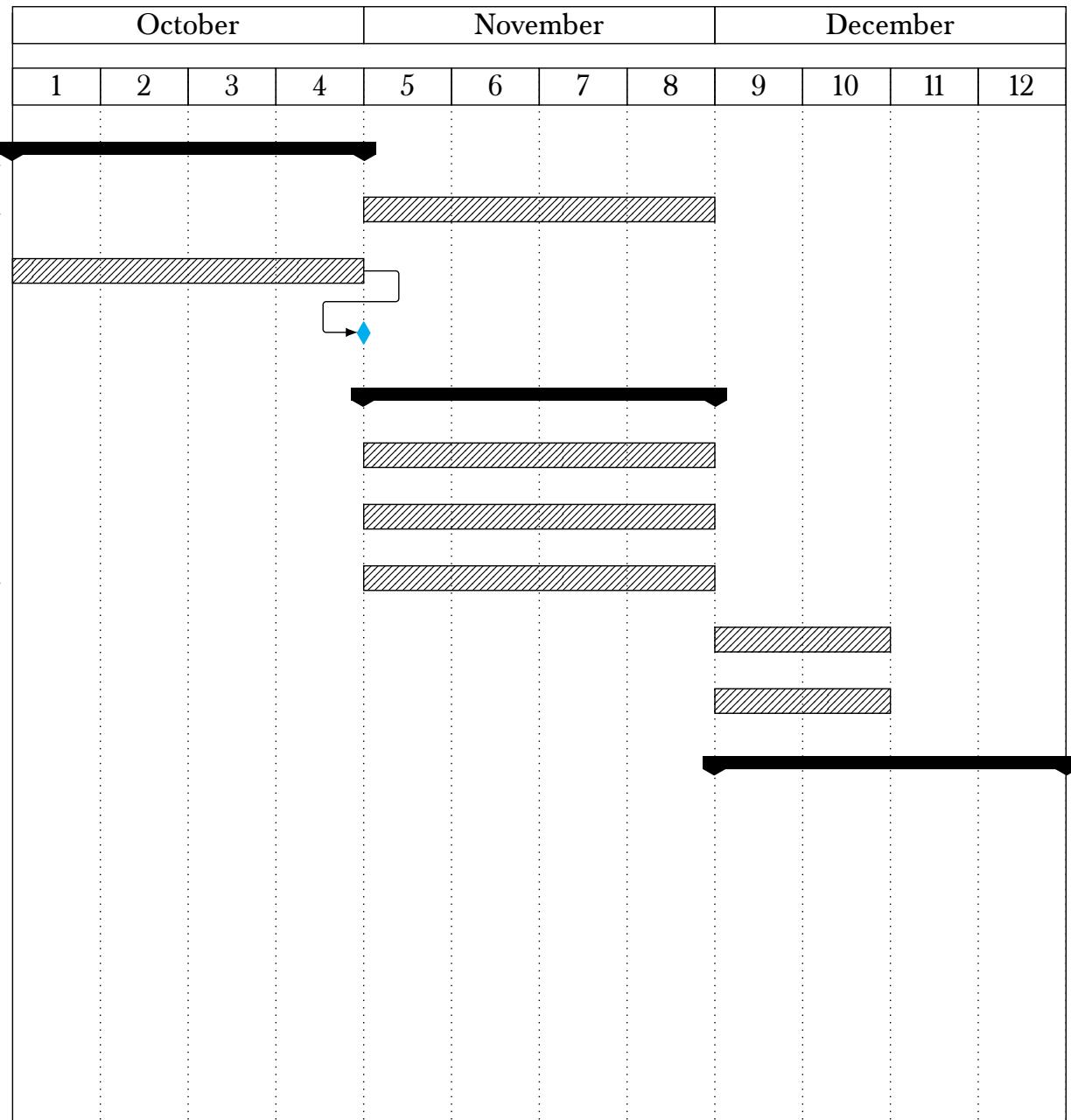
2. Concerning the Mondrian machines that are not working (Jupiter, Uranus, Mars), the goal is to obtain at least one 3D printer with a good performance using the possible parts of the three 3D printers. The human resource for this is the Nybi member (including Gregory) and the LF2L commits to assures the missing components.

3. Concerning the Saturno 3D Printer, a long term project that was discussed is the use of this 3D printer for **4D Printing purposes** (Printing + Memory shape). This 3D printer is not usable because there is electronic problem (power) and design considerations that need to be resolved. however, the dimensions and the material already installed could be useful for exploring the concept of dynamic printing objects.

### 3.1 Possible Planning October -December 2017

A planning (version beta) is proposed as illustrated in the next page:





## 4 Things to do for next meeting

1. To have a LF2L CAD version 2017.
2. Complete the inventory of the material at LF2L.

## 5 Date of the Next Meeting

**to confirm**



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## 6 Annexes

### 6.1 Space LF2L

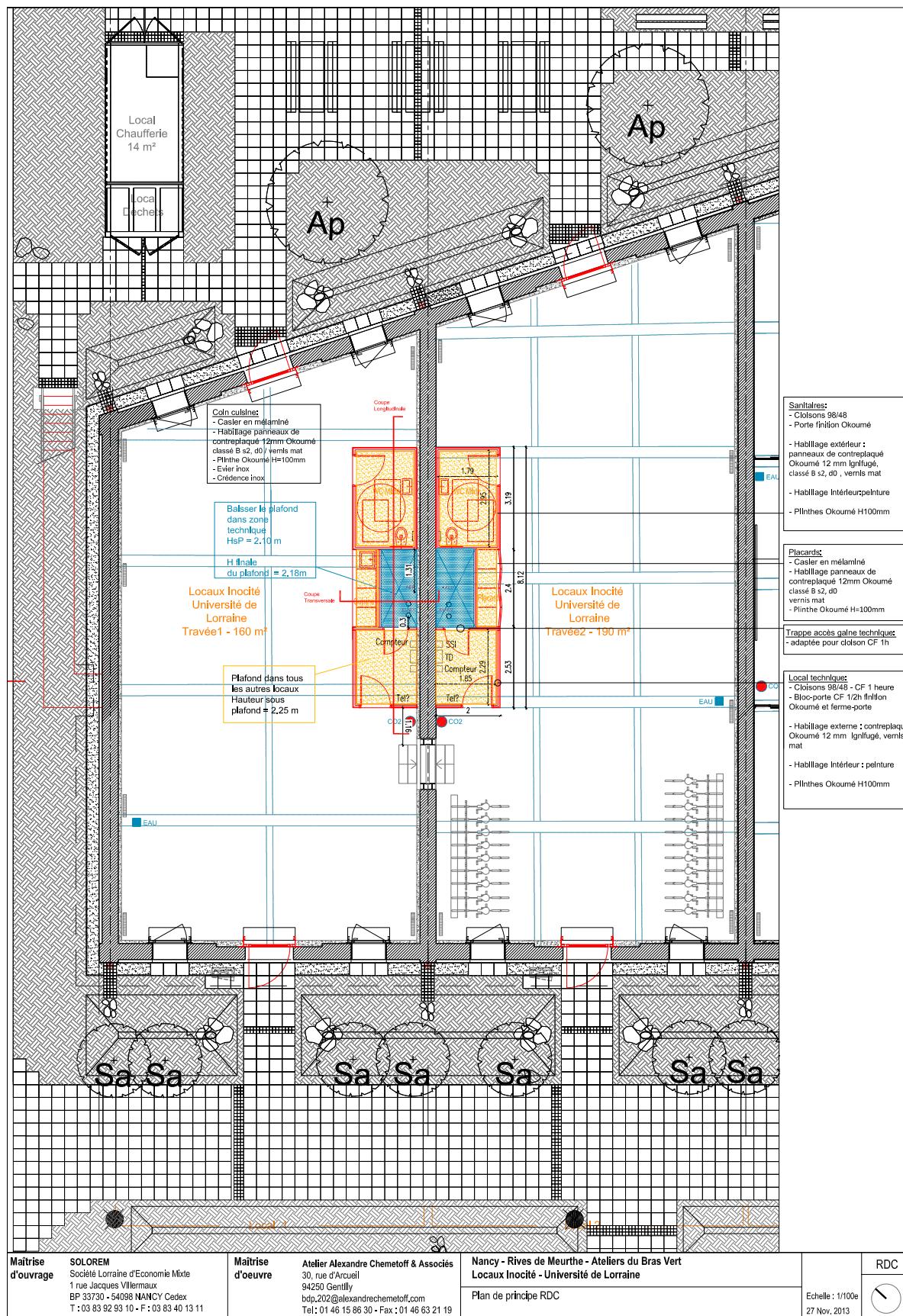


Figure 3: Technical drawing of the LF2L

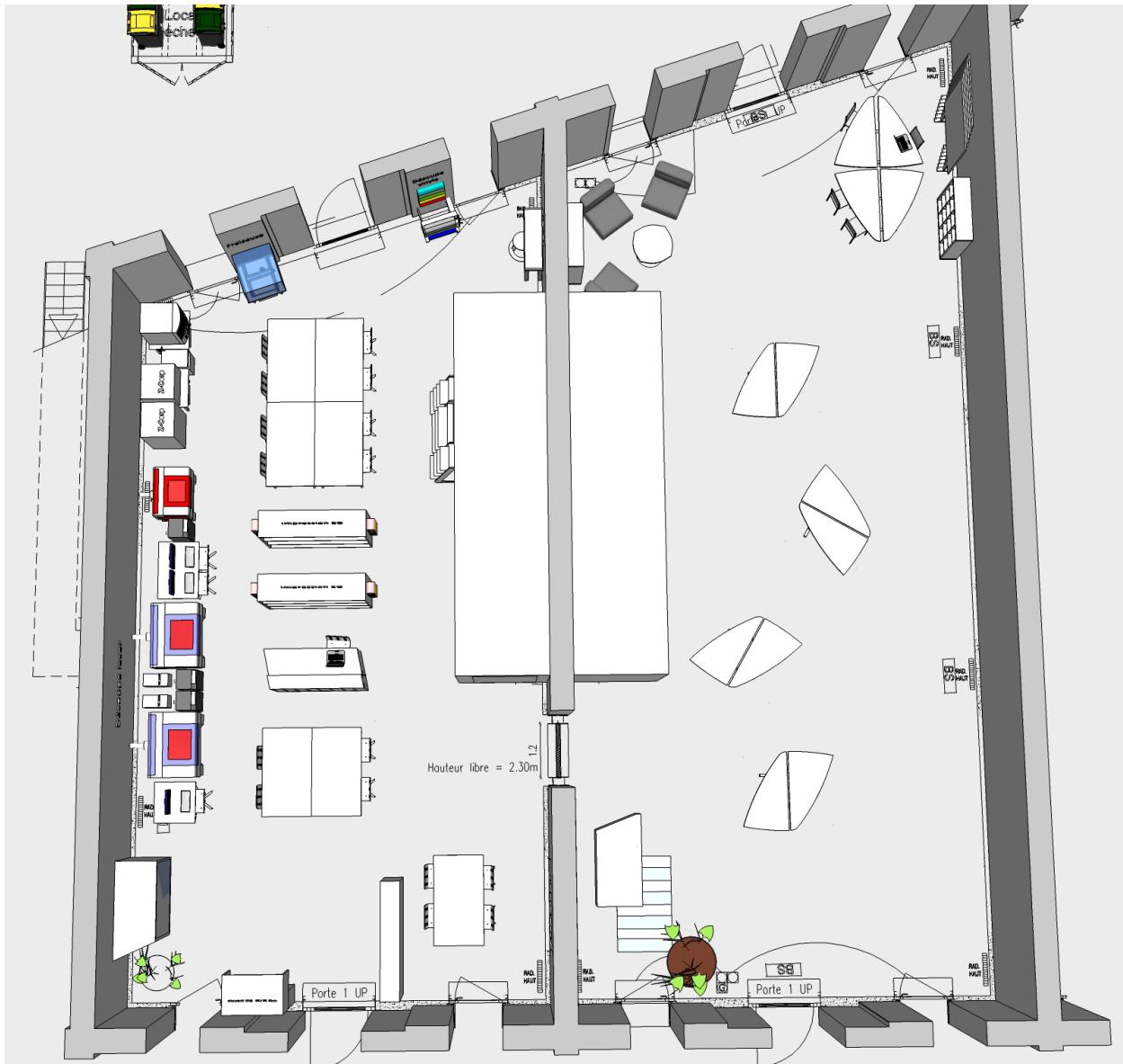


Figure 4: Technical drawing of the LF2L

## 6.2 Machines at LF2L

Table 2: The core set of the machines/tools at LF2L

Machine	Status of the Machine	Elements to buy	B	C	D	F	Tutorial to use?	Last revision
							X	
	Titan						X	
	XXX						X	
	XXX						X	



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